ICP DAS

PMC-523x/PMC-224x/PMD

(Power Meter Concentrator) Series

User Manual

[Version 4.0.1]



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1 System Introduction

The PMC-523x/PMC-224x(Power Meter Concentrator)/PMD(Power Meter Concentrator with Display) is an intelligent Power Meter Concentrator developed by ICP DAS. It features various functions such as: power data management, logic control, data logger and alarm notification functions. By using PMC/PMD solution; it is no longer required to write programming for power management system. It takes only a few clicks on the specific Web HMI Interface provided by PMC/PMD to complete power management and logic control settings for monitoring the power meters connected to the system. This easy-to-use solution will dramatically reduce the labor and cost spent on power monitoring and management system.

PMC-523x/PMC-224x /PMD series products are including following models:

Product Series		PMC-523x		PMC-224x	
Hardware	Dimension	117 mm x 126 mm x 58 mm		33 mm x 160 mm x 129 mm	
	Number of LAN Port	LAN port x 1		LAN port x **2**	
	LCD	-		-	
Detail Model Name		**PMC-5231 Series**	**PMC-5236 Series**	**PMC-2241M**	
Support Ethernet：		PMC-5231(M)	PMC-5236(M)	PMC-2241M	PMC-2246M
Support Ethernet / 3G： WCDMA 850/900/1800/1900 MHz		PMC-5231M-3GWA		-	
Support Ethernet / 4G： FDD LTE: B1/B3/B5/B7/B8/B20 MHz		PMC-5231M-4GE	PMC-5236M-4GE		
Support Ethernet / 4G： FDD LTE: B1/B3/B8 MHz TDD LTE: B38/B39/B40/B41 MHz		PMC-5231M-4GC	PMC-5236M-4GC		

Product Series		PMD-220x	PMD-420x
Hardware	Dimension	213mm x 148mm x 44mm	291mm x 229mm x 54mm
	Number of LAN Port	LAN port x 1	LAN port x 1
	LCD	**7" (16:9)**	**10.4" (4:3)**
Support Ethernet：		Yes	Yes

PMC-523x/PMC-224x/PMD allows connections to ICP DAS power meters via RS-485 or Ethernet interface to read the power data of the devices measured by the power meters; and then real-time record the power data in the data file. PMC-523x/PMC-224x/PMD also provides data logger file auto send-back function;

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together with PMC Data Server software or SCADA software, it allows collection and analysis of the power data.

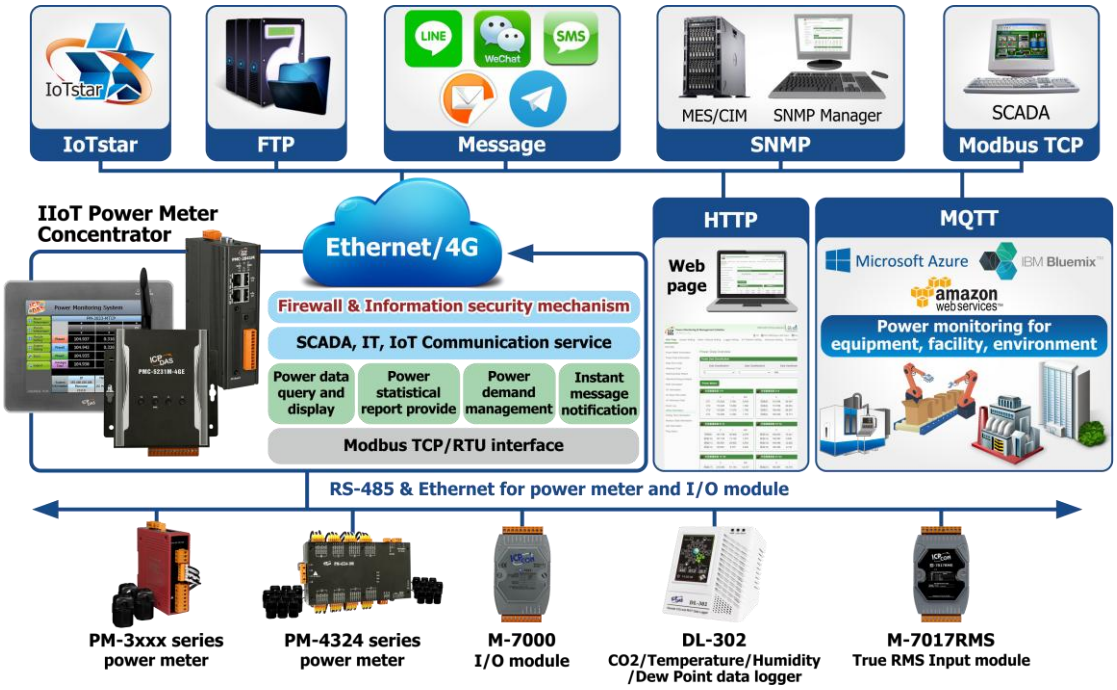


Figure1-1 : System Architecture

With the built-in Web Server, it allows connection to PMC-523x/PMC-224x/PMD for power meter parameters and system settings via browser and allows viewing the real time or historical power data of the power meters. In addition to power data monitoring function, the PMC-523x/PMC-224x/PMD also could connect to ICP DAS XV-Board , M-7000/DL/IR modules and standard Modbus RTU/TCP Slave modules. By working with the I/O modules, and functions such as IF-THEN-ELSE logic rule execution and Alarm Notification, PMC-523x/PMC-224x/ PMD offers more thought-out power demand management and alarm notification functions, and is able to perform load shedding of the devices if required, and enables real-time monitoring and control of the power consumption of the devices. At the same time, with the Data Logger function on microSD card, the PMC-523x/PMC-224x/PMD could real-time record the power data and I/O channel data, and automatically sends back the data file to management center for further statistics and analysis; PMC-523x/PMC-224x/PMD also offers Modbus TCP/RTU Slave function that allows SCADA software or HMI devices to connect to PMC-523x/PMC-224x/PMD to get real-time power data of the devices via Modbus TCP/RTU protocol. In addition, they also support the MQTT protocol to connect with the MQTT broker for the message publishing and subscribing mechanism, and the connection with the IoT service which Microsoft Azure and IBM Bluemix provide. The flexible integration ability with the

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SCADA/IoT/IT system make PMC-523x/PMC-224x/PMD a perfect concentrator of power meter in the Energy monitoring and management application of Industry 4.0 age.

When using PMC-523x/PMC-224x/PMD to build a power management and monitoring system, during the whole process of system development, no programming is required; it takes a few clicks on web page to complete all settings; it is easy for the user to quickly view the power data of the devices and furthermore process the data for statistics and analysis. The PMC-523x/PMC-224x/PMD is an easy-to-use and easy-to-build total solution for power management and monitoring that makes more efficient energy usage.

PMC/PMD features:

- Web-Based Operation
  - ◆ No extra software tool is required; all operations can be done through the Web browsers to build a power monitoring & management solution.
  - ◆ Built-in Web Server allows to set up the parameters of the power meters and view power data via browsers.
- Power Data Display
  - ◆ Support ICP DAS Modbus TCP/RTU power meters.
  - ◆ Display real-time or historical power data (in data table or chart form).
  - ◆ Provides Daily and Monthly power data report.
- Power Data Log
  - ◆ Provides real-time power data log of the power meters (in csv format).
  - ◆ Automatically send back power data files at scheduled time via FTP.
  - ◆ Allow to recover Data Log files when the network is resumed after temporary network disconnection.
  - ◆ Together with PMC Data Server software, it allows to import the content of the power data files into the Database system.
- Power Demand Management and Alarm Notification
  - ◆ With built-in IF-THEN-ELSE logic engine that enables thought-out power demand management functions.
  - ◆ Support ICP DAS XV-Board, M-7000/DL/IR modules and standard Modbus RTU/TCP Slave modules for real-time I/O control and monitoring.
  - ◆ Provides Timer & Schedule function for device operation control.
  - ◆ Provides alarm message notification function.
- Local Display for On-Site operations (PMD only)
  - ◆ PMD is equipped with local side TFT LCD (with Touch Panel). It provides an

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easy way for viewing the power data and setting the system parameters on sites.

- Connection with SCADA/IT/IoT system
  - ◆ Support Modbus TCP/RTU Slave protocol that allows seamless integration with SCADA software.
  - ◆ PMC-523x/PMC-224x/PMD support the MQTT protocol. It can publish the power data of the power meter which connect to PMC-523x/PMC-224x/PMD to the MQTT broker, and receive the message of the Subscribe MQTT Topics which is published by others MQTT device for the using in the IF-THEN-ELSE logic rule.
  - ◆ PMC-523x/PMC-224x/PMD support the connection ability with the IoT Cloud Platform as Microsoft Azure, IBM Bluemix, etc. It work as the power meter concentrator in the IoT application to connect with power meters, collect and transfer the power data to the Cloud platform for future data analysis. PMC-523x/PMC-224x/PMD also can receive the message which is published from the Cloud platform for the corresponding actions at the field side.
  - ◆ PMC-523x/PMC-224x/PMD support the connection ability with ICP DAS IoTstar. It enables the remote management and firmware update on the PMC-523x/PMC-224x/PMD controller via user-friendly and intuitive Web page interface, and receive the power data and I/O channel data of the Sensors and Power meters from the remote PMC-523x/PMC-224x/PMD controllers and import them into the Database.
- Others
  - ◆ PMC-5231M-4GE/4GC, PMC-5231M-3GWA supports 4G/3G Wireless data communication. With the 4G/3G SIM card, it can send the data logger files and Email alarm message back to the control center by 4G/3G Wireless Network.
  - ◆ PMC-5231M-4GE/PMC-5231M-4GC/PMC-5231M-3GWA /PMD equips SMS command receiving and alarm message notification function. It allows to include SMS alarm sending action into logic rules to send a pre-set SMS message to related personnel when an event occurs. In addition, these power meter concentrators also allows to receive the SMS commands sending by specific phones numbers to perform tasks such as real-time channel monitoring, channel data modification and logic rules execution (triggered by SMS), etc. (for SMS message operation, PMD must connect with GTM-203M-3GWA).
  - ◆ Provide the Internal Register with Math function. The Internal Register can be

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used to hold temporary variables. It also can work with the math operators such as plus"+", minus"-", times"*", divide"/", superscript"^", left parenthesis"(" and right parenthesis")" to complete the editing of formula, then PMC/PMD will calculate the result of the formula, and save the result into the Internal Register for IF-THEN-ELSE rule checking or data logging.

- Offers access management for logic rule settings and encoded function for the content to avoid unauthorized access to the system.

This document is intended to give you a full-range operations of web page to PMC-523x/PMC-224x/PMD. You will be able to learn how to connect to power meters and I/O modules, how to display and log the power data, how to edit logic of the rules and how to download the rules to the PMC-523x/PMC-224x/PMD for conditional execution. In the following document, we use "PMC/PMD" to represent PMC-523x/PMC-224x/PMD series controllers. For the operations of the local display of PMD series, please refer to "PMD user manual for local operations".

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2 Before Installation

Modify PMC/PMD‘s network settings to fit current network environment settings, and the default network settings of PMC/PMD is as follow:

- IP：192.168.255.1
- Subnet mask：255.255.0.0
- Gateway address：192.168.0.1
- DNS Server address：8.8.8.8 (default: Google DNS Server)

Steps

(1) Modify the network settings of the PC or Notebook to be the same network segment as PMC/PMD. For example:
   - IP：192.168.255.10
   - Subnet mask：255.255.0.0
   - Gateway address：192.168.0.1

(2) Connect PMC/PMD **LAN1** to PC by network cable. (PMC/PMD is capable of auto-crossover)

(3) Start the browser and input http://192.168.255.1 in the address bar.

(4) Input default administrator password “Admin” to login into the page.

(5) After login in PMC/PMD web page, go to System Setting Network Setting, modify the network setting to fit current network environment. More detailed setting information please refer to 6.2 Network Setting.

(6) Save the settings and connect PMC/PMD to the network.

Please Note:

1. Before installing PMC/PMD, please finish the hardware installation of the ICP DAS Power meter modules, and make sure all wiring connections are accurate.
2. If there are the M-7000/DL/IR modules or Modbus TCP/RTU Slave modules which will connect with PMC/PMD, please also finish the hardware installation of the M-7000/DL/IR modules or Modbus TCP/RTU Slave modules, and make sure all wiring connections are accurate.
3. One PMC/PMD allows connections to at most 24 ICP DAS Modbus power meters (including Modbus RTU and Modbus TCP power meters.).
4. One PMC/PMD allows connections to at most 8 Modbus TCP/RTU Slave I/O modules.
5. A single I/O interface allows connections to at most 16 devices (Power meters and I/O modules).

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3 System Login

When connect to PMC/PMD webpage server via Web browser (IE 8 / Firefox 3.6 / Chrome 14.0.8 version or above are recommended), in order to get a better operation experience, 1280x1024 resolution is recommended. The Login page of PMC/PMD is shown as below:

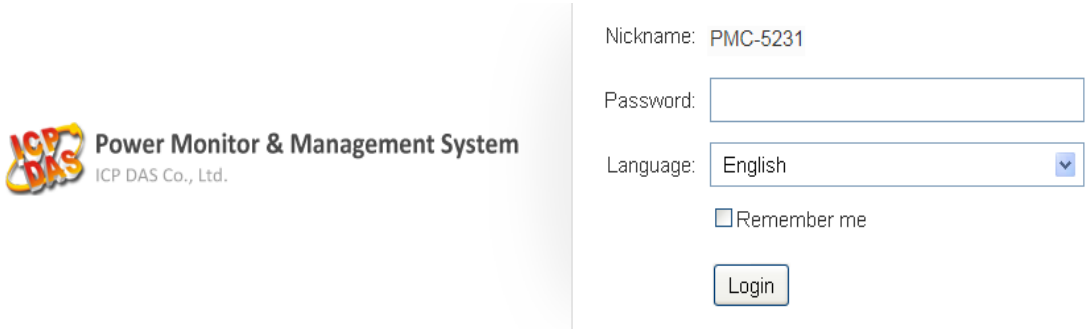


Figure3-1 : PMC/PMD Login page

By inputting different passwords, two levels of authority are granted as follow:

- **Administrator (Default password: Admin)**
  Login as an administrator allows performing settings and reviewing of system information, power meter information and I/O modules information, it also allows performing Logic rule edition. Only one administrator is allowed to login into the system at the same time.
- **General User (Default password: User)**
  General users are allowed to view power meter data and I/O module information only; they are not allowed to perform any settings. It allows maximum 5 general users to login and get into the system at the same time.

Select your preferred language from the dropdown list in the “Language” field for the Web page user interface (English, Traditional Chinese, Simplified Chinese). After login into the system, if the user want to change the language again, logout and re-select the language on the Login page.

Please note: Before starting the system, please make sure the browser you are using already enable JavaScript support, otherwise the system will not function properly.

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4 System Main Page

After login into the system, PMC/PMD default home page will be displayed, and will automatically read settings of the PMC/PMD to the webpage.

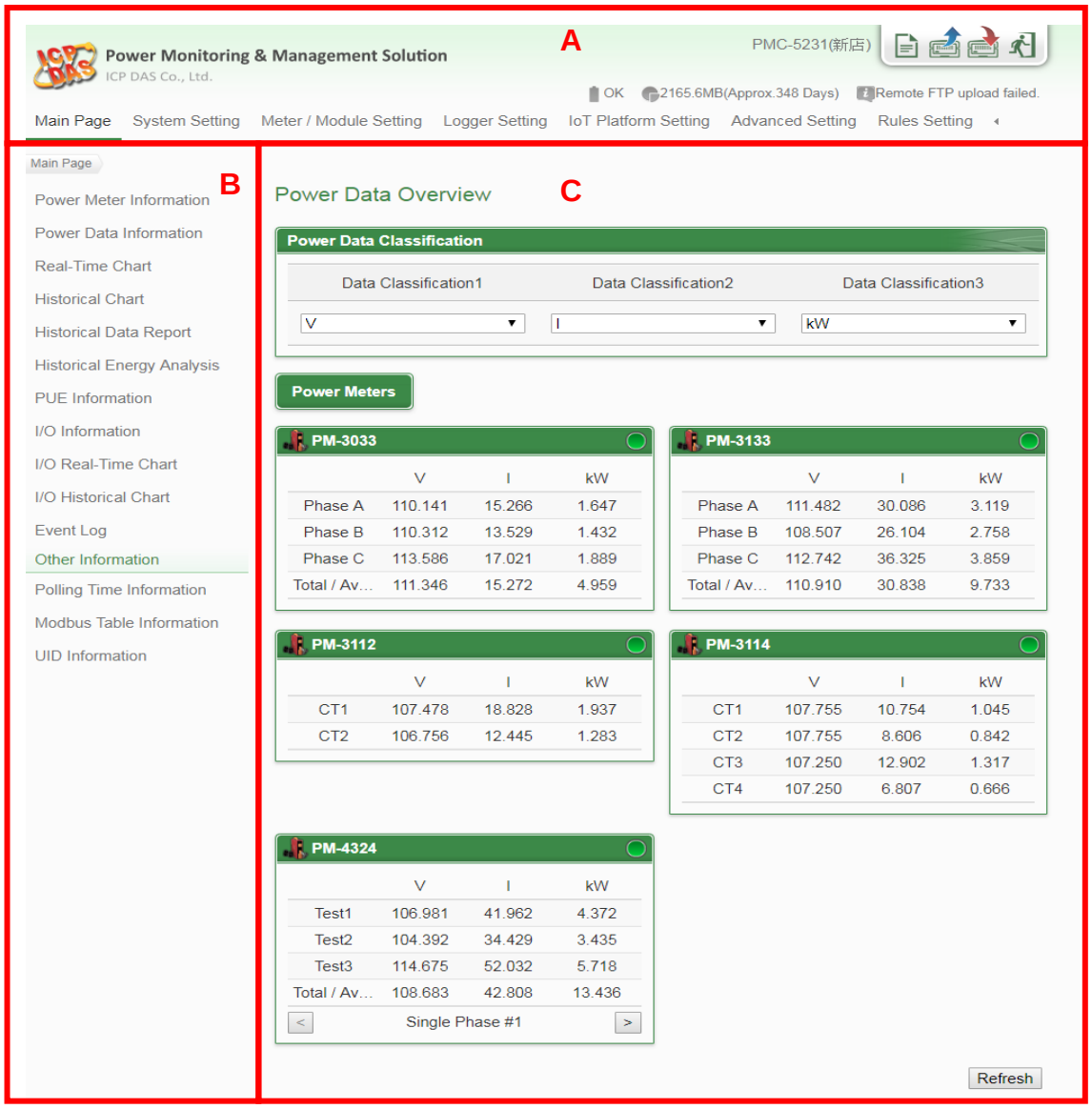


Figure4-1 : Main Page

PMC/PMD main page could be divided into 3 areas:

A. System function area
B. Sub-function area
C. Data review/System setting area

More detailed information for each area will be given in the following section.

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4.1 System function area

System function area provides immediately access to the main functions of PMC/PMD, such as: system settings, system real-time information display, rule files management, etc, shown as below:

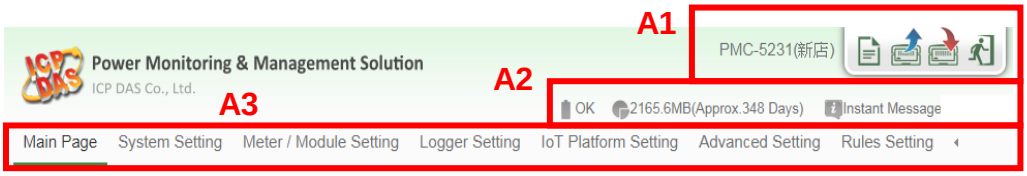


Figure4-2 : System Function Area (login as a Administrator)

System function area includes the following areas:

A1. Rules management toolbar

A2. Real-time information area

A3. System function toolbar

When login as a general user, the setting functions in Rules management toolbar and System function toolbar will be locked, and only allows viewing the power meter data, the I/O module data and Real-time system information. The interface is shown as below:

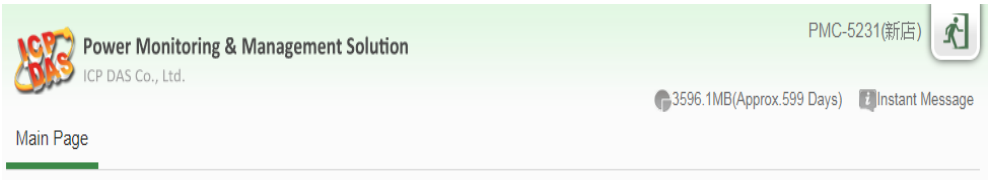


Figure4-3 : System Function Area(login as a General user)

Each function in system function area is as the flowing:

4.1.1 Rules management toolbar

Rules management toolbar allows user to perform different functions. When login into the system as the administrator, the rule management toolbar will be shown as below:



Figure4-4 : Rules management toolbar (login as a Administrator)

If login as a general user, the rule management toolbar will be shown

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as below:



Figure4-5 : Rules management toolbar (login as a General user)

The functions of the Rules management toolbar are as follow:

- On the left side of the Rules management toolbar, the user could move the mouse to the nickname field to give a nickname for this PMC/PMD in the nickname field for easy recognition.



- "New" button allows resetting the settings of all parameters and Rules. Click on button and click on "OK", the settings on PMC/PMD webpage on the browser will be cleared. If the user would like to clear the setting on PMC/PMD, then continue to click on "Save" button to save the new settings (cleared settings) to the PMC/PMD.

  Please note: once the settings are cleared and save to the PMC/PMD, the settings will be cleared permanently.



Figure4-6 : Confirm to clear settings

- "Load" button allows to load all parameter settings and rule settings on PMC/PMD. Click on button and click "OK" to load all parameter settings and rules settings from PMC/PMD to the web page for further edition.

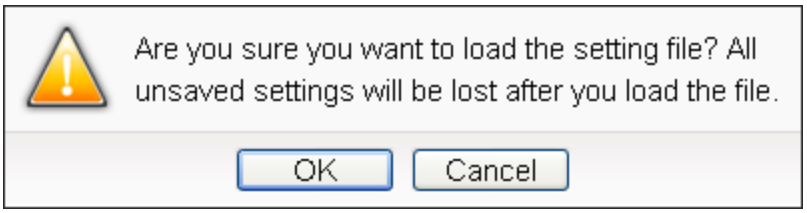


Figure4-7 : Confirm to load settings

- "Save" button allows to save all parameter settings and Rule settings to PMC/PMD. Click on button and click "OK" to save all parameter settings and Rule settings from the web page of

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PMC/PMD to the PMC/PMD.



Figure4-8 : Confirm to save settings

- "Logout" button allows to log out the system, click on button and click "OK" to logout the system.

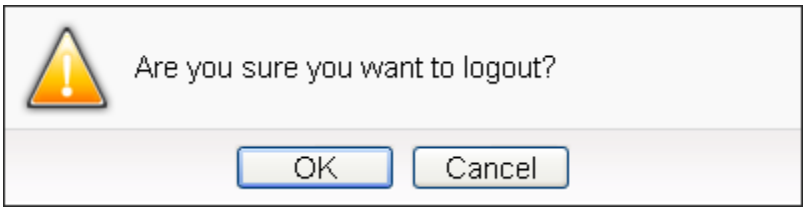


Figure4-9 : Confirm to logout (The settings are saved)

If the settings are not saved to the PMC/PMD before performing logout, a warming message will appear as below:

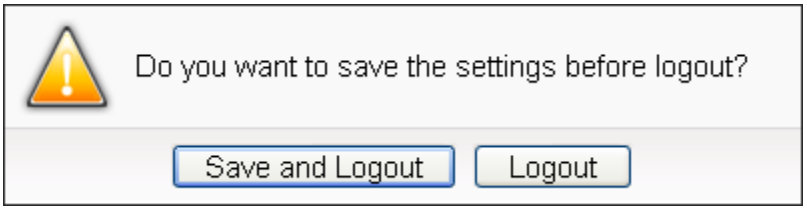


Figure4-10 : Confirm to logout (The settings are not saved)

Please note:

1. All the edited settings on the webpage have to be saved to PMC/PMD to make all settings take effect; before click on button, the settings will only be saved on the Web page site, not in the PMC/PMD.
2. Please DO NOT logout or close the web page during the process of the edition, otherwise all pre-set settings on the page will be disappeared.

In addition, on the left side of the Rules management toolbar, the user could give a nickname for this PMC/PMD in the nickname field for

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easy recognition.

4.1.2 Real-time information area

Real-time information area allows display of current free space and approximate number of days available to save of the microSD card of the PMC/PMD and the real-time system information, shown as below:

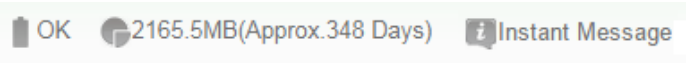


Figure4-11 : Real-time information area

- OK Allows display of the current status of the battery of PMC/PMD. Please change the battery when it runs out. Otherwise, the PMC/PMD would not keep the system time when it is powered off.
- 2165.5MB(Approx.348 Days) Allows display of the current free space and approxmiate number of days available to save of the micro SD card in PMC/PMD.
- Instant Message Allows display of real-time system information, click on “Instant Message”to open up the list of real-time information, maximum 10 information will be kept on the list.

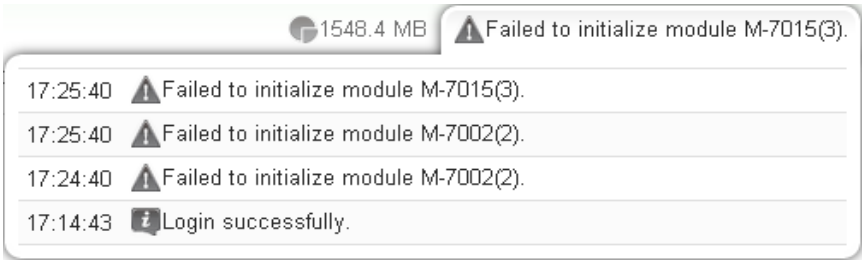


Figure4-12 : Real-time information list

4.1.3 System function toolbar

According to the level of login permission, the System function toolbar will be different. If login as an administrator, all parameter settings and data review function will be enabled; more detailed information of the functions will be give in the following sections.

The System function toolbar includes the following function options:

- Chapter 5: Main Page
- Chapter 6: System Setting
- Chapter 7: Power Meter/ I/O Module Setting
- Chapter 8: Data Logger Setting
- Chapter 9: IoT Platform Setting
- Chapter 10: Advanced Setting

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- Chapter 11: Rule Setting

If login as a general user, they are allowed to view real-time information on Main Page only; they also do not have the permission to edit the settings of the parameters and the rules.

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4.2 Sub-function area

Sub-function area will display detailed functions under the selected System function. The user could edit or review detailed function options in the Sub-function area. On the upper Sub-function area, the path of current function will be displayed to show the current function path.

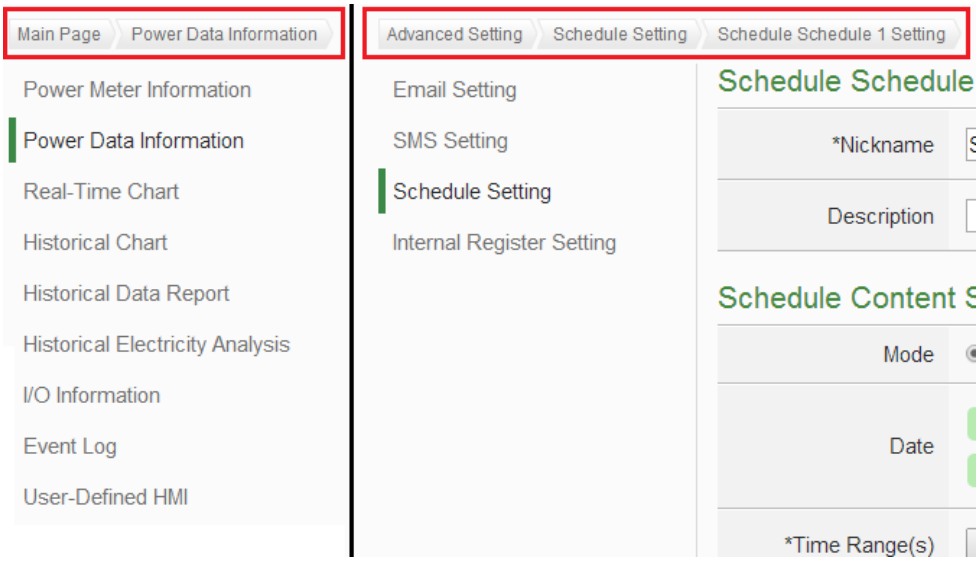


Figure4-13 : Current function path

4.3 Data review/System setting area

Data review/System setting area allows to set system parameters and data review of PMC/PMD, the content of this area will be varied according to the sub-function selected. When the user login into the page, the Data review/System setting Area of the Main Page will be Power Data overview page, it will display all power information of the power meters that are connected to the PMC/PMD, shown as below:

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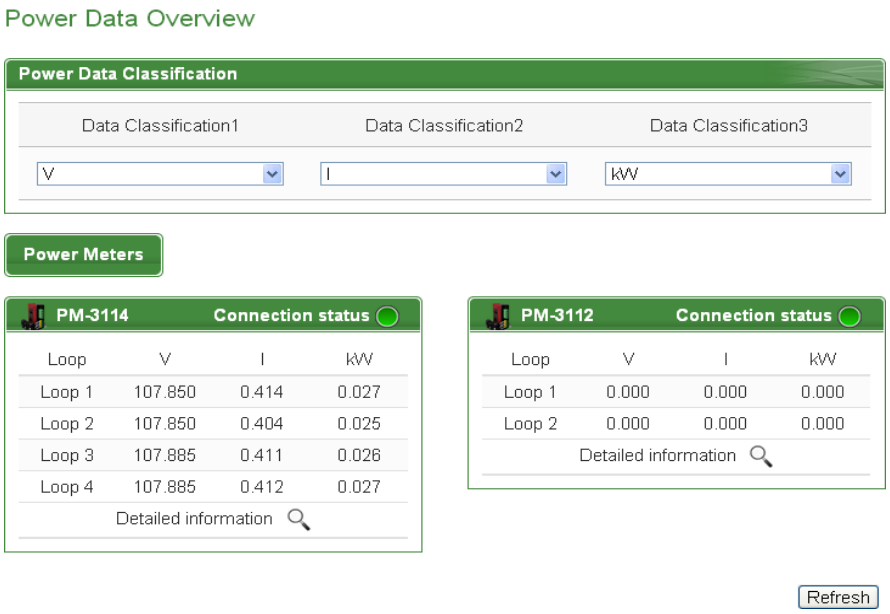


Figure4-14 : Power data Overview page

Power data overview page display the power data of the power meters that connected to the PMC/PMD. Depend on the requirement to select the desired classification of the power data to display the desired power data. The page refreshes every 20 sec, the user could also click “Refresh” button to refresh the data immediately.

The power data classification includes the following options:
V(Voltage), I(Current), kW(Real Power), kvar (Reactive Power), kVA (Apparent Power), PF (Power Factor), kWh, kvarh, kVAh, Daily Accumulated Electricity, Monthly Accumulated Electricity, Yearly Accumulated Electricity, Daily Carbon Emissions, Monthly Carbon Emissions, Yearly Carbon Emissions, Hourly Maximum Demand, Daily Maximum Demand, Monthly Maximum Demand, Actual Demand and Forecast Demand. The displayed power data will be varied according to the selected power data classification.

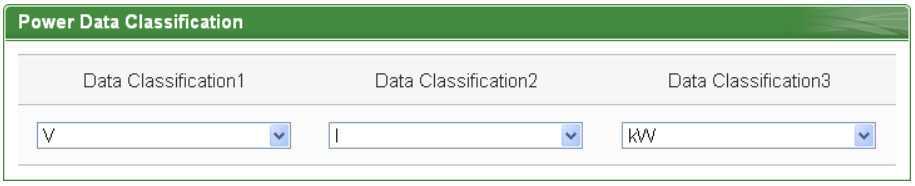


Figure4-15 : Select the classification of Power data

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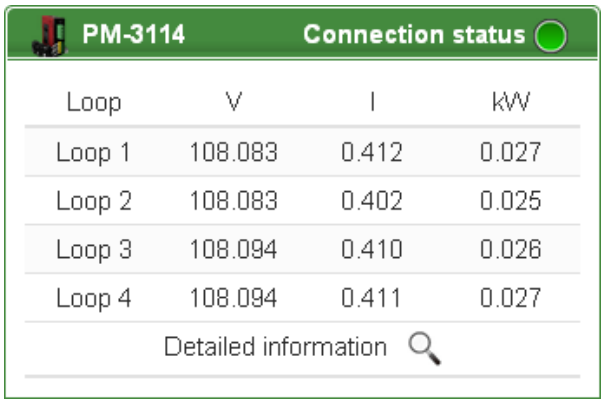


Figure4-16 : Display power data of the selected classification

- "Connection Status" will reveal the connection status between the power meter and PMC/PMD, the graphic indicators are as follow:
  : Online : Offline : Connecting

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5 Main Page

On the Main Page, 10 information display options are as follow: Power Meter Information, Power Data Information, Realtime Chart, Historical Chart, Historical Data Report, Historical Electricity Analysis, PUE Information, I/O Information, Event Log, Polling Time Information, Modbus Table Information and UID information, shown as follow:

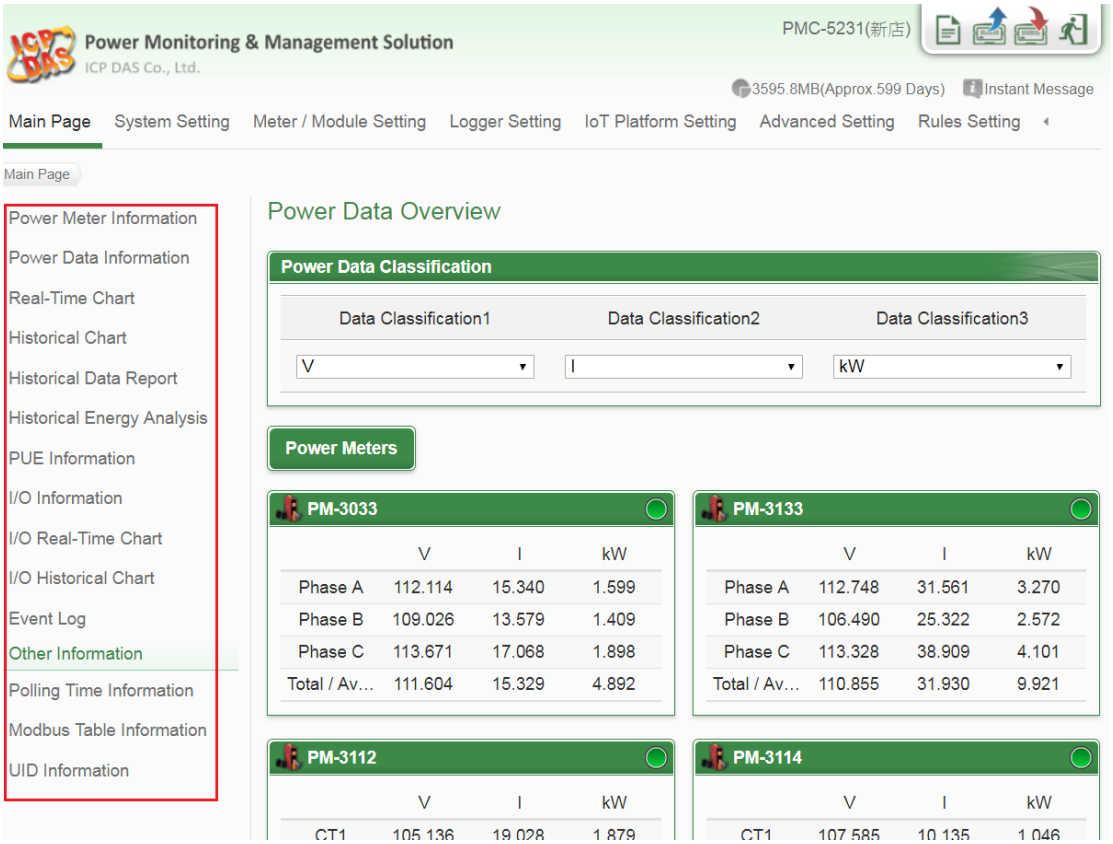


Figure5-1 : Information display options on Main Page

5.1 Power Meter Information

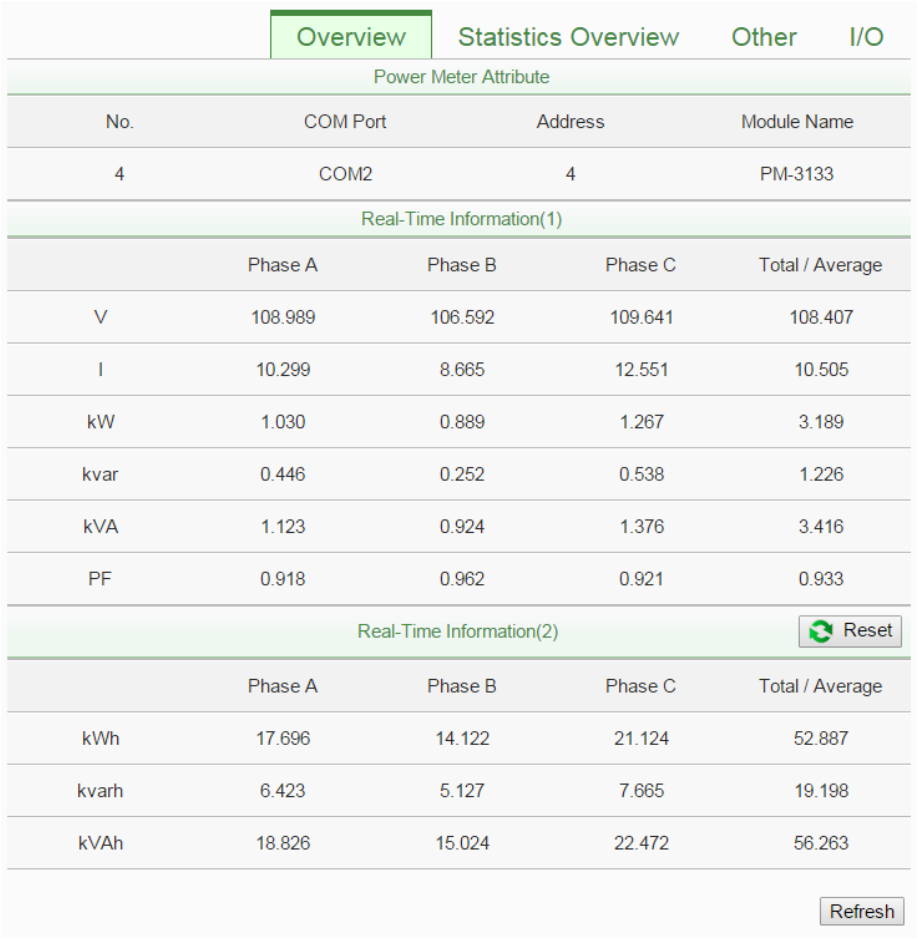
Power Meter Information page displays detailed power data information including: Power Meter Information Overview and Power Meter Statistics Information Overview.

5.1.1 Power Meter Information Overview

After getting into this page, the system will display real-time power information of the selected power meter. To display desired power meter data information, select the power meter from the dropdown list

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of the “Power Meter List”. The page refreshes every 20 seconds, the user could also click “Refresh” button to refresh the data immediately. Power Meter Information Overview includes the following sections:



Overview | Statistics Overview | Other | I/O

Power Meter Attribute

No.	COM Port	Address	Module Name
4	COM2	4	PM-3133

Real-Time Information(1)

	Phase A	Phase B	Phase C	Total / Average
V	108.989	106.592	109.641	108.407
I	10.299	8.665	12.551	10.505
kW	1.030	0.889	1.267	3.189
kvar	0.446	0.252	0.538	1.226
kVA	1.123	0.924	1.376	3.416
PF	0.918	0.962	0.921	0.933

Real-Time Information(2) Reset

	Phase A	Phase B	Phase C	Total / Average
kWh	17.696	14.122	21.124	52.887
kvarh	6.423	5.127	7.665	19.198
kVAh	18.826	15.024	22.472	56.263

Refresh

Figure5-2 : Power Meter Information Overview

- Power Meter Attribute

  The Power Meter Attribute section will display different information according to different power meters and the ways they are connected to the PMC/PMD. Currently PMC/PMD supports connecting to power meter via Modbus RTU (Figure 5-3) or Modbus TCP(Figure 5-4). If the power meter is connected via Modbus RTU, it will display the Power Meter Number (No.), Com Port, Address, Module Name. If the power meter is connected via Modbus TCP, it will display the Power Meter Number (No.), IP, Port, NetID, Module Name.

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Power Meter Attribute			
No.	COM Port	Address	Module Name
4	COM2	4	PM-3133

Figure5-3 : The attribute of PM-3133 Power Meter

Power Meter Attribute				
No.	IP	Port	NetID	Module Name
2	192.168.100.95	502	9	PM-3133-MTCP

Figure5-4 : The attribute of PM-3133-MTCP Power Meter

- Real Time Power Information

  In this section, it provides real time power data information of the selected Power Meter. For 3 phase power meter, it will display real time information of Phase A, Phase B and Phase C(Figure 5-5).For single phase power meter, it will display real time information of Loop 1, Loop2, Loop3, and Loop4(Figure 5-6). For PM-3112 will display real time information of Loop 1 and Loop2 (Figure 5-7).

Real Time Information(1)				
	Phase A	Phase B	Phase C	Total / Average
V	106.02	107.56	105.42	106.33
I	18.35	14.00	25.56	19.30
kW	1.88	1.41	2.53	5.84
kvar	0.48	0.52	0.93	1.94
kVA	1.95	1.51	2.69	6.16
PF	0.97	0.94	0.94	0.95
Real Time Information(2)				Reset
kWh	0.14	0.10	0.18	0.42
kvarh	0.05	0.03	0.06	0.14
kVAh	0.15	0.10	0.19	0.44

Figure5-5 : Real Time Power Information of PM-3133

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Real Time Information(1)				
	Phase A	Phase B	Phase C	Total / Average
V	106.02	107.56	105.42	106.33
I	18.35	14.00	25.56	19.30
kW	1.88	1.41	2.53	5.84
kvar	0.48	0.52	0.93	1.94
kVA	1.95	1.51	2.69	6.16
PF	0.97	0.94	0.94	0.95
Real Time Information(2)				Reset
kWh	0.14	0.10	0.18	0.42
kvarh	0.05	0.03	0.06	0.14
kVAh	0.15	0.10	0.19	0.44

Figure5-6 : Real Time Power Information of PM-3114

Real Time Information(1)		
	Loop 1	Loop 2
V	109.14	112.11
I	31.59	26.11
kW	3.27	2.77
kvar	1.10	0.96
kVA	3.45	2.93
PF	0.95	0.95
Real Time Information(2)		Reset
kWh	65.22	52.45
kvarh	23.67	19.03
kVAh	69.38	55.80

Figure5-7 : Real Time Power Information of PM-3112

- Reset Accumulated Value of the Power Meter

  When login as the Administrator, it allows to click on “Reset” to reset the value of kWh, kvarh, and kVAh to be 0 if required.

  Please Note: After performing the reset function to reset the value of the kWh, kvarh, and kVAh of the selected power meter, the resetting operation is irreversible.

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5.1.2 Power Meter Statistics Information Overview

On the Power Meter Statistics Information Overview page, the Demand Information section will display the Actual Demand, Forecast Demand, Contract Capacity, Hourly Maximum Demand, Daily Maximum Demand and Monthly Maximum Demand, etc. In the Statistics Information section, the Daily/Monthly/Yearly Accumulated Electricity and Daily/Monthly/Yearly Carbon Emissions for each loop will be displayed.

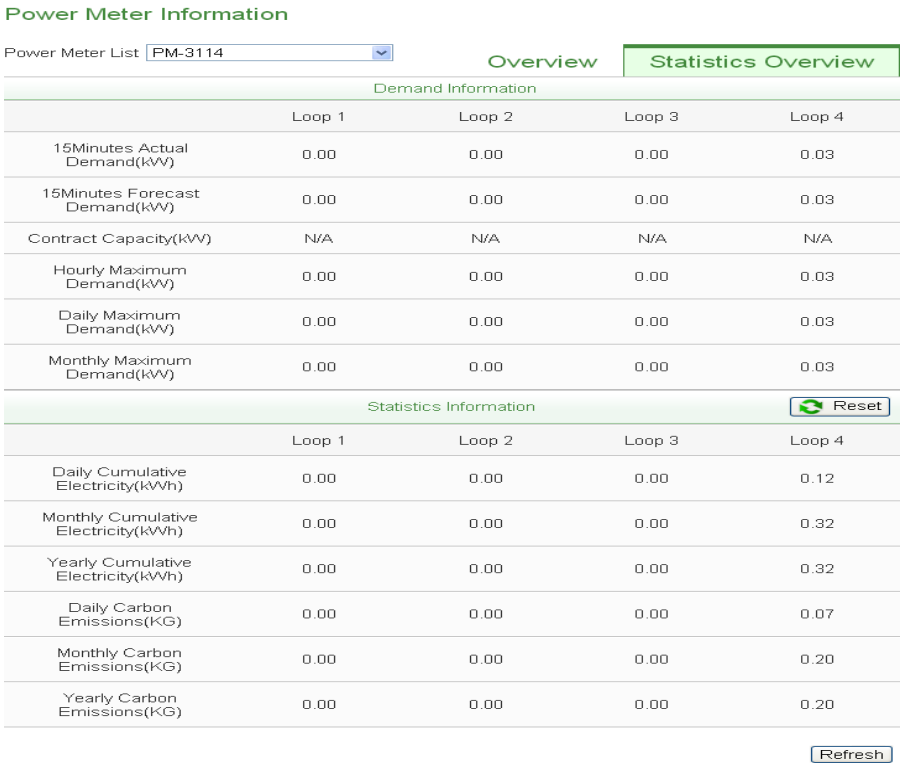


Figure5-8 : Power Meter Statistics Information

- Reset Power Meter Statistics information

  When login as an administrator; the user could click on “Reset” button to set the values such as: Daily/Monthly/Yearly Accumulated Electricity and Daily/Monthly/Yearly Carbon Emissions to default values if required.

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5.1.3 Other Information

In the "Other" information page, users can view or setup the PT Ratio、CT Ratio、Phase Sequence、Wiring Mode、Voltage Mode and other specific parameters of the power meter.

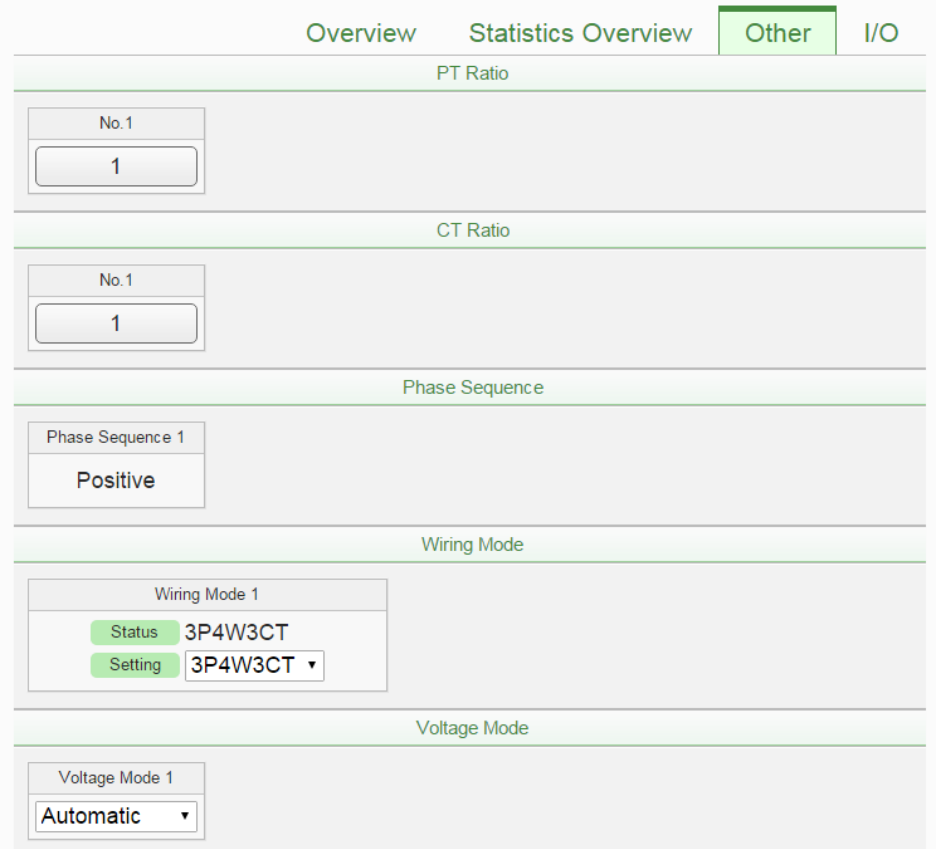


Figure5-9 : Power Meter Other Information Page

5.1.4 I/O Information

In the "I/O" information page, the I/O status of the power meter will be listed. When login as the Administrator, it allows click on “Status” to perform output operations. When login as a general user, it only allows to view I/O status, the output operation is not allowed.

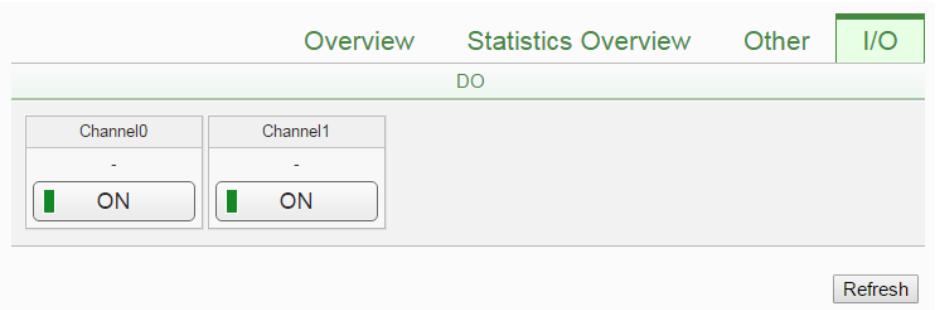


Figure5-10 : Power Meter I/O Information Page

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5.2 Power Data Information

Power data information can be displayed in two modes (Overview and Group Overview), user can change the viewing mode according to the requirements; more detailed information will be introduced in the following sections.

5.2.1 Overview

Power Data Information overview mode allows display of power data of different power meters at the same time. Select the classification from the dropdown list of the Data Classification field; it will list the requested data from various power meters for easy comparison. The page refreshes every 20 seconds, the user could also click “Refresh” button to refresh the data immediately.

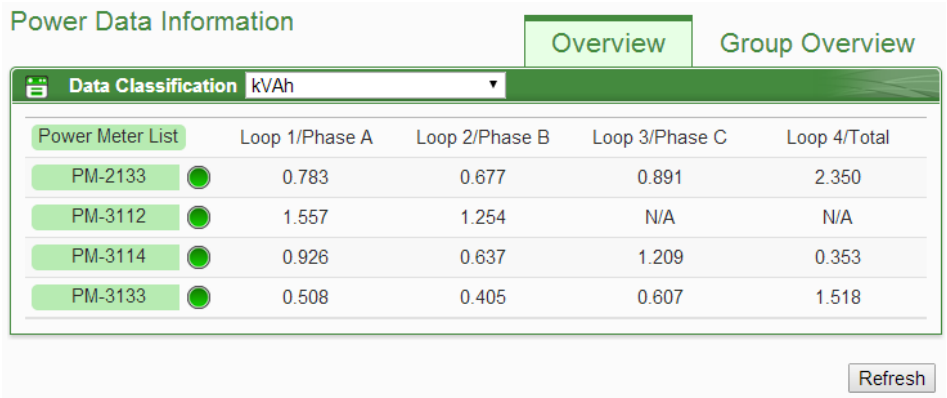


Figure5-11 : Power Data Overview Mode

The graphic indicators next to the power meter will reveal the connection status of the power meter, the indicators are as follow:

: Online : Offline : Connecting

Click on “Change display list” (Figure 5-12) to bring up the Power Meter List window(Figure 5-13). Select the power meter to be displayed in the power meter list, click “OK” to complete the settings.

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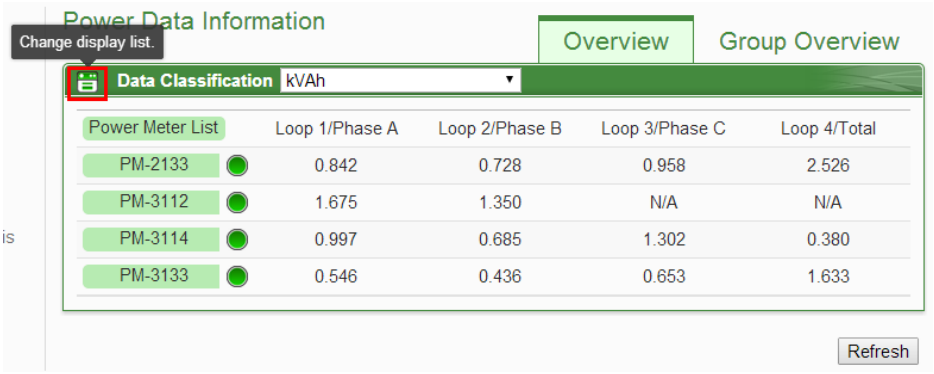


Figure5-12 : Change Display List Button

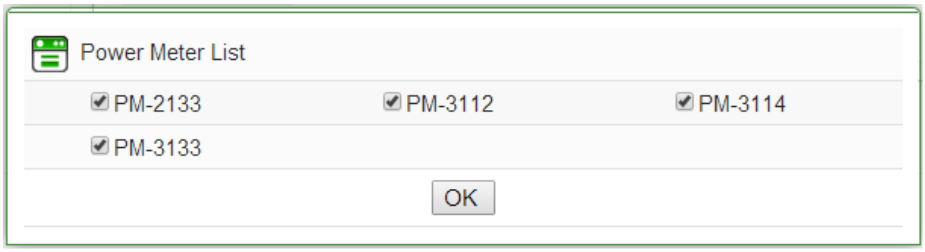


Figure5-13 : The Power Meter List

5.2.2 Group Overview

Power Data Information group overview mode allows display of power data of pre-set group of power meters (please refer to 6.7 Power Meter Group Setting). The page refreshes every 20 seconds, the user could also click “Refresh” button to refresh the data immediately.

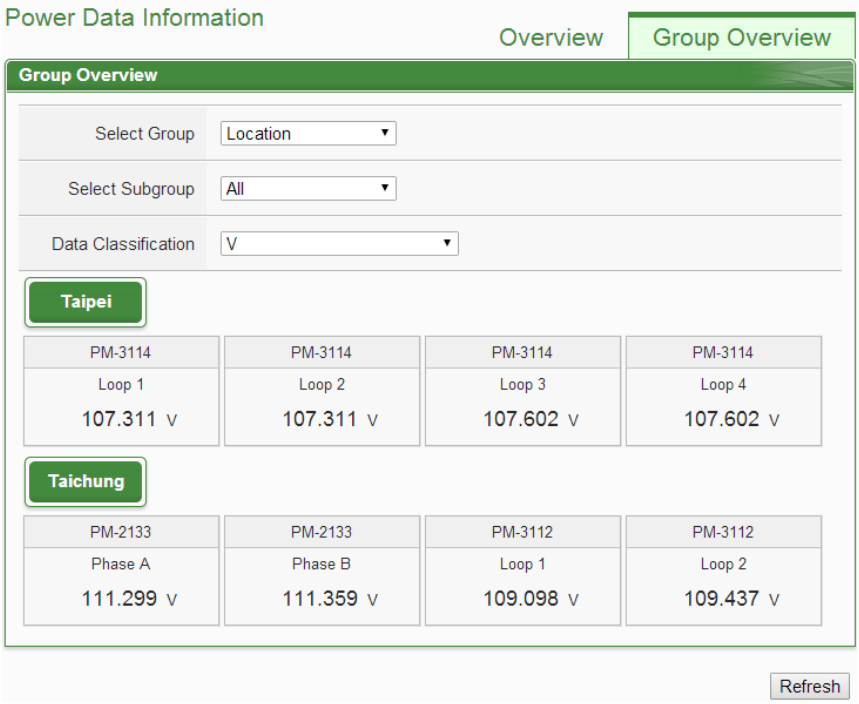


Figure5-14 : Power Data Group Overview Mode

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- Select Group

  Select the group from the dropdown list in the “Select Group” field. If no group is pre-set, the inquiry operation will be disabled.

- Select Subgroup

  Select the subgroup from the dropdown list in the “Select Subgroup” field. User can select one subgroup to view or select “All” to view power data of all subgroups.

- Data Classification

  The power data classification includes the following options:
  V(Voltage), I(Current), kW(Real Power), kvar (Reactive Power), kVA (Apparent Power), PF (Power Factor), kWh, kvarh, kVAh, Daily Accumulated Electricity, Monthly Accumulated Electricity, Yearly Accumulated Electricity, Daily Carbon Emissions, Monthly Carbon Emissions, Yearly Carbon Emissions, Hourly Maximum Demand, Daily Maximum Demand, Monthly Maximum Demand, Actual Demand and Forecast Demand. The displayed power data will be varied according to the selected power data classification.

5.3 Realtime Chart

Realtime Chart allows display of power information of the power meter in real-time trend and pie chart. Realtime Chart can be displayed in two modes (Power Meter mode and Group mode). The users can change the viewing mode according to their requirements. The detailed description is as follow:

5.3.1 Power Meter Mode

Select the power meter from the dropdown list of the Power Meter List and select the classification from the dropdown list of the Data Classification field, and then click on “Inquiry” button, it will show the chart.

- Power Meter List

  All power meter connected to the PMC/PMD will be list on the dropdown list of the Power Meter List, if no power meter is connected, the inquiry operation will not be able to perform.

- Data Classification

  Data Classification allows to inquire various power data options, including: V(Voltage), I(Current), kW(Real Power), kvar (Reactive Power), kVA (Apparent Power), PF (Power Factor), kWh, kvarh, kVAh,

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Daily Accumulated Electricity, Daily Carbon Emissions, and Actual Demand.

Please refer to Figure 5-15 for an example of Realtime Chart for “Power Meter Mode”. Each time the Realtime Chart displays only one power information classification. If a different power information classification is inquired, previously displayed chart will be closed automatically. The user could choose desired power data classification to view the corresponding Realtime Chart. The chart refreshes every 5 seconds.

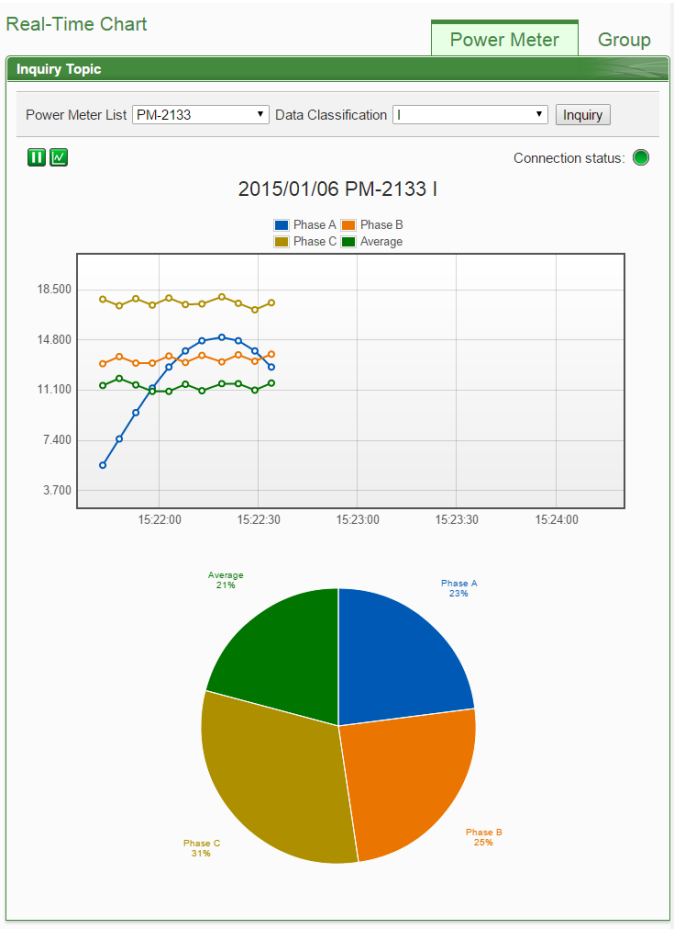


Figure5-15 : Realtime Chart (Power Meter Mode)

There are three function icons on the upper area of the Power Meter Realtime Chart:

- The icon allows to pause the update of the chart, only the data within the 25 minutes will be displayed. The user could click and drag on the chart and move forward or backward to show desired time zone. Click to resume the update of the chart. To view the data on a specific marker, move the mouse over the marker to display the data

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value.

-  icon allows to hide the markers on the chart; click on  button to show the markers on the chart.
- "Connection Status" will reveal the connection status of the power meter, the graphic indicators are shown as follow:
  : Online : Offline : Connecting

5.3.2 Group Mode

Select the option from the dropdown lists of the Group, Subgroup and the Data Classification field, and then click on "Inquiry" button, it will show the chart.

- Group

  The preset group lists will be shown on the dropdown list of the Group, if no group is pre-set, the inquiry operation will not be able to perform.

- Subgroup

  According to the selected Group option, the corresponding subgroups will be listed. If the selected Group contains no subgroup or the subgroup doesn't setup any loop/phase of the power meter, the inquiry operation will not be able to perform.

- Data Classification

  Data Classification allows to inquire various power data options, including: V(Voltage), I(Current), kW(Real Power), kvar (Reactive Power), kVA (Apparent Power), PF (Power Factor), kWh, kvarh, kVAh, Daily Accumulated Electricity, Daily Carbon Emissions, and Actual Demand.

Please refer to Figure 5-16 for an example of Realtime Chart for "Group Mode". Each time the Realtime Chart displays only one power information classification. If a different power information classification is inquired, the previously displayed chart will be closed automatically. The user could choose desired power data classification to view the corresponding Realtime Chart. The chart refreshes every 5 seconds.

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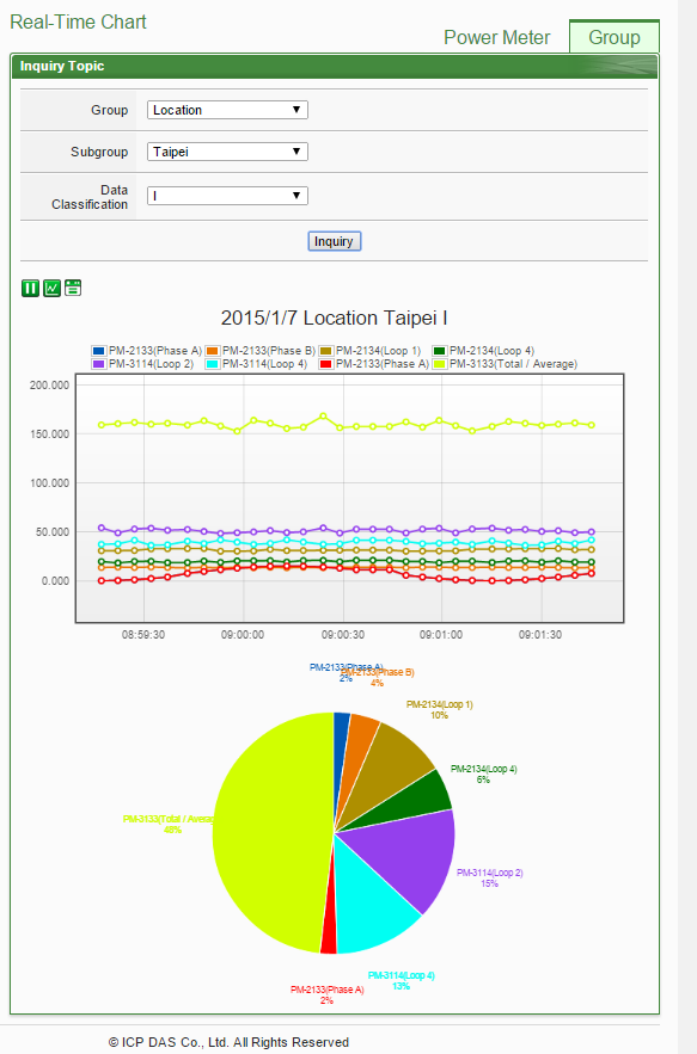


Figure5-16 : Realtime Chart (Group Mode)

There are three function icons on the upper area of the Power Meter Realtime Chart:

- The icon allows to pause the update of the chart, only the data within the 25 minutes will be displayed. The user could click and drag on the chart and move forward or backward to show desired time zone. Click to resume the update of the chart. To view the data on a specific marker, move the mouse over the marker to display the data value.
- icon allows to hide the markers on the chart; click on button to show the markers on the chart.
- icon will show the connection status of the power meters of the subgroup, the graphic indicators are shown as follow:

  : Online : Offline : Connecting

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5.4 Historical Chart

Historical Chart allows display of the value and chart of power data in historical trend. Select the power meter from the dropdown list of the Power Meter List, choose the classification from the dropdown list of the Data Classification and then specify the date from the dropdown list of the Date. The interface is shown as below. User also can click the "Download CSV" button to download the csv file of the specify power meter for the specify the date.

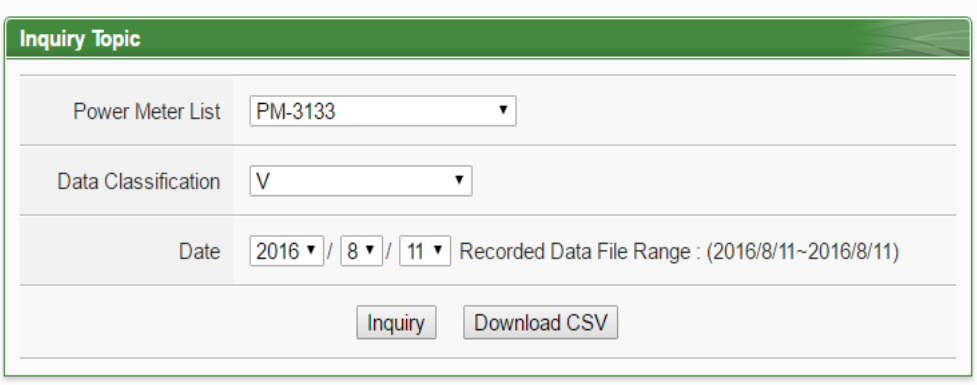


Figure5-17 : Historical Chart Inquiry

- Power Meter List

  All power meter connected to the PMC/PMD will be list on the dropdown list of the Power Meter List, if no power meter is connected, the inquiry operation will not be able to perform.

- Data Classification

  Data Classification allows to inquire various power data options, including: V(Voltage), I(Current), kW(Real Power), kvar (Reactive Power), kVA (Apparent Power), PF (Power Factor), kWh, kvarh, kVAh, Daily Accumulated Electricity, Daily Carbon Emissions, and Actual Demand.

- Date

  The dates that are available for power data retrieval will be displayed. Please note, if no log file is available, the inquiry operation will not be performed.

Click on “Inquiry” to display the power data historical statistic chart (Figure 5-18) and table (Figure 5-19) of the selected date range. If the selected date does not contain the file or exceeds the date of the file storage range, a message “No file exists” will be displayed. The Historical Data Chart and

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Historical Data Table are shown as below:

- Historical Data Chart

  The historical power data of specified classification will be displayed in historical chart. The user could select the range on the below region or drag and move on the chart to adjust the viewing range. Move the mouse cursor close to the marker, the value will be displayed.

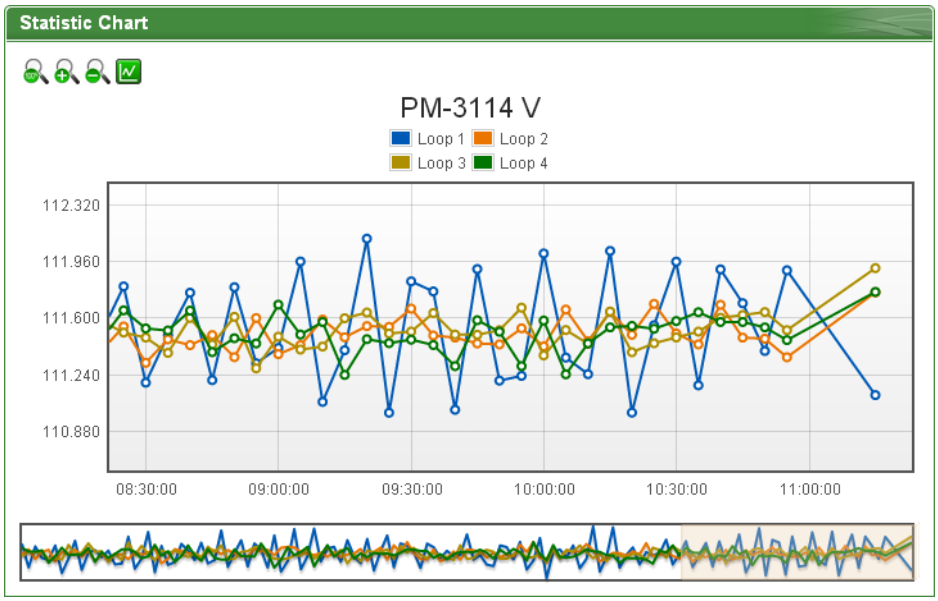


Figure5-18 : Historical Data Chart for power data

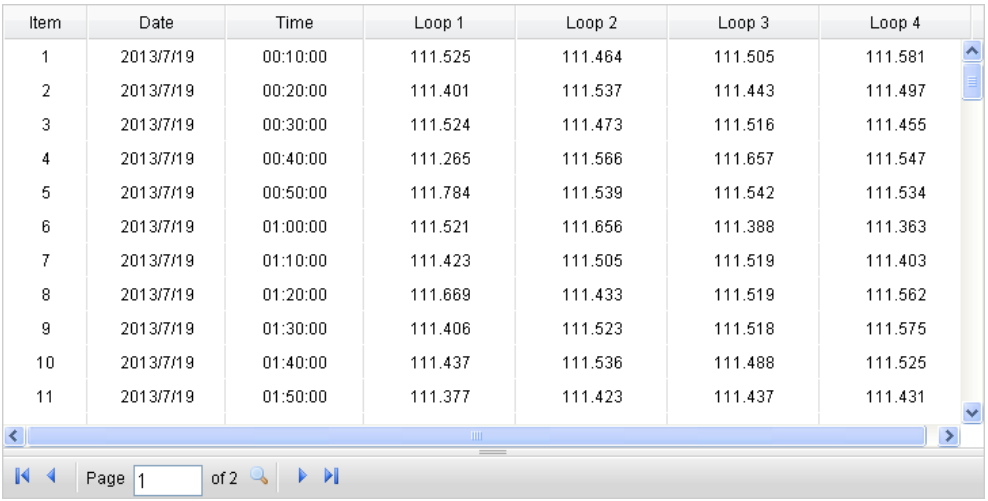
On the upper left of the Historical Chart, there are 4 function icons.

- Set the Historical Chart to be default status.
- Zoom in the Y-axis of the Historical Chart
- Zoom out the Y-axis of the Historical Chart
- Hide the markers on the Historical Chart. Show the markers on the Historical Chart

- Historical Data Table

  Historical Data Table will display the requested historical power data; the historical power data of selected classification of each loop (or phase) will be listed.

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Item	Date	Time	Loop 1	Loop 2	Loop 3	Loop 4
1	2013/7/19	00:10:00	111.525	111.464	111.505	111.581
2	2013/7/19	00:20:00	111.401	111.537	111.443	111.497
3	2013/7/19	00:30:00	111.524	111.473	111.516	111.455
4	2013/7/19	00:40:00	111.265	111.566	111.657	111.547
5	2013/7/19	00:50:00	111.784	111.539	111.542	111.534
6	2013/7/19	01:00:00	111.521	111.656	111.388	111.363
7	2013/7/19	01:10:00	111.423	111.505	111.519	111.403
8	2013/7/19	01:20:00	111.669	111.433	111.519	111.562
9	2013/7/19	01:30:00	111.406	111.523	111.518	111.575
10	2013/7/19	01:40:00	111.437	111.536	111.488	111.525
11	2013/7/19	01:50:00	111.377	111.423	111.437	111.431

Figure5-19 : Historical Data Table for power data

On the lower left of the Historical Data Table, there are 5 function icons.

- Go to the first page.
- Go to previous page.
- Go to specific page.
- Go to next page.
- Go to last page.

5.5 Historical Data Report

The Historical Data Report allows display of the power data report of desired power meter; specify the power meter, power classification and date range to inquire the data, shown as below:

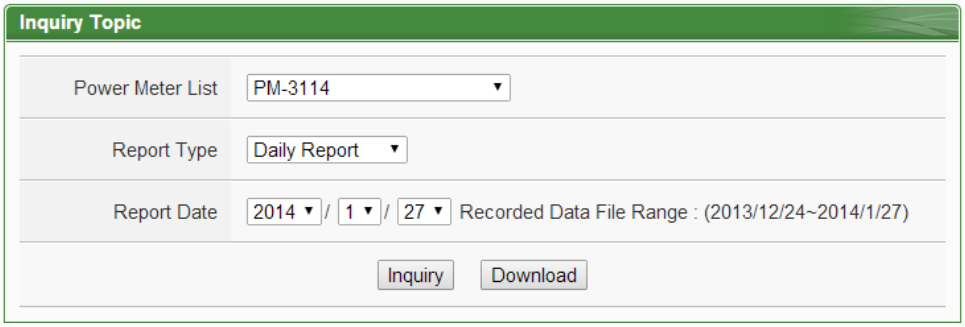


Figure5-20 : Historical Data Report inquiry

- Power Meter List

  All power meter connected to the PMC/PMD and the Power Meter Groups will be listed on the dropdown list of the Power Meter List.

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When a single power meter is selected, a power data report of the specified power meter will be generated. If a power meter group is selected, a report of the "Total accumulative electricity" of all power meters in this group will be generated. If no power meter is connected to PMC/PMD, the inquiry operation will not be able to perform. About the setting of Power Meter Group, please refer to 6.7 Power Meter Group section.

- Report Type
  Allow to inquire Daily Report, Weekly Report, Monthly Report or Annual Report options.
- Report Date
  The dates that are available for data retrieval will be displayed.
  Please note: if no log file is available, the inquiry operation will not be performed.

Click on “Inquiry” or ”Download” to display/download the Historical Data Report of the selected date range. If the selected date does not contain the file or exceeds the date of the file storage range, a message “No file exists” will be displayed. For the number of loops of power meters are different, the data report will be in different format, please refer to Figure 5-21 for the Daily Report of 3-phase power meter and Figure 5-22 for the Daily Report of single phase power meter.

PM-2133 2013/04/15 Daily Report

Time	Max. Demand(kW)	kWh	PF(%)	I_a(A)	I_b(A)	I_c(A)	V_a(V)	V_b(V)	V_c(V)	kVA Tot.(kW)	kvar Tot.(kW)
00	3.429	2.835	89.0	9.283	8.781	8.523	224.429	224.006	225.050	3.156	-1.102
01	3.775	3.004	90.6	9.500	9.039	8.743	224.910	224.502	225.498	3.279	-0.975
02	4.484	3.034	89.1	9.724	9.251	9.016	224.016	223.666	224.656	3.340	-1.054
03	4.040	3.214	92.2	10.019	9.579	9.321	224.116	223.789	224.747	3.465	-0.921
04	4.351	2.764	85.4	9.125	8.686	8.345	224.284	223.963	224.935	3.094	-1.108
05	3.939	2.946	88.1	9.183	8.767	8.431	224.307	223.989	224.964	3.221	-0.780
06	4.191	3.195	92.3	9.785	9.381	9.090	224.029	223.706	224.687	3.416	-0.840
07	4.595	3.354	93.0	10.101	9.689	9.383	222.777	222.476	223.442	3.544	-0.720
08	3.826	3.741	99.8	10.293	9.985	9.694	221.961	221.888	222.791	3.761	-0.163
09	4.353	4.141	100.0	11.208	10.935	10.725	222.727	222.797	223.613	4.143	-0.093
10	4.486	4.296	100.0	11.603	11.327	11.127	222.359	222.413	223.230	4.287	-0.071
11	4.407	4.273	100.0	11.627	11.365	11.144	222.136	222.205	222.975	4.293	-0.066
12	4.584	4.505	100.0	12.210	11.896	11.542	223.254	223.028	223.907	4.507	-0.044
13	5.278	5.051	100.0	13.794	13.454	13.360	219.214	219.237	220.022	5.053	0.022
14	5.316	5.211	100.0	14.306	13.854	13.893	219.212	219.278	220.039	5.234	0.027
15	5.255	5.198	100.0	14.091	13.734	13.702	220.170	220.290	221.001	5.190	0.029
16	5.381	5.270	100.0	14.206	13.981	13.845	220.339	220.472	221.191	5.257	0.047
17	5.323	5.270	100.0	14.172	13.994	13.679	221.754	221.819	222.529	5.265	0.055
18	5.090	3.943	100.0	10.749	10.668	10.245	220.483	220.677	221.269	3.951	-0.118
19	3.902	3.860	99.9	10.552	10.429	10.038	220.689	220.959	221.548	3.872	-0.142
20	3.833	3.602	96.8	10.344	10.181	9.895	221.677	221.872	222.562	3.711	-0.502
21	3.540	3.241	92.1	10.342	10.071	9.884	221.711	221.750	222.578	3.548	-1.021
22	3.555	3.293	92.5	10.224	9.940	9.754	222.108	222.144	223.018	3.529	-0.970
23	4.248	3.263	90.8	10.082	9.731	9.541	222.724	222.705	223.584	3.493	-0.927

Daily Maximum Demand: 5.381 kW Time: 2013/04/15 16:41:59 Total: 92.504 kWh

Figure5-21 : Daily Report for PM-3133

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PM-3114 Loop1 2013/07/19 Daily Report

Time	Max. Demand(kW)	kWh	PF(%)	I(A)	V(V)	kVA Tot.(kW)	kvar Tot.(kW)
00	0.804	0.792	95.2	7.500	111.503	0.836	0.253
01	0.798	0.792	94.8	7.517	111.497	0.838	0.262
02	0.800	0.782	93.8	7.480	111.423	0.833	0.282
03	0.803	0.791	94.5	7.513	111.492	0.838	0.265
04	1.512	0.034	95.7	8.287	111.594	0.927	0.279
05	0.903	0.794	95.3	7.482	111.567	0.834	0.251
06	0.805	0.790	94.6	7.498	111.480	0.836	0.265
07	0.802	0.791	94.8	7.492	111.534	0.836	0.260
08	0.797	0.791	94.5	7.502	111.474	0.837	0.265
09	0.804	0.785	94.2	7.495	111.441	0.835	0.276
10	0.805	0.794	94.9	7.509	111.445	0.837	0.257

Daily Maximum Demand: 1.512 kW Time: 2013/07/19 04:57:59 Total: 7.936 kWh

Figure5-22 : Daily Report for PM-3114

2017/5/9 Factory Lighting Daily Report												
Time	0	1	2	3	4	5	6	7	8	9	10	11
kWh	0.312	0.311	0.318	0.320	0.314	0.312	0.313	0.309	0.313	0.324	0.020	0.312
Time	12	13	14	15	16	17	18	19	20	21	22	23
kWh	0.332	0.329	0.334	0.332	0.333	0.334	0.333	0.335	0.338	0.324	0.323	0.319
Total Accu. Electricity:7.444 kWh												

Figure5-23 : "Total Accu. Electricity" report for Power Meters Group

5.6 Historical Electricity Analysis

Historical Electricity Analysis can be done in 3 ways: Energy Usage Analysis by Trend, Energy Usage Analysis by Time and Energy Usage Breakdown by Circuit/Group. The user can query electricity analysis for specific date by selecting Chart Type, Data Classification, Date and Loop(s)/Phase(s); the following section will provide more detailed information:

5.6.1 Energy Usage Analysis by Trend

The users could specify the data classification and the time range under this section, and then select the loop(s)/phase(s) to be inquired; the corresponding Energy Usage Analysis will be displayed in Trend chart format.

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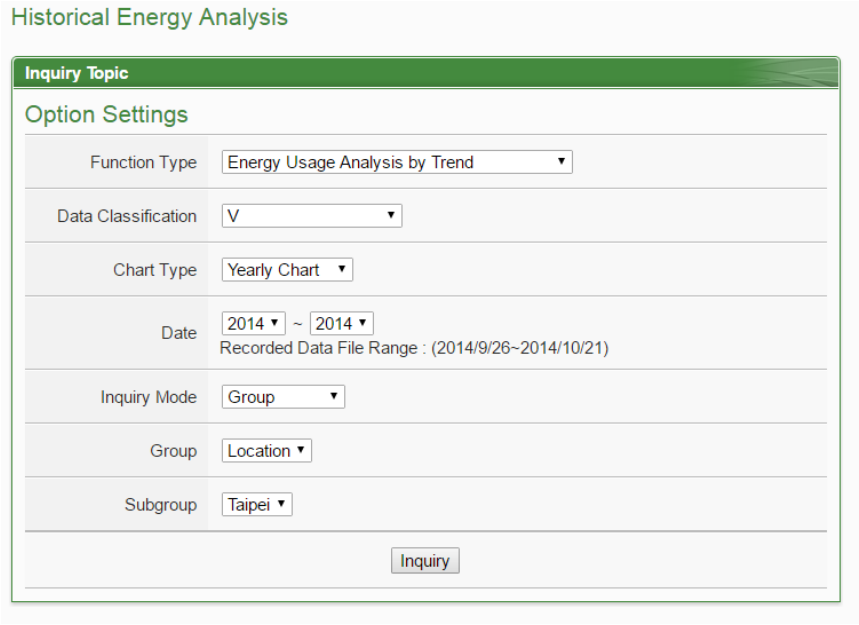
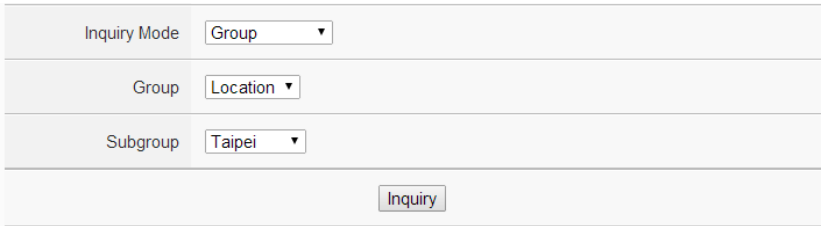


Figure5-24 : Energy Usage Analysis by Trend

- Function Type: The user can select one of the following three options for electricity analysis: Energy Usage Analysis by Trend, Energy Usage Analysis by Time Period and Energy Usage Breakdown by Circuit/Group.
- Data Classification: includes V (voltage), I (current), PF (power factor), Energy Usage (KWh), Carbon Emissions, and Maximum Demand.
- Chart Type: Provides Yearly Chart、Monthly Chart and Daily Chart.
- Date: Select the date range to be queried (the system will provide the date range can be queried)
- Inquiry Mode：The user can select one of the following two options for inquiring: group mode and user-defined mode.
  - Group：

    In group mode, the user can select group and subgroup to inquire the energy usage analysis of loops/phases of the power meters in the format of trend chart. If no group is pre-set, the user will not be able to perform inquiry operation.



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Figure5-25 : Inquiry by Group Mode

- User-defined：

  In user-defined mode, all power meters connected to the PMC/PMD will be listed. If no power meter is connected, the user will not be able to perform inquiry operation. The minimum loop/phase to be queried is 1 loop/phase.

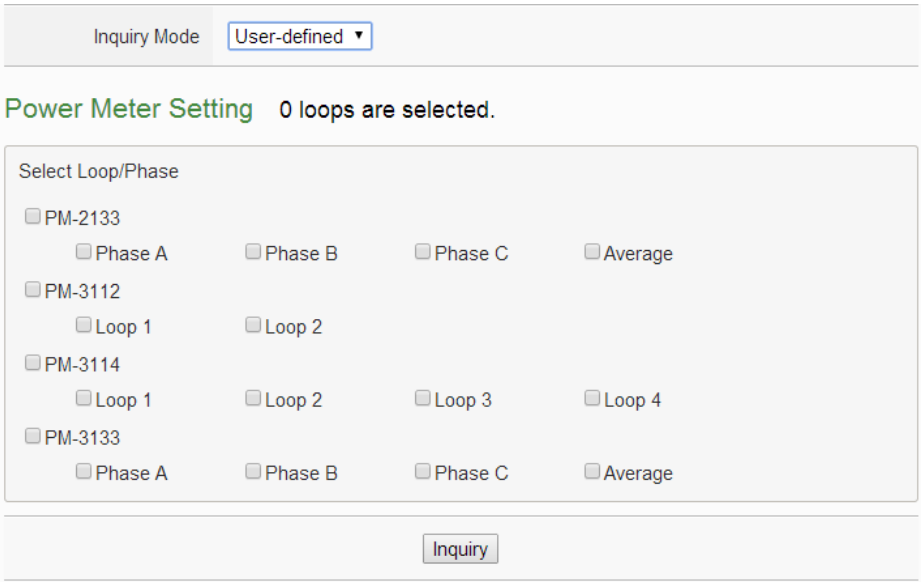


Figure5-26 : Inquiry by User-defined Mode

Click on “Inquiry” button to display the trend of Energy Usage Analysis for the specified date range. If the selected date does not contain the file or exceeds the date of the file storage range, a message “No file exists” will be displayed. The trend of Energy Usage Analysis data of specified classification will be displayed in historical chart. The user could select the range on the below region or drag and move on the chart to adjust the viewing range. Move the mouse cursor close to the marker, the value will be displayed.

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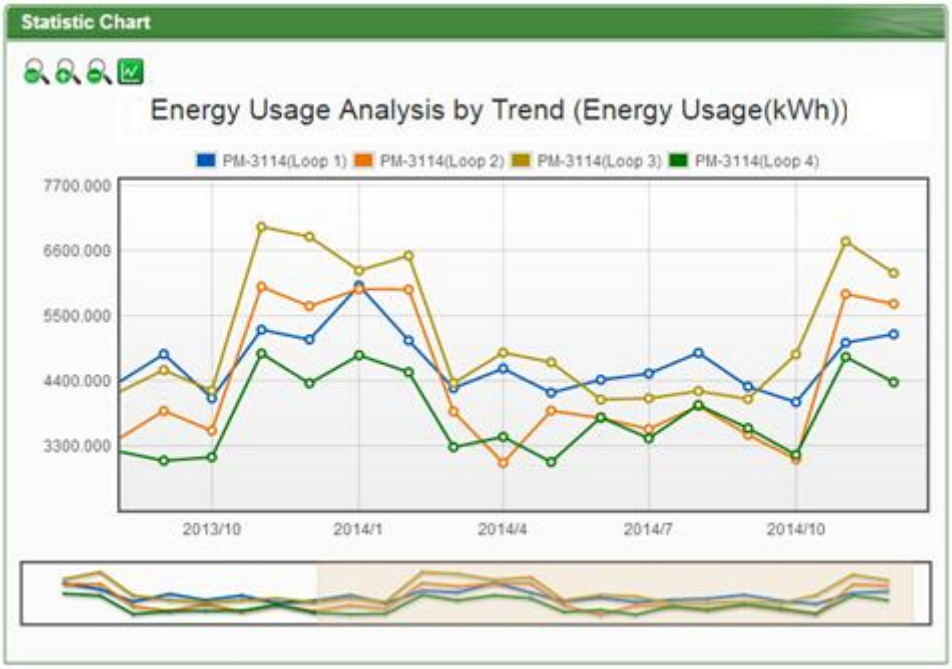


Figure5-27 : PM-3114 Energy Usage Analysis Trend Chart

On the upper left of the Energy Usage Analysis by Trend Chart, there are 4 function icons.

- Set the Energy Usage Analysis by Trend Chart to be default status.
- Zoom in the Y-axis of the Energy Usage Analysis by Trend Chart.
- Zoom out the Y-axis of the Energy Usage Analysis by Trend Chart.
- Hide the markers on the Energy Usage Analysis by Trend Chart. Show the markers on the Energy Usage Analysis by Trend Chart.

5.6.2 Energy Usage Analysis by Time Period

The users could specify the data classification and the time range under this section, and then select the loop(s)/phase(s) to be inquired; the corresponding Energy Usage Analysis by Time Period will be displayed in histogram chart to show the annual, quarterly or monthly energy usage comparison for each year.

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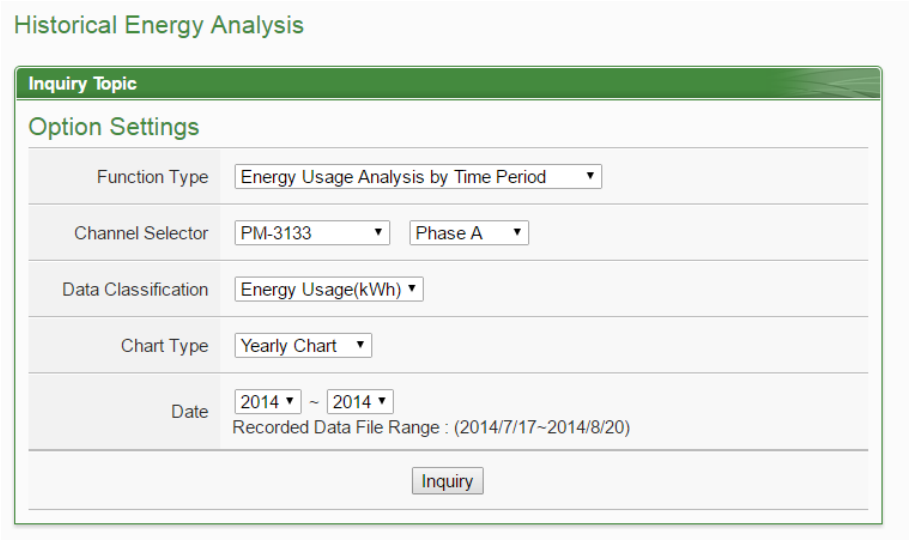


Figure5-28 : Energy Usage Analysis by Time Period

- Function Type: The user can select one of the following three options for energy analysis: Energy Usage Analysis by Trend, Energy Usage Analysis by Time Period and Energy Usage Breakdown by Circuit/Group.
- Select Loop/Phase: All power meters connected to the PMC/PMD will be listed. If no power meter is connected, the user couldn't perform inquiry operation.
- Data Classification: includes V (voltage), I (current), PF (power factor), Energy Usage (KWh), Carbon Emissions, and Maximum Demand.
- Chart Type: Provides Yearly Chart, Quarterly Chart and Monthly Chart.
- Date: Select the date range to be queried (the system will provide the date range can be queried)

Click on "Inquiry" button to display the Energy Usage Analysis by Time for the specified date range. If the selected date does not contain the file or exceeds the date of the file storage range, a message "No file exists" will be displayed. The Energy Usage Analysis by Time Period will be displayed in the lower region in histogram chart. Move the mouse cursor close to the histogram chart, the value will be displayed.

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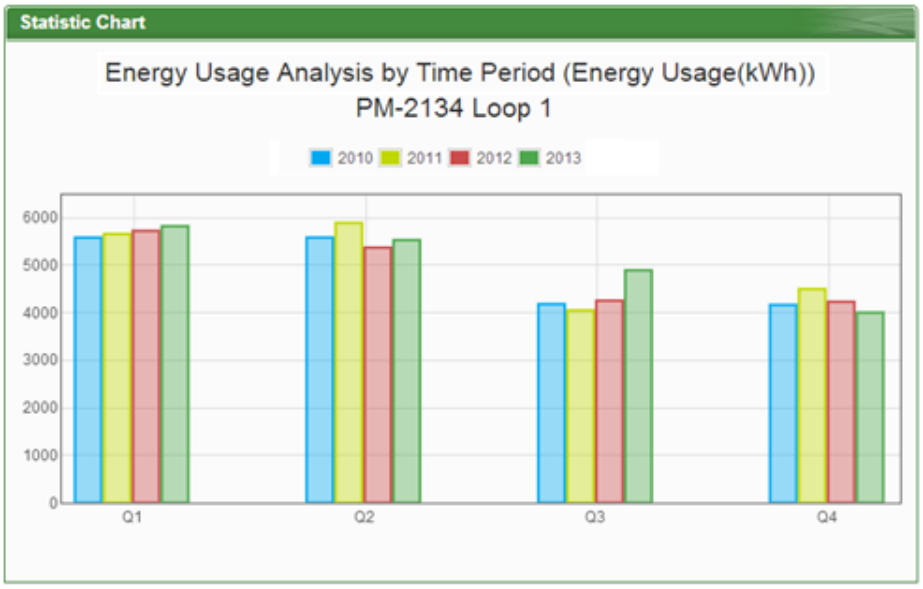


Figure5-29 : Time Histogram Chart for PM-3114 Loop 1

5.6.3 Energy Usage Breakdown by Circuit/Group

The users could specify the data classification and the time range under this section, and then select the loop(s)/phase(s) to be inquired; the corresponding Energy Usage Breakdown by Circuit/Group will be displayed in category pie chart to show the Energy Usage Proportion of the loops/phases.

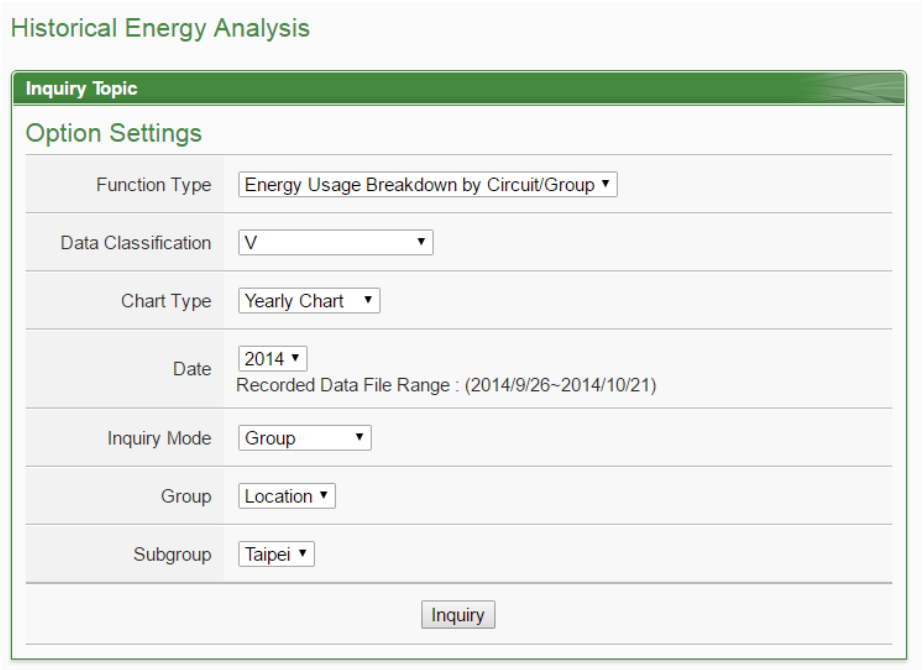


Figure5-30 : Energy Usage breakdown by Circuit/Group

◆ Function Type: The user can select one of the following three options

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for energy analysis: Energy Usage Analysis by Trend, Energy Usage Analysis by Time Period and Energy Usage Breakdown by Circuit/Group.

- Data Classification: includes V (voltage), I (current), PF (power factor), Energy Usage (KWh), Carbon Emissions, and Maximum Demand.
- Chart Type: Provides Yearly Chart, Monthly Chart and Daily Chart.
- Date: Select the date range to be queried (the system will provide the date range can be queried).
- Inquiry Mode：The user can select one of the following two options for inquiring: group mode and user-defined mode.
  - Group：

    In group mode, the user can select group and subgroup to inquiry the energy usage analysis of loops/phases of the power meters in the format of proportion chart. If no group is pre-set, the user will not be able to perform inquiry operation.



Figure5-31 : Inquiry by Group Mode

  - User-defined：

    In user-defined mode, all power meters connected to the PMC/PMD will be listed. If no power meter is connected, the user will not be able to perform inquiry operation. The minimum loop/phase to be queried is 1 loop/phase.

Click on “Inquiry” button to display the Energy Usage Breakdown by Circuit/Group for the specified date range. If the selected date does not contain the file or exceeds the date of the file storage range, a message “No file exists” will be displayed. The Energy Usage Breakdown by Circuit/Group will be displayed as category pie chart in the lower region. Move the mouse cursor close to the category pie chart, the value will be displayed. The electricity usage information will be listed as table below. The maximum and minimum value of the loop/phase will be listed on the table. If the Data Classification of the inquired data is Electricity Usage (KWh), the statistic information of total Energy Usage will also be listed on

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the table.

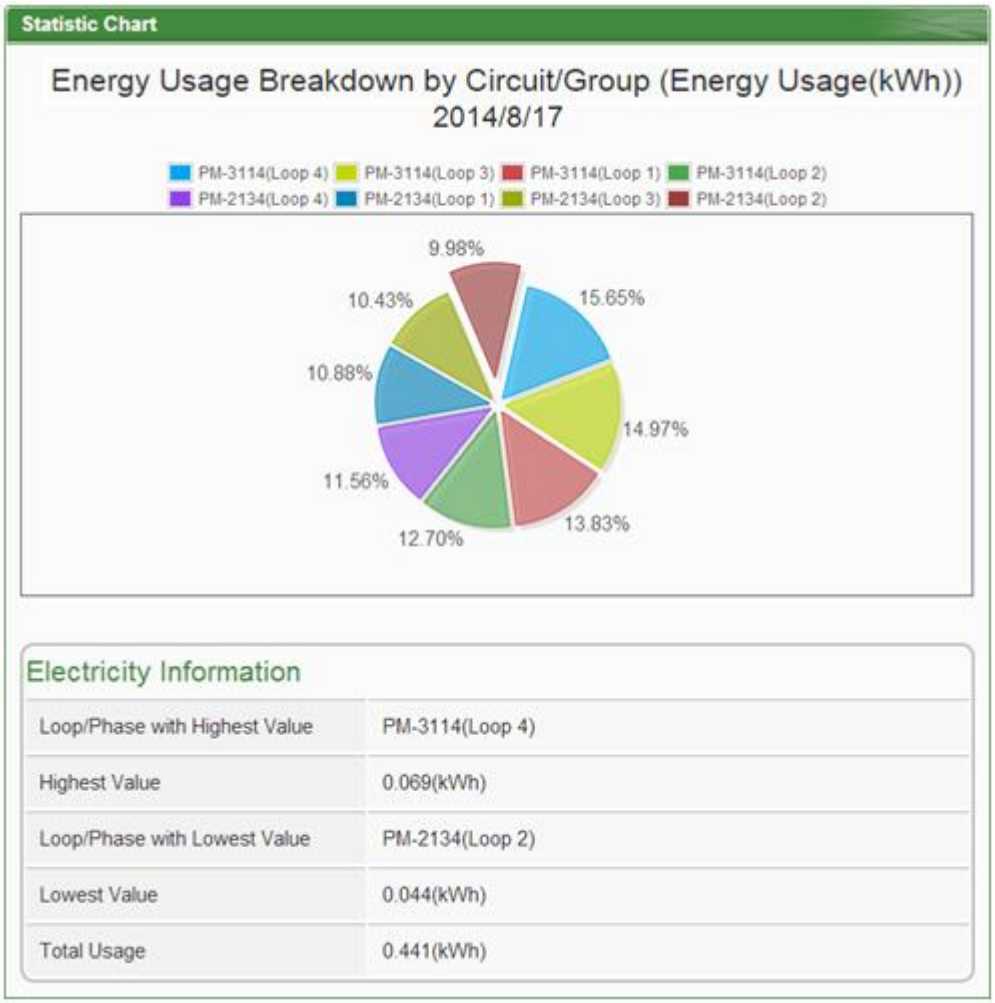


Figure5-32 : Energy Usage Breakdown by Circuit/Group Chart

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5.7 PUE Information

Power Usage Effectiveness(PUE) information can be displayed in two modes(Real-Time and History), users can change the viewing mode according to the requirement；more detailed information is as below:

5.7.1 Real-Time

"Real-Time" overview mode allows display of the multiple PUE values which are calculated by "Total Facility Energy" and "IT Equipment Energy" preset by users. The page refreshes every 20 seconds, the user could also click "Refresh" button to refresh the data immediately.

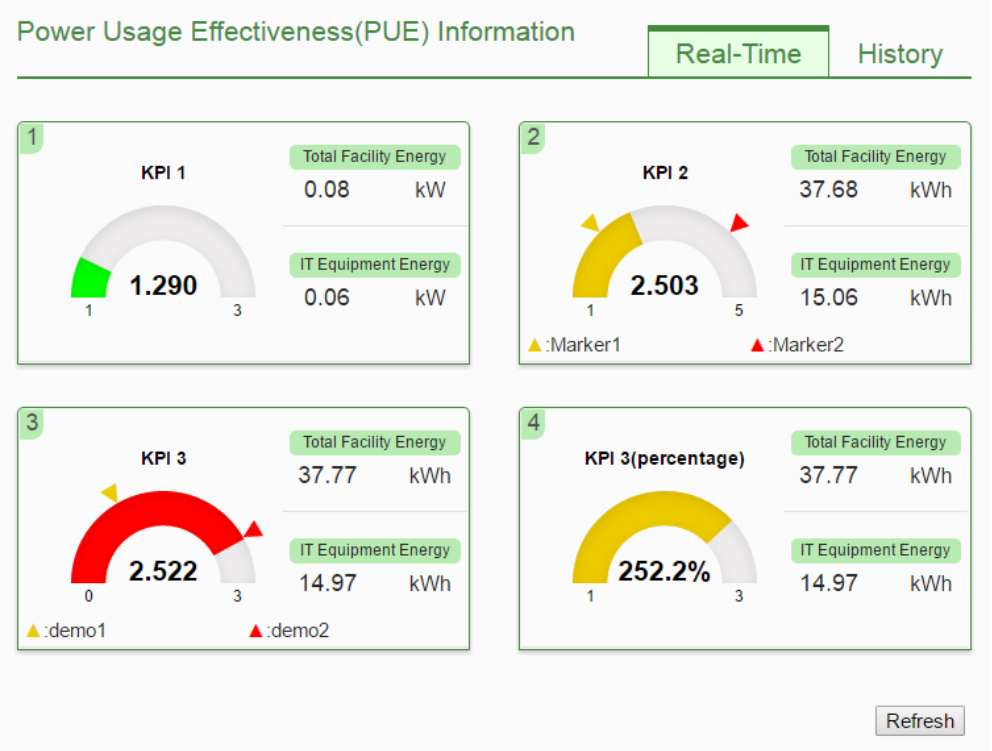


Figure5-33 : PUE information - Realtime

5.7.2 History

"History" overview mode allows display of the PUE data in historical trend. Select the PUE option from the dropdown list of the PUE List, choose the classification from the dropdown list of the Chart Type and then specify the date from the dropdown list of the Date. The interface is shown as below:

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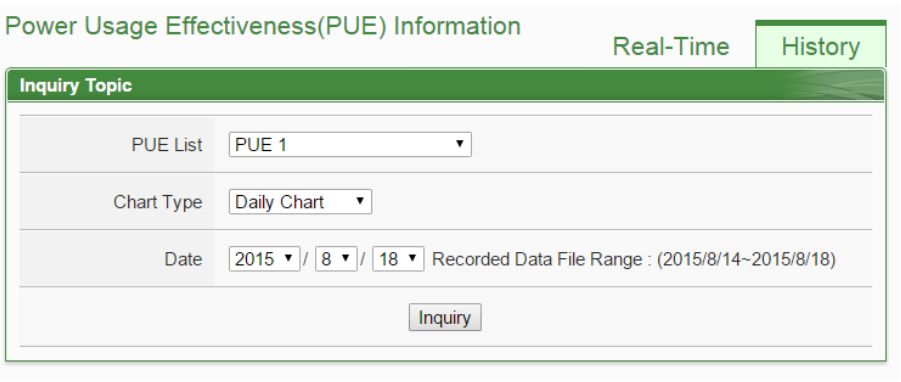


Figure5-34 : PUE information - History(1)

- PUE List：All PUE options which are preset by users will be listed on the dropdown list of the PUE List, if no PUE option is preset, the inquiry operation will not be able to perform.
- Chart Type：Provides Daily Chart and Monthly Chart.
- Date：The dates which are available for PUE data retrieval will be displayed. Please note, if no log file is available, the inquiry operation will not be performed.

Click on “Inquiry” to display the PUE data historical statistic chart (Figure 5-35) of the selected date range. If the selected date does not contain the file or exceeds the date of the file storage range, a message “No file exists” will be displayed.

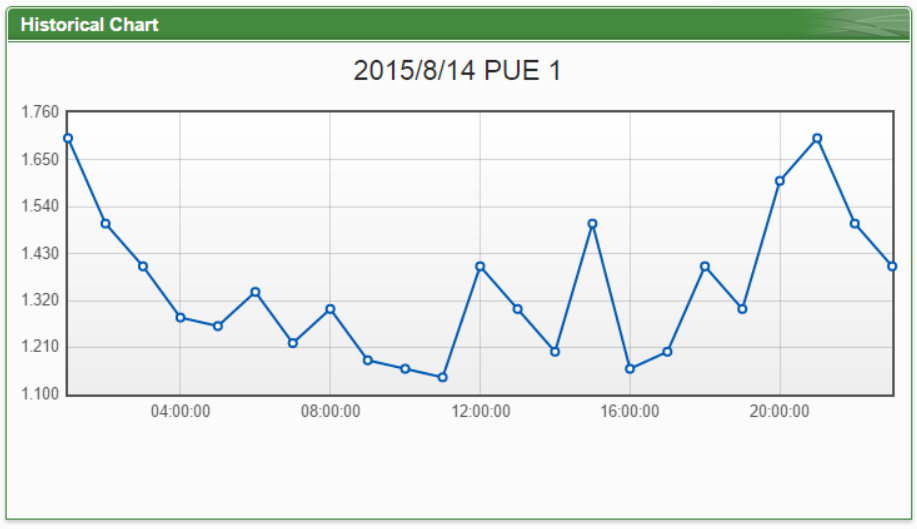


Figure5-35 : PUE information - History(2)

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5.8 I/O Information

The I/O Information page will display the real-time values of the Internal Registers of the PMC/PMD and the real-time I/O channels values of all I/O modules (including XV Board, M-7000, DL or IR Modules, Modbus RTU Modules and Modbus TCP modules) that are connected to the PMC/PMD. If login as the Administrator, it allows to modify the values of Internal Registers or output values of the DO/AO channels (Figure 5-36). If login as a general user, they are allowed to view the values of Internal Registers and the I/O channels (Figure 5-37) only.



Figure5-36 : I/O Information(login as Administrator)



Figure5-37 : I/O Information(login as General User)

The graphic indicator on the right side of the I/O modules will reveal the connection status of the module, the graphic indicators are as follow:
: Online : Offline : Connecting

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5.9 I/O Realtime Chart

I/O Realtime Chart allows display of real-time channel data of the I/O module in trend style. Select the I/O module from the dropdown list of the "I/O module List", the classification from the dropdown list of the "Type" field, the I/O channel from the "Channel Selector" field then click on “Inquiry” button, it will show the chart. The interface is shown as below:

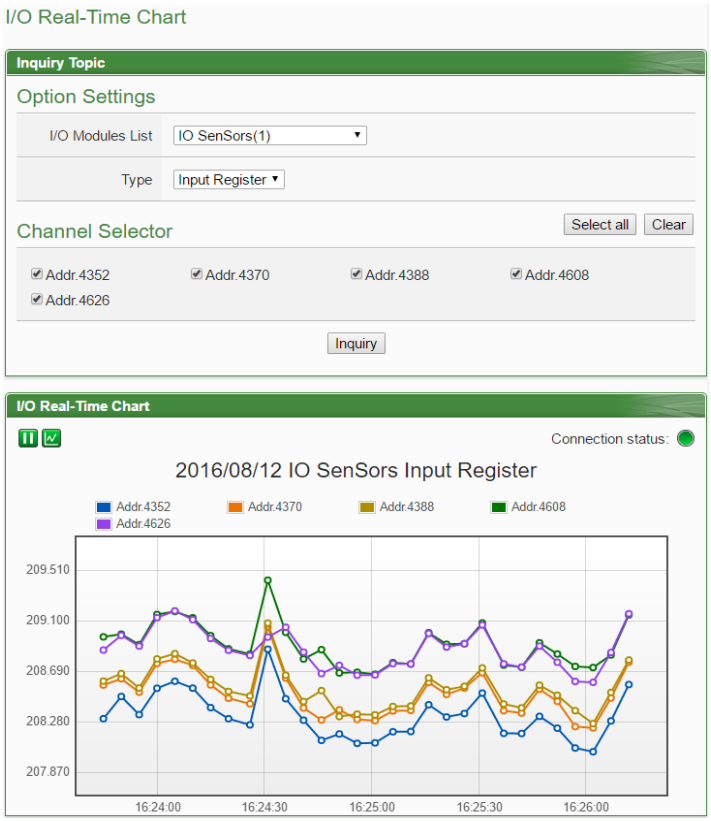


Figure5-38 : I/O Realtime Chart

There are three function icons on the upper area of the I/O Realtime Chart:

- The icon allows to pause the update of the chart, only the data within the 25 minutes will be displayed. The user could click and drag on the chart and move forward or backward to show desired time zone. Click to resume the update of the chart. To view the data on a specific marker, move the mouse over the marker to display the data value.
- icon allows to hide the markers on the chart; click on button to show the markers on the chart.
- “Connection Status” will reveal the connection status of the I/O module, the graphic indicators are shown as follow:

  : Online : Offline : Connecting

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5.10 I/O Historical Chart

I/O Historical Chart allows display of I/O channel historical data of the Data Logger in trend style. Specify the date from the dropdown list of the "Date" field, select the I/O channel from the "Channel Selector" field, then click on “Inquiry” button, it will show the chart. The interface is shown as below. User also can click the "Download CSV" button to download the csv file of the Data Logger for the specify date:

Please Note：The PMC/PMD’s I/O historical data is from I/O Data Logger and User-Defined Data Logger.

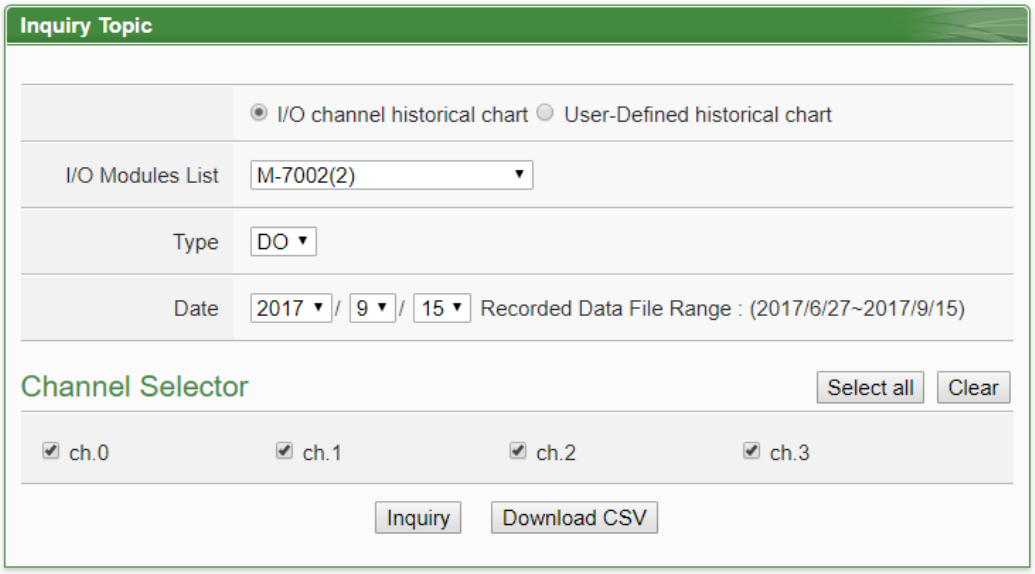


Figure5-39 : I/O Channel Historical Chart

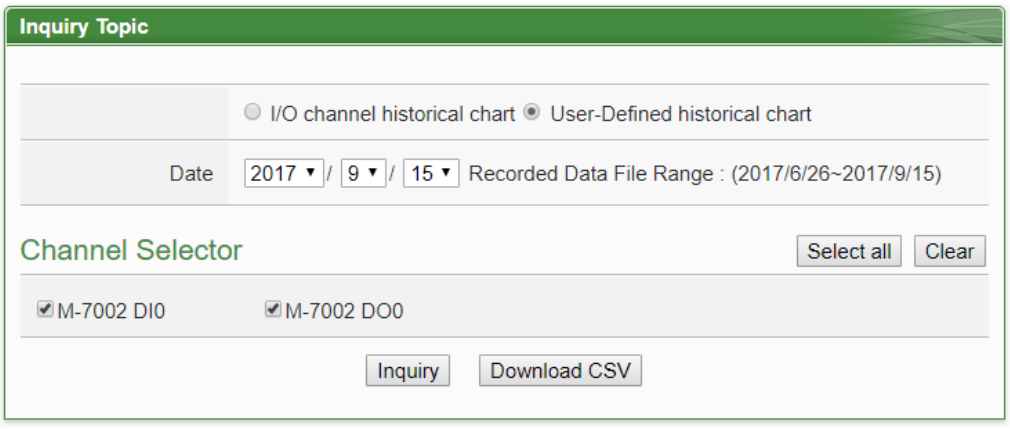


Figure5-40 : User-Defined Historical Chart

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- Date

  The dates that are available for channel data retrieval will be displayed. Please note, if no log file is available, the inquiry operation will not be performed.

- Channel Selector

  All Channel of the User-Defined Data Logger will be list on the dropdown list of the "Channel Selector" List, if there is no any channel in the User-Defined Data Logger, the inquiry operation will not be able to perform

Click on “Inquiry” to display the channel data historical statistic chart (Figure 5-40) of the selected date. If the selected date does not contain the file or exceeds the date of the file storage range, a message “No file exists” will be displayed. The Historical Data Chart is shown as below:

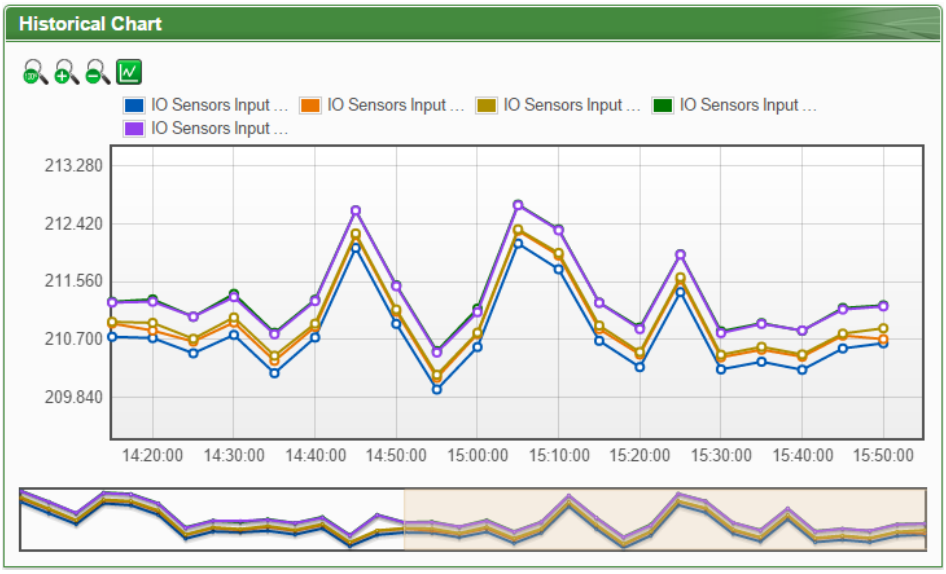


Figure5-41 : I/O Historical Data Chart

On the upper left of the Historical Chart, there are 4 function icons.

- Set the Historical Chart to be default status.
- Zoom in the Y-axis of the Historical Chart
- Zoom out the Y-axis of the Historical Chart
- Hide the markers on the Historical Chart. Show the markers on the Historical Chart

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5.11 Event Log

The Event Log page allows to view the list of system event logger information when login as the Administrator.

Time	Type	Content	Result
2013/07/19 15:59:24	Modbus RTU	Meter read failed (PM-2133 ID:3 address:4352~4423)	Failed
2013/07/19 15:59:15	Rules Setting	Rules file download succeeded	OK
2013/07/19 15:58:21	Modbus RTU	Meter read failed (PM-2133 ID:3 address:4352~4423)	Failed
2013/07/19 15:58:12	Rules Setting	Rules file download succeeded	OK
2013/07/19 15:55:57	Modbus RTU	Meter read failed (PM-2133 ID:3 address:4352~4423)	Failed
2013/07/19 15:55:48	Rules Setting	Rules file download succeeded	OK
2013/07/19 15:47:50	Modbus RTU	Meter read failed (PM-2133 ID:3 address:4352~4423)	Failed
2013/07/19 15:47:42	Rules Setting	Rules file download succeeded	OK
2013/07/19 15:11:59	Modbus RTU	Meter read failed (PM-2133 ID:3 address:4352~4423)	Failed
2013/07/19 15:11:50	Rules Setting	Rules file download succeeded	OK
2013/07/19 14:45:21	Modbus RTU	Meter read failed (PM-2133 ID:3 address:4352~4423)	Failed
2013/07/19 14:45:19	Firmware	Firmware upgrade succeeded [1.0.0 to 1.0.0]	OK
2013/07/19 14:41:02	Firmware	Download [[20130705]PMC-5151.zip] succeeded	OK
2013/07/19 14:19:20	Modbus RTU	Meter read failed (PM-2133 ID:3 address:4352~4423)	Failed
2013/07/19 14:19:17	Firmware	Firmware upgrade succeeded [1.0.0(Demo) to 1.0.0]	OK
2013/07/19 14:15:20	Firmware	Download [20130710-PMC-5151.hex] succeeded	OK
2013/07/19 14:12:27	Rules Setting	Rules file download succeeded	OK
2013/07/19 14:06:59	Rules Setting	Rules file download succeeded	OK
2013/07/19 13:59:55	Firmware	Firmware upgrade succeeded [1.0.0 to 1.0.0(Demo)]	OK
2013/07/19 13:59:08	Modbus RTU	Meter read succeeded(PM-3112 ID:4 address:4352~4387)	OK

Figure5-42 : Event Log information display

The Event Log record including the following information:

- The PMC/PMD failed to read data of the power meter(s).
- Change the network settings on the PMC/PMD.
- Save settings to the PMC/PMD.
- Change the system time setting.
- Reset accumulated power data of the power meter to 0.
- Transfer Data Logger files to FTP server succeeded or failed.
- When performing firmware upgrade, record the transfer of the firmware file to the PMC/PMD is succeeded or failed.
- The upgrade of the firmware is succeeded or failed.

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5.12 Polling Time Information

Users can check the polling time of each modules and power meters which are connected with PMC/PMD currently. The "Polling Time Information Page" is as below:

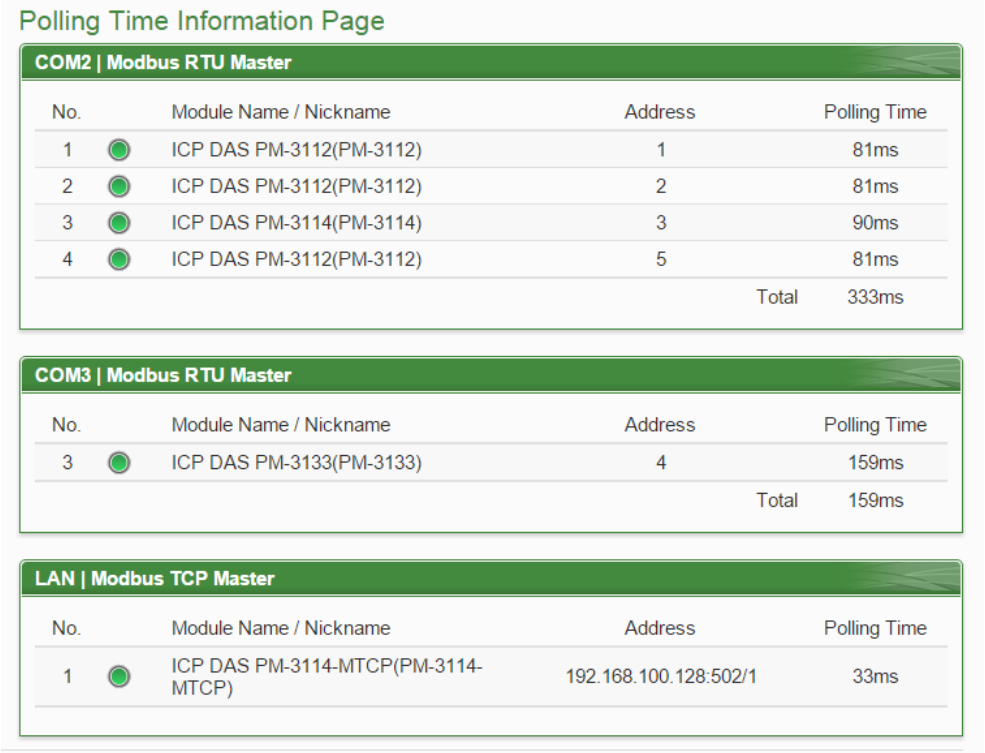


Figure5-43 : Polling Time Information

The graphic indicator on the right side of the No. will reveal the connection status of the module, the graphic indicators are as follow:

: Online : Offline : Connecting

5.13 Modbus Table Information

The user can query and print the detailed modbus address information of the modules which are connected to PMC/PMD. Please refer to Appendix I for more detailed Modbus address description.

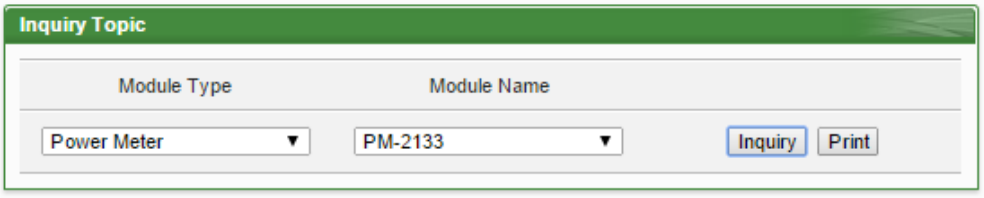


Figure5-44 : The Interface of Modbus Table Information

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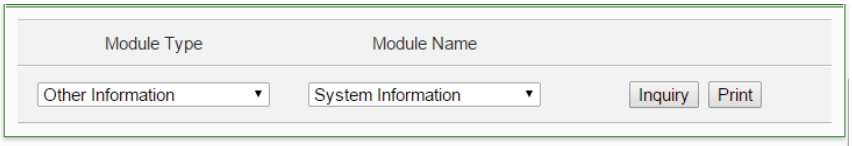
◆ Module Type

"Module Type" includes 4 options : Power Meter, I/O Module, XV-Board and Other Information

◆ Module Name

According to the selected "Module Type" option, the corresponding module name or information of "Module Name" will be listed.

Click on "Inquiry" to display the Modbus table information of the selected module. The users can click on the "Print" button to print this Modbus address table.



PM-2133					
No.	Port	Address	Module Name	PT Ratio1	CT Ratio1
1	COM2	1	PM-2133	1	1

Input Register, Unit : Register(16 Bits)				
Parameter Name	Modbus Address	Length	Data Type	Range
Phase A				
V	30300	2	Float	Floating Point
I	30302	2	Float	Floating Point
kW	30304	2	Float	Floating Point
kvar	30306	2	Float	Floating Point
kVA	30308	2	Float	Floating Point
PF	30310	2	Float	Floating Point
kWh	30312	2	Float	Floating Point
kvarh	30314	2	Float	Floating Point
kVAh	30316	2	Float	Floating Point
Phase B				
V	30318	2	Float	Floating Point
I	30320	2	Float	Floating Point
kW	30322	2	Float	Floating Point
kvar	30324	2	Float	Floating Point
kVA	30326	2	Float	Floating Point

Figure5-45 : Inquiry result of Modbus Table Information

5.14 UID Information

Users can check the UID information of each power meters which are connected with PMC/PMD currently. The "UID Information" page is as below:

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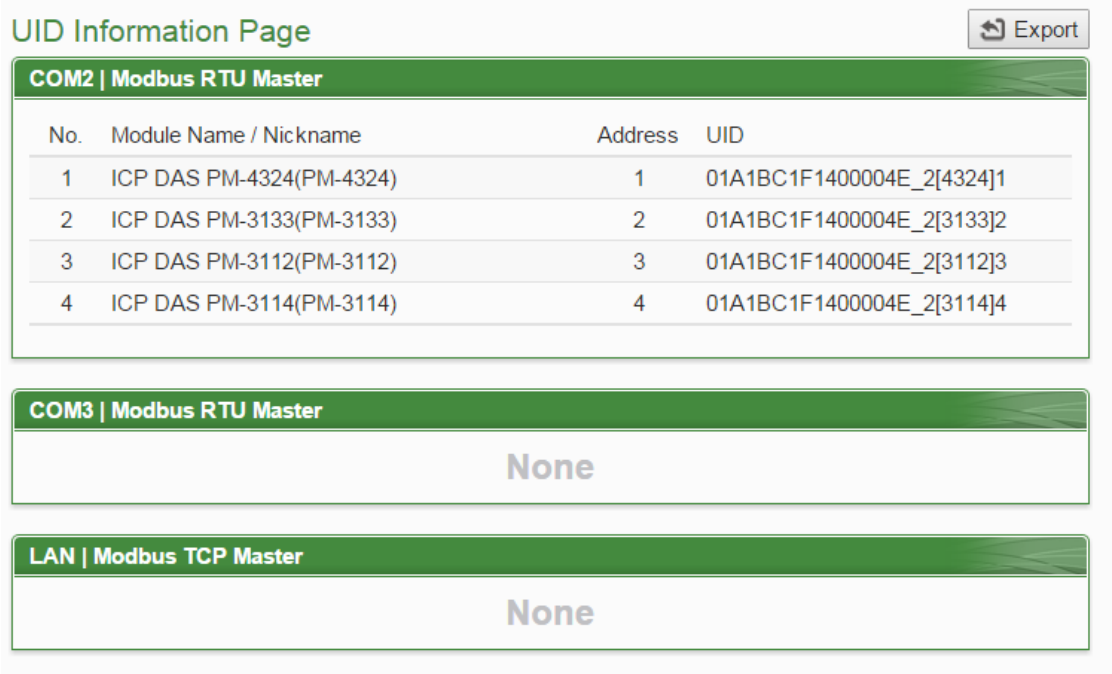


Figure5-46 : Power Meter UID Information Page

Users can click "Export" button to export the UID information as CSV file.

5.15 Ping Status Page

It displays the latest Ping results of all Ping targets. The latest ping result is displayed in the “Result” column, and the response time is displayed in the “Response Time” column. In the “Failed Times/Ratio” column, it displays the continuous failed numbers or the failed ratio that depends on the Failed Condition. The “Last Success Time” column displays the timestamp of the latest successful ping.

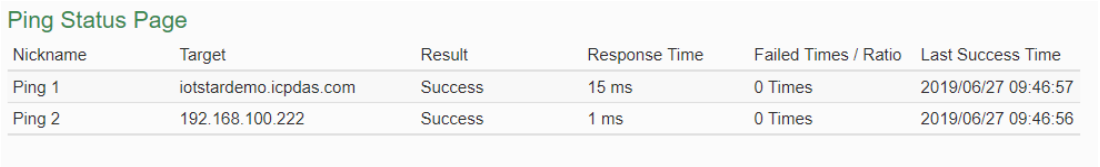


Figure5-47 : Ping Status page

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6 System Setting

System Setting includes 6 options: Time Setting, Network Setting, SNMP Setting, Security Setting, I/O Interface Setting, Power Meter Group Setting and Other Setting. When you get into the System Setting page, the system settings information of this PMC/PMD will be displayed, as shown below:

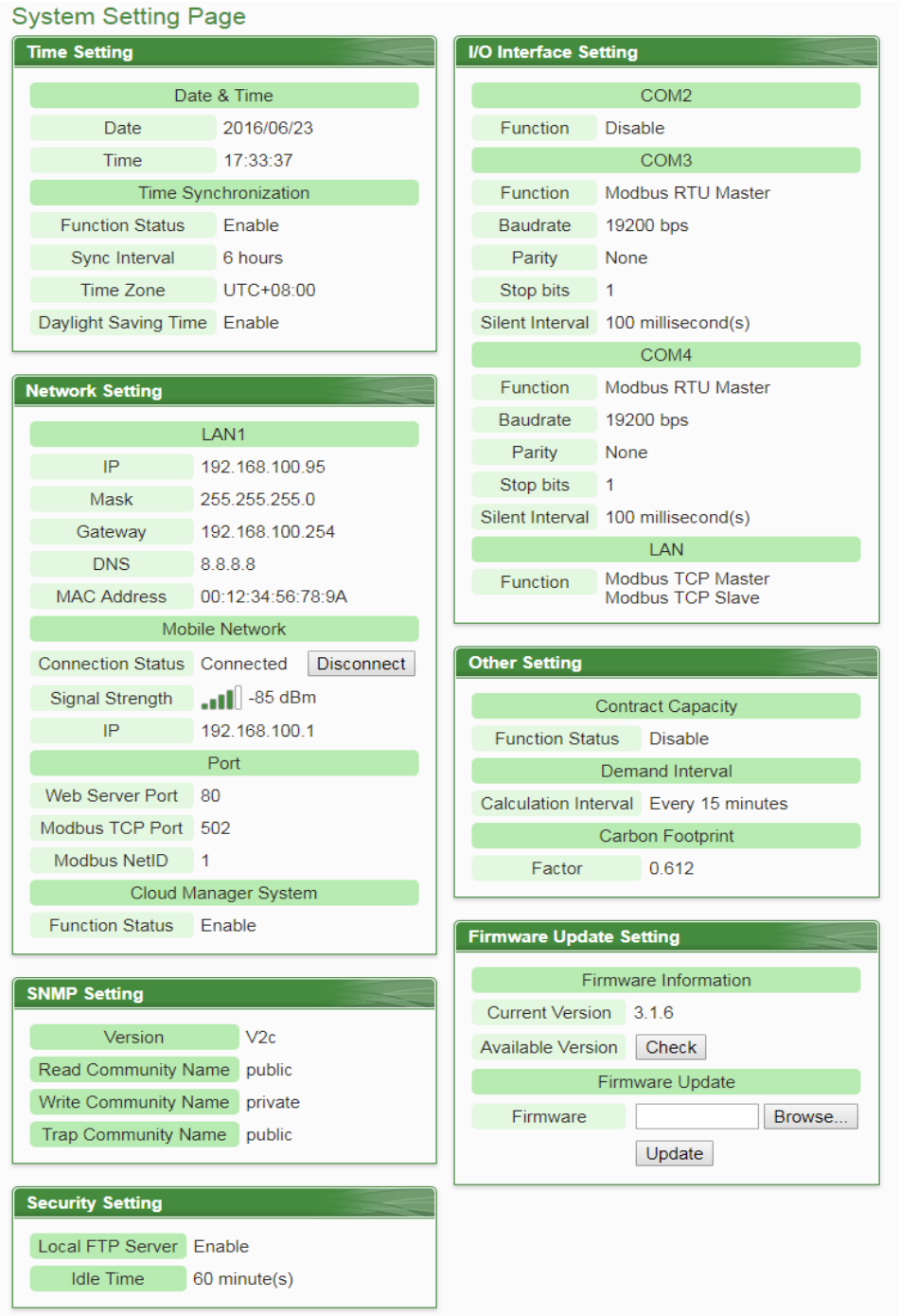


Figure6-1 : System Setting Overview Page

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The user could view system setting information of PMC/PMD or perform firmware update on this page. For firmware update operations, please refer to 6.8 Firmware Update.

6.1 Time Setting

On the Time Setting page, it allows to set the time of PMC/PMD and Time Synchronization function. The setting interface is as below:

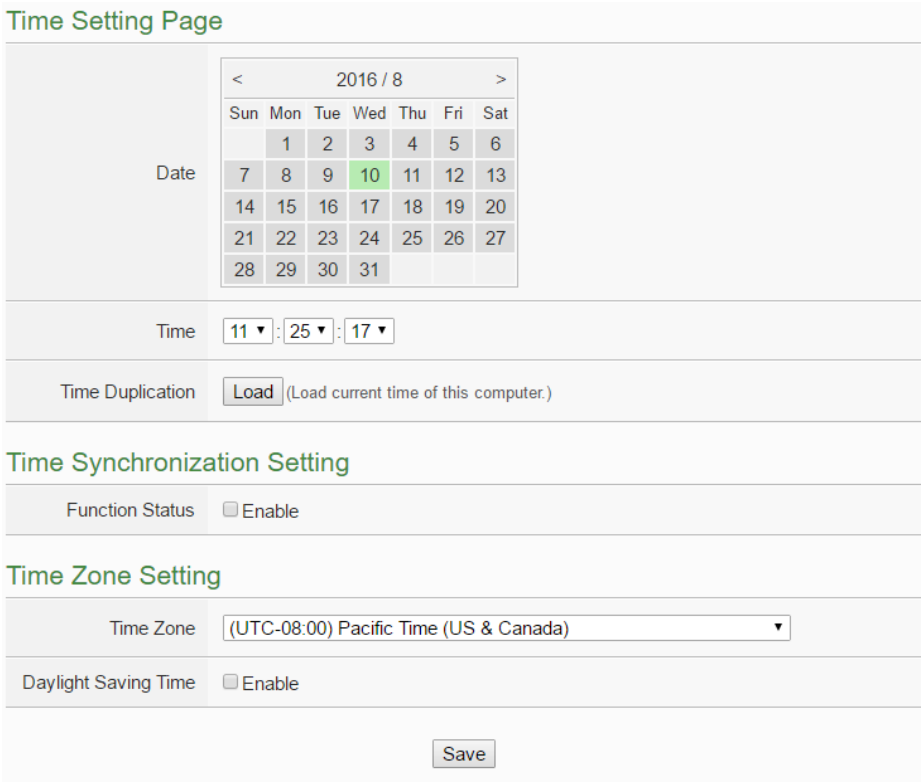


Figure6-2 : Time Setting Page

When get into this page, the system will read and display current time of the PMC/PMD. To modify the system time of PMC/PMD, set up the date and time on the “Time Setting page section” and then click “save” to complete the settings. The user could click on “Load” in the “Time Duplication” to synchronize the system time of the computer where the browser located and the system time of the PMC/PMD. The PMC/PMD also provides SNTP Time Server function that allows to set up Time Synchronization to sync the clock through network. The following figure illustrates the set up interface:

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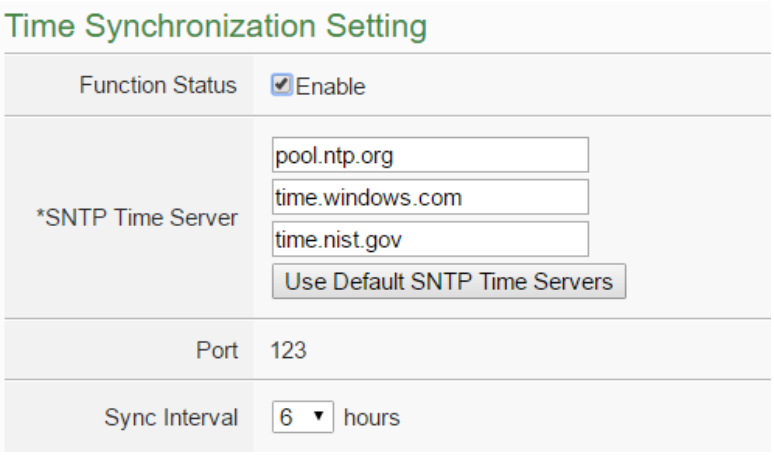


Figure6-3 : Time Synchronization Setting

Follow the steps below to set up Time Synchronization Setting:

i. In the “Function Status” field, check “Enable” to enable the Time Synchronization function.
ii. In the “SNTP Time Server” field, input the IP address or domain name of the SNTP Time Server. There are 3 default SNTP Time Servers, the user could modify the address to use other server. Click “Use Default SNTP Time Servers” to restore the default Time Server settings.
iii. The default Port number setting is “123”, currently it is not allowed to be modified.
iv. In the “Sync Interval” field, select the time interval to specify how often will the PMC/PMD automatically connect to SNTP time server for time synchronization through the network. The user could set the time interval to be 6, 12, or 24 hours.
v. After all settings are completed, click “Save” button to save the changes.

In addition, users can select the time zone of the PMC/PMD location from the dropdown list in the “Time Zone” field, and enable the daylight saving time function in the “Daylight Saving Time” field if required.

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6.2 Network Setting

Network Setting allows making a change to network configuration, web server port setting, Modbus settings, Dynamic DNS setting and IoTstar Connection settging on the PMC/PMD. The following figure illustrates the configuration interface. Please Note：PMC-523x/PMD series only support LAN1 setting. PMC-224x series support LAN1 & LAN2 setting.

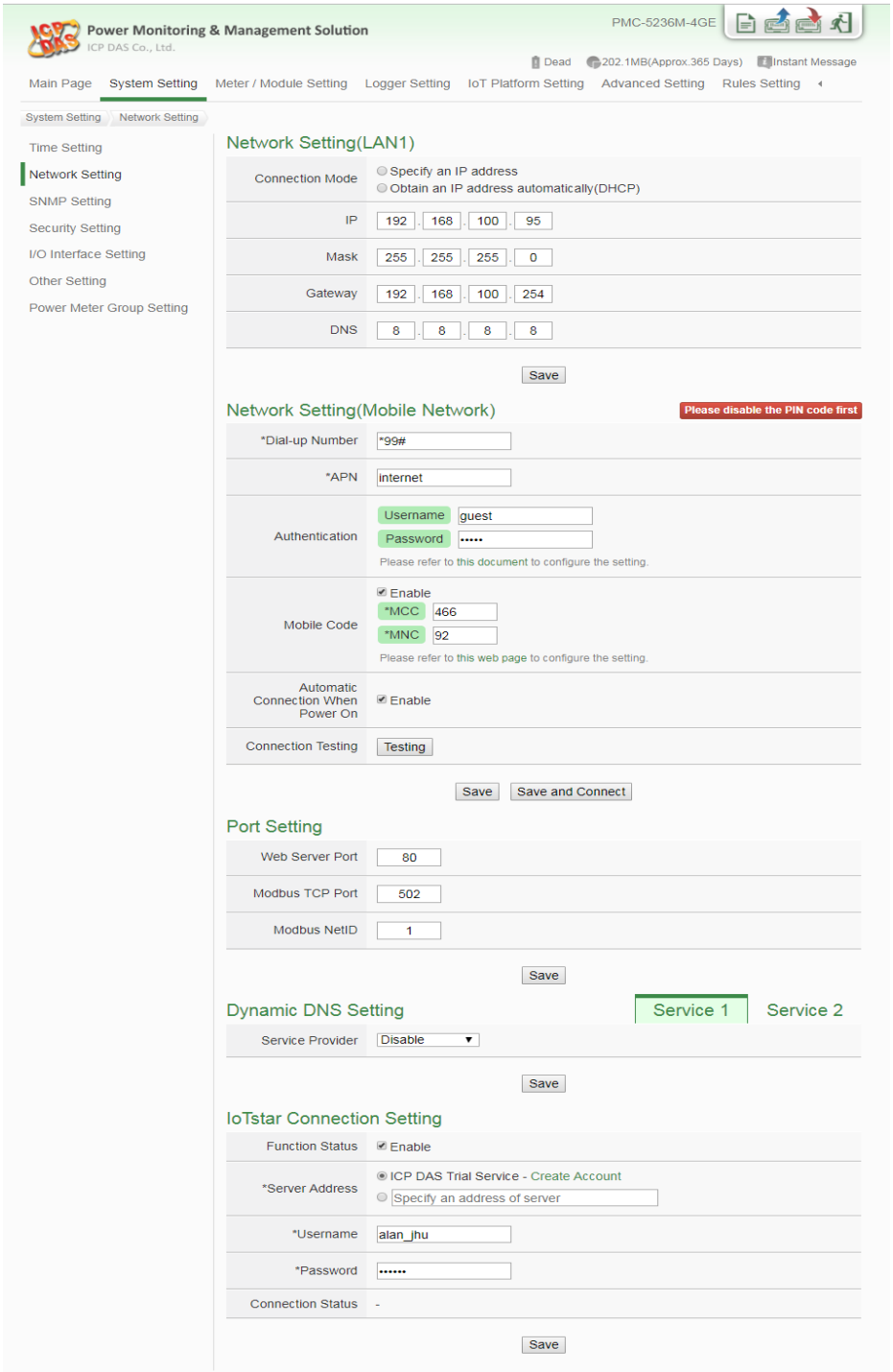


Figure6-4 : Network Setting Page

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- Network Setting (LAN)

  Each time when the user enters this page, it will read and display current network configuration and port settings from the PMC/PMD. In the “Connection mode” field, please select the connection mode as “Obtain an IP address automatically (DHCP)” or “Specify an IP address”, then modify IP/Mask/Gateway/DNS Server IP configuration. After all settings are completed, click “Save” button to save the changes. After the network configuration is completed, the user could login into PMC/PMD webpage via LAN1 or LAN2, and is able to retrieve data via Modbus TCP.

  Please note:

  1. PMC/PMD adopts Google DNS server as system default DNS server, the default IP is “8.8.8.8”, the IP can be modified to other DNS server IP if required.
  2. If the connection mode is “Specify an IP address”, then you make modification to the IP address, the system will logout automatically and re-connect to the web page automatically based on the new setting. If the connection mode is “Obtain an IP address automatically (DHCP)”, the system may fail to re-connect to the web page because the IP address is changed. Please use PMC Utility to search the PMC/PMD, get the new IP address of PMC/PMD, and then launch browser to connect to the PMC/PMD with the new IP address.

- Network Setting (Mobile Network)

  The Network Setting (Mobile Network) section is for user to complete the setting of Mobile Network of PMC-5231M-4GE(or 4GC)/ PMC-5231M-3GWA. The default Dial-up number is “*99#”. User can change it by the proprietary number provided by the Telecommunication Service Company. To configure the setting for "APN" and "Authentication" field, please refer to the document provided on the PMC Web page. "Mobile Code" is an optional setting. It depends on the service the Telecommunication Service Company provides. If the user select the "Automatic Connection When Power On" option, it will enable the PMC-5231M-4GE(or 4GC)/PMC-5231M-3GWA to complete the Mobile Network connection automatically when power on PMC. User can click the "Connection Testing" button to test the Mobile

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Network connection status between the PMC-5231M-4GE(or 4GC)/PMC-5231M-3GWA and the Mobile Network. Please Note: In order to complete the connection to the Mobile Network, please remember to disable the PIN code setting of the SIM used in PMC-5231M-4GE(or 4GC)/PMC-5231M-3GWA.

After completing the Mobile Network setting, the connection status between PMC and Mobile Network can be shown on the System Setting Page; and the connection status (Connect or Disconnect) can be changed manually. This section also displays the strength level of the Mobile Network Signal and the IP address that PMC-5231M-4GE(or 4GC)/PMC-5231M -3GWA occupies through Mobile Network.

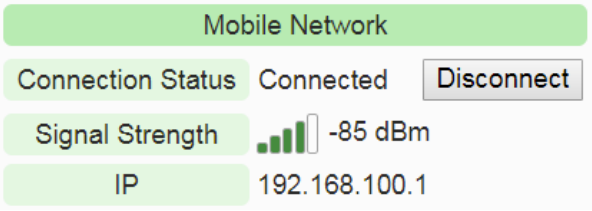


Figure6-5 : Signal Strength level and IP address for Mobile Network

- Port Setting

  In the “Port Setting” section, the user can modify the Web Server Port/ Modbus TCP Port/Modbus NetID. After all settings are completed, click “Save” button to save the changes.

- Dynamic DNS Setting

  PMC/PMD provides the Dynamic DNS service. The following figure illustrates the configuration interface:

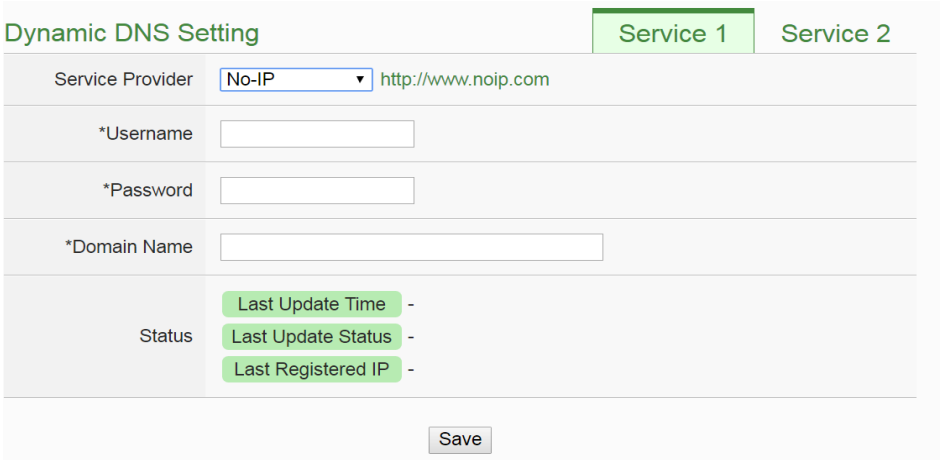


Figure6-6 : DDNS Setting Page

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Follow the steps below to set up Dynamic DNS service:

i. Click the services tabs on the right-top corner of “Dynamic DNS service”. System provides two items for selection as “Service 1” and “Service 2”. User can enable one Dynamic DNS service for normal status, or enable two Dynamic DNS services for the redundant service.

ii. In the “Service Provider” field, select the provider of Dynamic DNS services from the dropdown list. Currently system provides 5 service providers for selection as “No-IP”, “ChangeIP”, “Free DNS”, “Dyn” and “DNS-O-Matic”. User can also select “Disable” to disable the service.

iii. If user selects “No-IP”, “ChangeIP”, “Dyn” or “DNS-O-Matic”, please enter the ID, Password and Domain Name to login the service. If user selects “Free DNS”, please insert the Token to login the service.

iv. After all settings are completed, click “Save” button to save the changes.

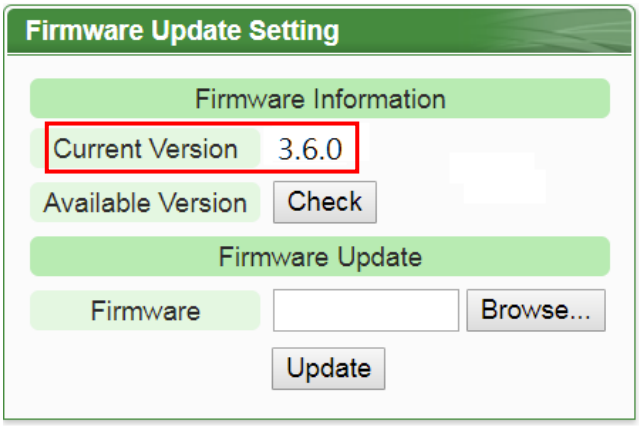
- IoTstar Connection Setting

  The IoTstar Connection Setting section is for user to complete the PMC/PMD's setting for the Network connection to the IoTstar. Please follow the steps below for the settings:

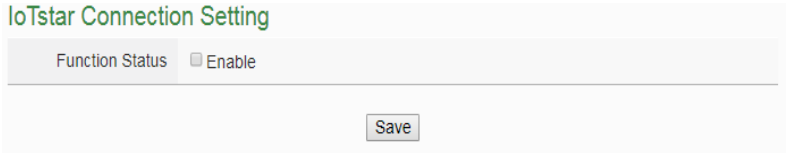
  Please Note：ICP DAS IoTstar Cloud Manager System only support PMC-523x/PMC-224x/PMD controller.

  i. Make sure the firmware version of the PMC/PMD is V3.6.0 or later version. If the PMC/PMD does not install with the right firmware version, please update the firmware before taking the next step.

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ii. Click “Enable” of the “Function Status” to enable the network connection to the ICP DAS IoTstar.



iii. Two options : “User-built IoTstar” and ”IoTstar Trial” are available for selection.

If user select ”User-built IoTstar”, please click 

in the “Server Address” field, then input the IP address or Domain Name of the PC or Platform (with IoTstar installed). Enter the login username and password in the “Username” and “Password” fields. PMC/PMD will login and connect to the IoTstar by the information provided.

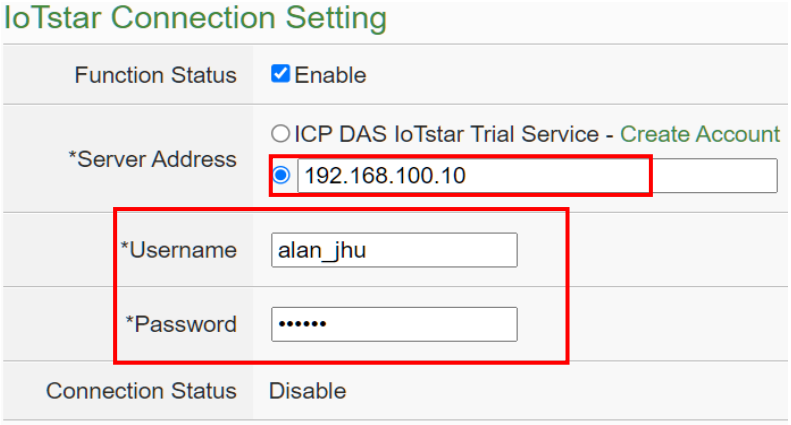


Figure6-7 : IoTstar connection setting page(1)

If user want the PMC/PMD to connect the “IoTstar Trial, please

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click ◉ICP DAS IoTstar Trial Service in the “Server Address” field, then enter the login username and password (require to apply in advance) in the “Username” and “Password” fields. PMC/PMD will login and connect to the “IoTstar Trial” by the information provided.

Please Note: For the account application of the “IoTstar Trial”, please refer to the instructions in "Appendix X：ICP DAS “IoTstar Trial” account application".

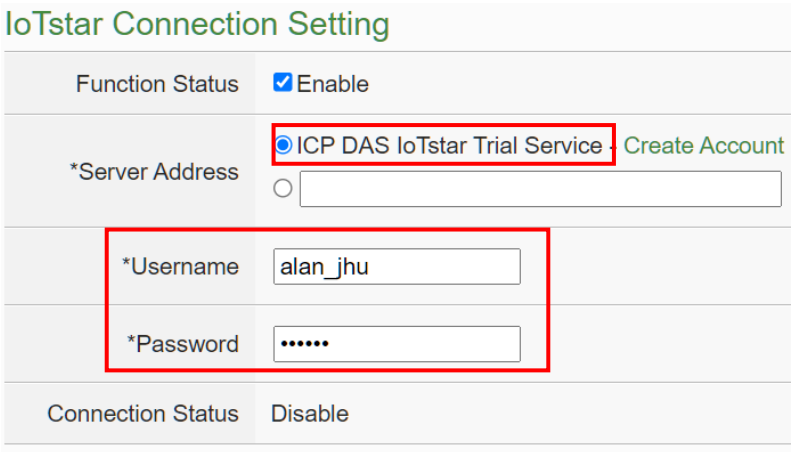
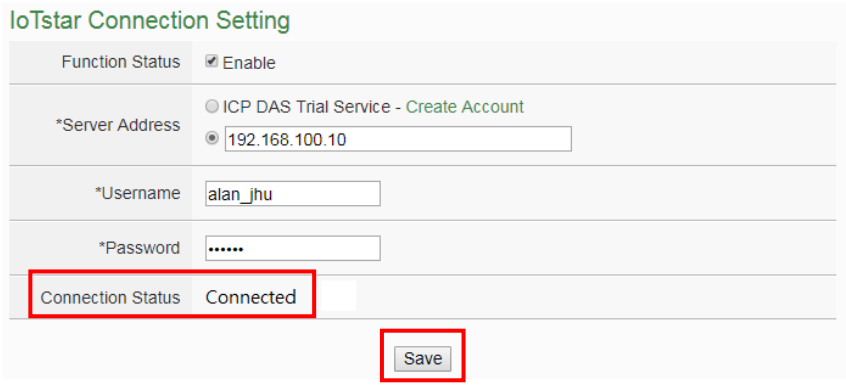


Figure6-8 : IoTstar connection setting page(1)

iv. After all settings are completed, click “Save” button to save the changes. This PMC/PMD will connect to the IoTstar immediately. The users can review the current connection status between PMC/PMD and IoTstar through the information displayed in the "Connection Status" field.



v. If the "Connection status" field shows the "Connected" message, it means the connection between the PMC/PMD and IoTstar is in normal status. The authorized users now can login into the IoTstar (with the username and password set in “Step iii”) to perform remote monitoring and maintenance of the PMC/PMD.

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6.3 SNMP Setting

The PMC/PMD provides SNMP(Simple Network Management Protocol) V1 and V2c to work with the SNMP Network Management software for monitoring the system data, power meter data and I/O module data. The SNMP Setting page allows you to enable or modify the settings of the SNMP function on the PMC/PMD. The following figure illustrates the set up interface:

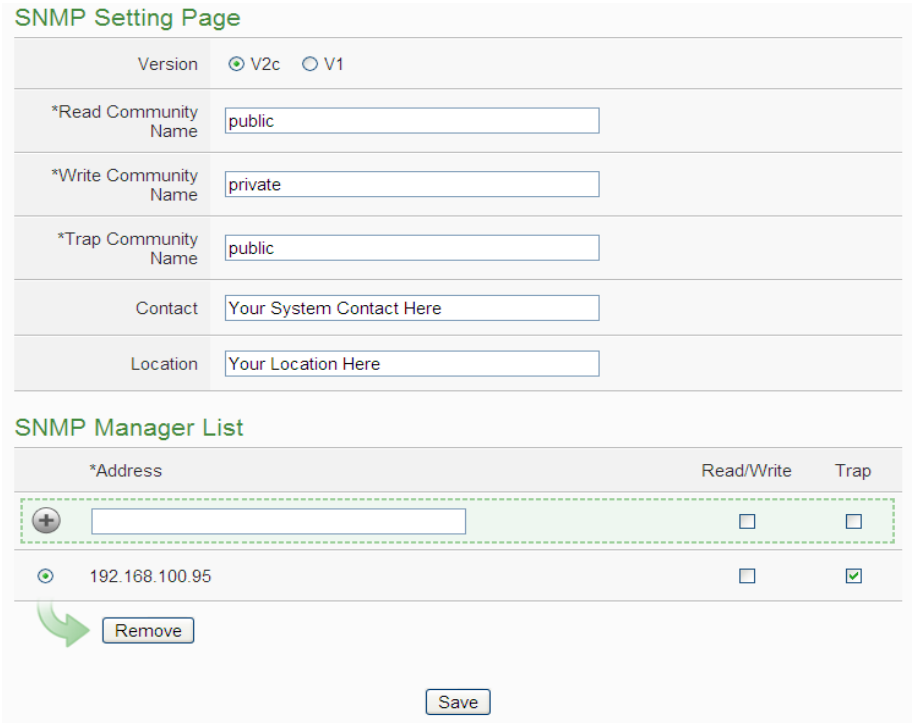


Figure6-9 : SNMP Setting Page

Please follow the steps below for the SNMP Settings：

i. In the “Version” field, select the SNMP version that you want to use. Currently PMC/PMD supports SNMP V2c and V1 protocol,

ii. In the “Read Community Name” field, input a string for “Read Community Name” for SNMP function. The default string is “public”.

iii. In the “Write Community Name” field, input a string for “Write Community Name” for SNMP function. The default string is “private”.

iv. In the “Trap Community Name” field, input a string for “Trap Community Name” for the SNMP function. The default string is “public”.

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v. In the “Contact” field, input the “Contact” string.
vi. In the “Location” field, input the “Location” string,

The SNMP Manager List is a list for all SNMP Managers which will interact with the SNMP Agent of PMC/PMD. Please follow the steps as below to perform the setting for SNMP Managers. After all settings are completed, click “Save” button to save the changes.

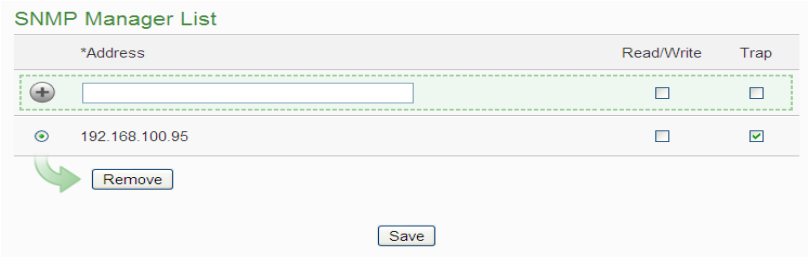


Figure6-10 : SNMP Manager List

i. Set up IP Address or domain name of the SNMP Manager that you want to add. Please set up the Address appropriately, if the settings are not the same as the settings of the SNMP Manager, the interaction between PMC/PMD and the SNMP Manager will be failed.

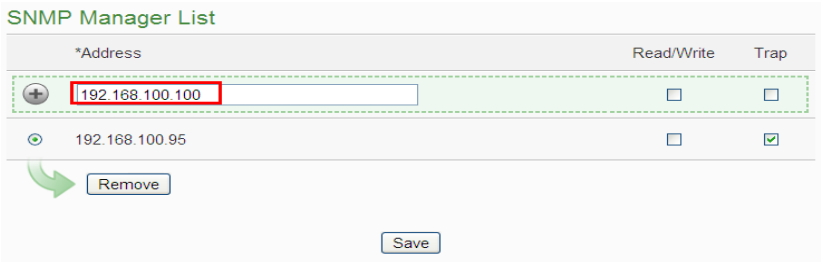


Figure6-11 : The Address Setting for SNMP Manager

ii. Click to Enable (or Disable) the working model between the SNMP Manager and the SNMP Agent of PMC/PMD. Currently PMC/PMD provides two working models as Read/Write (Polling) and Trap for SNMP Manager.

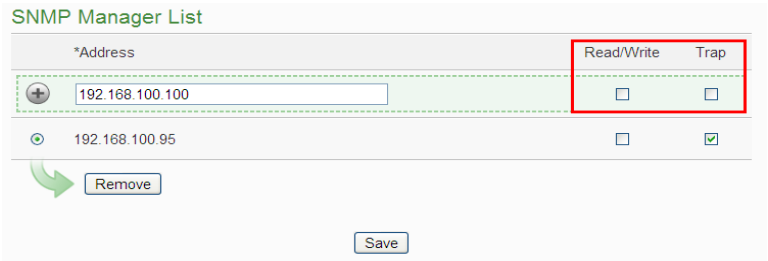


Figure6-12 : The Working Model Setting for SNMP Manager

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Please Note: If no "Read/Write" field on the list is enabled to accept the Read/Write commands, indicating that it will allow accepting the Read/Write commands from ANY SNMP Manager.

iii. After completing the IP address and working model setting, please click  button to add the SNMP Manager to the list. After adding the SNMP Manager, click “Save” button to save the changes.

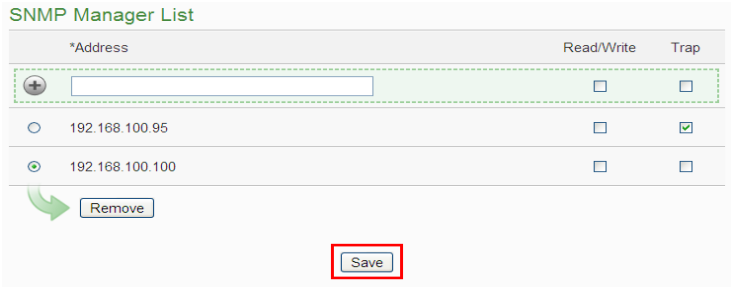


Figure6-13 : Save the SNMP Manager Setting

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6.4 Security Setting

Security Setting allows user to change the password that is required when access to PMC/PMD. The user could also modify the settings of FTP Server and Idle Time. The Security Setting page is as follow:

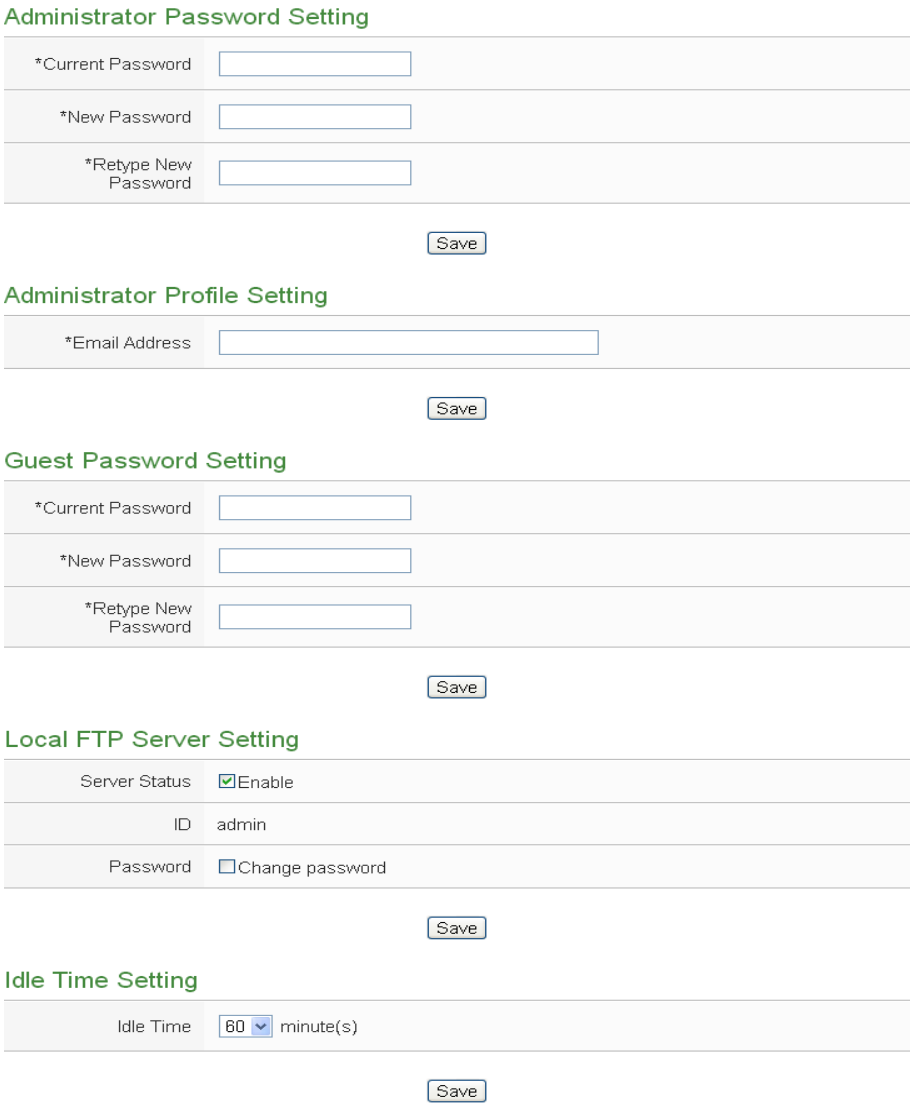


Figure6-14 : Security Setting Page

- Password Setting

  PMC/PMD provides two passwords sets, one for Administrator, the other for Guest. The default password for Administrator is “Admin” and “User” for Guest. The user can modify the password in the “Password Setting” section; the Password length is limited to 16 characters. After all settings are completed, click “Save” button to save the changes. In addition, if login as the Administrator, in the “Administrator Profile Setting” section, the users could input an email address, once the

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password is forgotten or lost, the PMC/PMD could send an email with the passwords (administrator and guest) to this email address, for more detailed information, please refer to Appendix II.

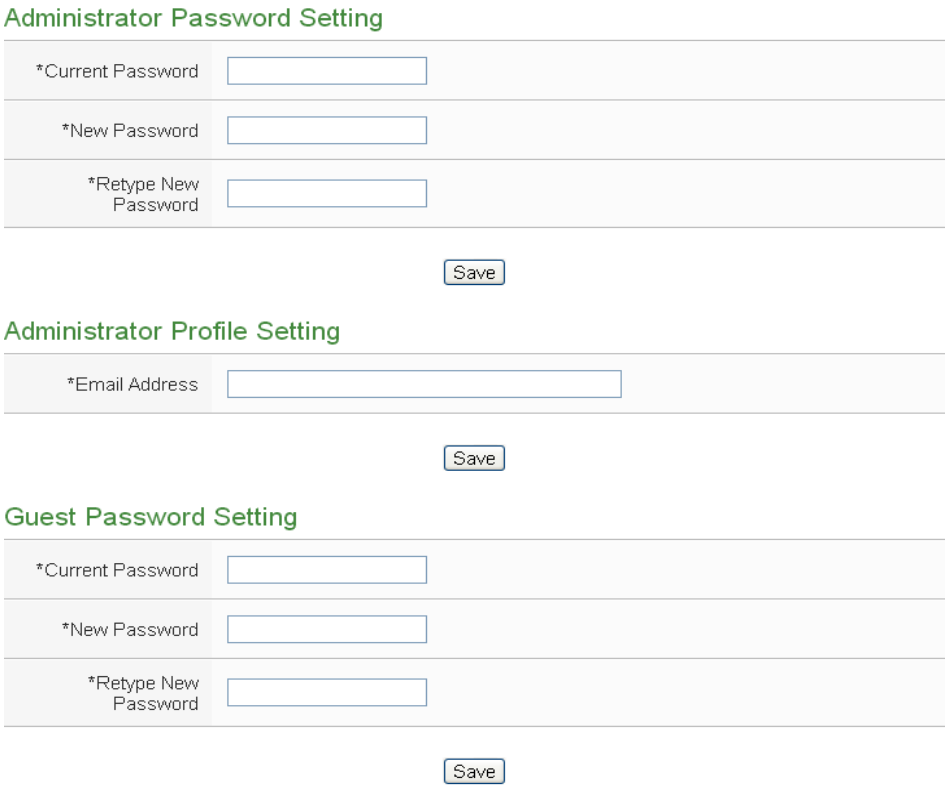


Figure6-15 : Password Setting Page

- Local FTP Server Setting

  In this section, it allows to enable or disable the FTP Server function on the PMC/PMD side. The user could connect to PMC/PMD FTP Server via FTP software to remotely retrieve event log or data record file. To enable this function, check "Enable" in the "Server Status" field. The default password is "Admin", the user could modify the password of the FTP Server on the PMC/PMD side if required.

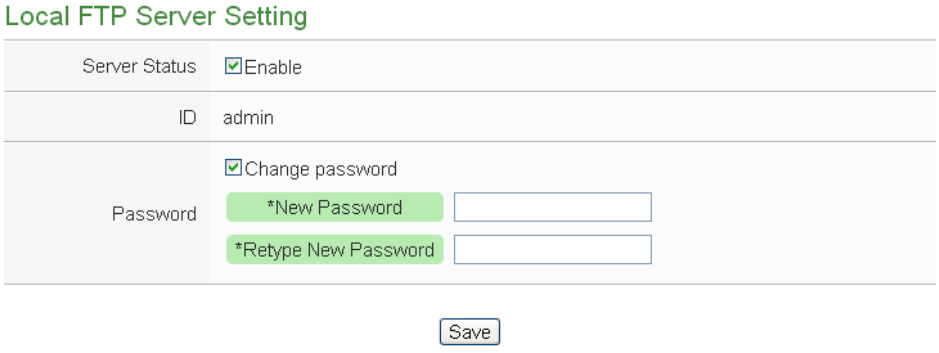


Figure6-16 : Local FTP Server Setting Page

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- Idle Time Setting

  After the administrator login into the PMC/PMD page, when the idle time exceeds the pre-set time interval (default is 10 minutes), the administrator will be automatically logout. The idle time could be set as Disable/10/20/30/60 minutes, after the setting is completed, click “Save” button to save the changes.

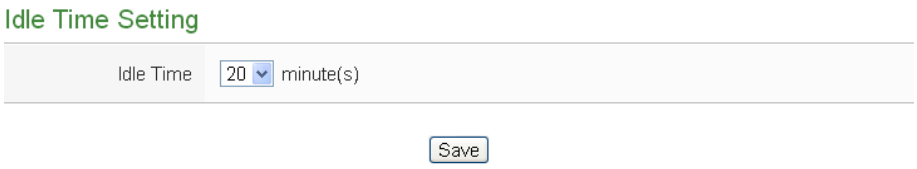


Figure6-17 : Idle Time Setting Page

6.5 I/O Interface Setting

I/O Interface Setting allows to setup the function settings on COM Port or LAN of PMC/PMD. The setting interface is shown as below:



Figure6-18 : I/O Interface Setting Page

The I/O interface functions for PMC/PMD are as below.

Model	I/O interface function
PMC-523x/ PMC-224x	● COM2(RS-232)：Reserved specifically for Modbus RTU Slave for connections to HMI or SCADA. ● COM3/COM4(RS-485)：Reserved for Modbus RTU Master to connect Modbus RTU slave devices or for Modbus RTU Slave to connect HMI or SCADA. ● LAN：LAN connection is by default set for Modbus TCP Slave to connect HMI or SCADA. It can also be set for Modbus TCP Mater to connect Modbus TCP devices.
PMD-220x	● COM1/COM2(RS-485)：Reserved for Modbus RTU Master to connect Modbus RTU slave devices or for Modbus RTU Slave to connect HMI or SCADA.

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	● LAN：LAN connection is by default set for Modbus TCP Slave to connect HMI or SCADA. It can also be set for Modbus TCP Mater to connect Modbus TCP devices.
PMD-420x	● COM1/COM2(RS-485)：Reserved for Modbus RTU Master to connect Modbus RTU slave devices or for Modbus RTU Slave to connect HMI or SCADA. ● COM3(RS-485)：Reserved specifically for Modbus RTU Slave for connections to HMI or SCADA. ● LAN：LAN connection is by default set for Modbus TCP Slave to connect HMI or SCADA. It can also be set for Modbus TCP Mater to connect Modbus TCP devices.

The following section will introduce how to set I/O interface for different functions:

- Connect to HMI or SCADA via COM Port

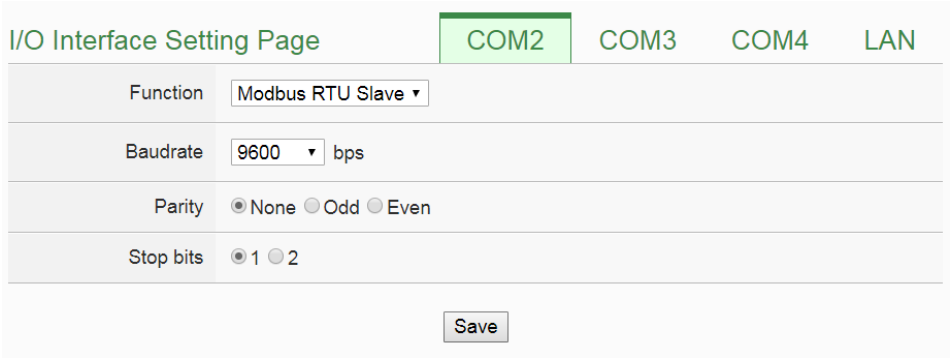


Figure6-19 : Function setting to connect to HMI or SCADA

The settings steps are as below:

i. In the “Baudrate” field, select the Baudrate from the dropdown list, the Baudrate of PMC/PMD and HMI or SCADA have to be set the same.

ii. In the “Parity” and “Stop bits” fields, set up the Parity and Stop bits. The Parity and Stop bits of PMC/PMD and HMI or SCADA have to be set the same.

iii. After all settings are completed, click “Save” button to save the changes.

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- Connect to Modbus RTU slave device via COM Port.

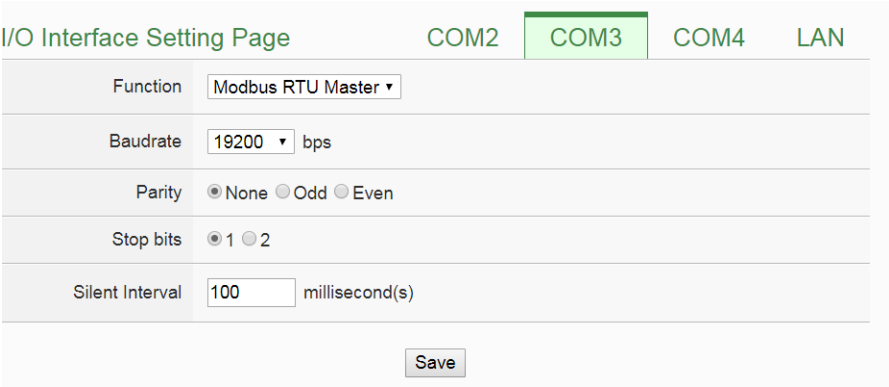


Figure6-20 : Function setting to connect to Modbus RTU slave device

The settings steps are as below:

i. In the “Baudrate” field, select the Baudrate from the dropdown list, the Baudrate of PMC/PMD and Modbus RTU slave device have to be set the same.

ii. In the “Parity” and “Stop bits” fields, set up the Parity and Stop bits. The Parity and Stop bits of PMC/PMD and Modbus RTU slave device have to be set the same.

iii. In the “Silent Interval” field, input the time interval between successive sending of commands from the PMC/PMD to the Modbus RTU slave device, the unit will be millisecond (ms).

Please Note: After the “Baudrate” is selected, the system will automatically generate a proper value in the “Silent Interval” field. For each Modbus RTU Slave device has different Modbus command process capability, the response time for sending result from Modbus RTU Slave device to PMC/PMD might be different. The user can adjust this value to most appropriate time interval, such as: extend this value to make sure every Modbus RTU Slave device connected to the PMC/PMD has enough time to process the Modbus command, or shorten this value to improve the efficiency of the poll mechanism between Modbus RTU Slave device and PMC/PMD.

iv. After all settings are completed, click “Save” button to save the changes.

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- Connect to HMI (or SCADA) and Modbus TCP Slave device via LAN

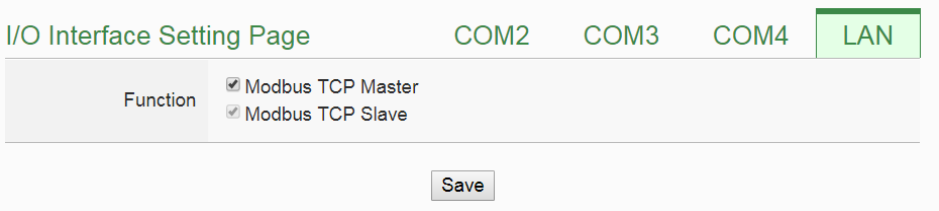


Figure6-21 : I/O Function setting about LAN

The LAN function on PMC/PMD is by default set for Modbus TCP Slave to connect HMI or SCADA. User can also select the “Modbus TCP Master” Checkbox to enable the Modbus TCP Mater function for connecting to Modbus TCP Slave devices through Ethernet.

6.6 Other Setting

In the “Other Setting” section, it allows to set up Contract Capacity Setting, Demand Interval Setting and Carbon Emissions Setting. The setting interface is shown as below:

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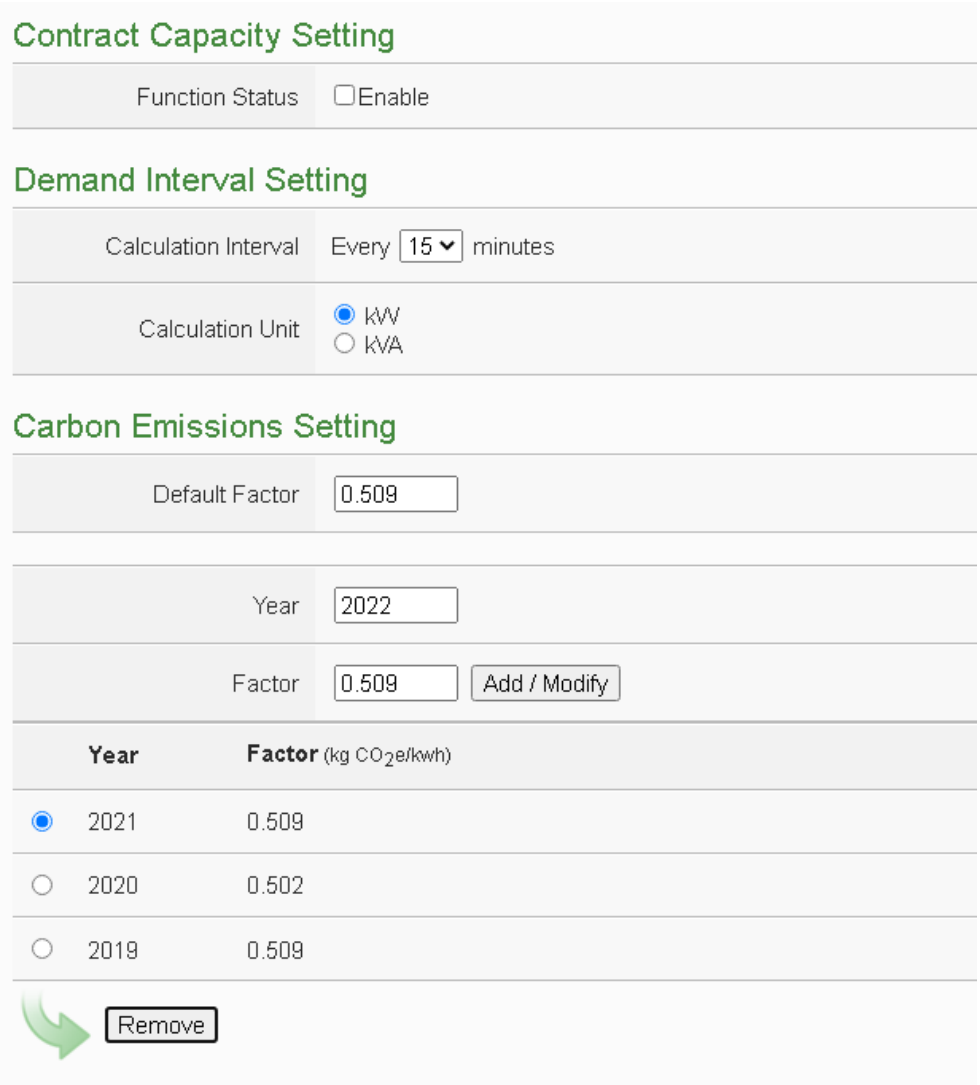


Figure6-22 : Other setting page

- Contract Capacity Setting

  In this section, it allows to enable and set Contract Capacity. To enable the Contract Capacity function, click on “Enable” and input the Contract Capacity. Click “Save” button to save the settings. The Contract Capacity being set will be displayed on the System Setting main page.

- Demand Interval Setting

  In this section, it allows to set Demand Interval Setting. The system will calculate the demand according to this demand interval. The default interval is 15 minutes; the user could set the interval to be 15/30/60 minutes. Click “Save” button to save the settings.

- Carbon Emissions Setting

  In this section, user can assign the electricity carbon emissions factor for each year to let PMC/PMD can calculate the electricity carbon emissions.

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The setting procedure for electricity carbon emissions factor is as below:

i Input the year user want to assign the carbon emission factor.

ii Input the carbon emissions factor. Please assign the value according to the electricity carbon emissions factor published by the International Energy Agency (IEA) for each country. Please note: When PMC/PMD is calculating the electricity carbon emissions, if user does not complete the carbon emission factor setting for the corresponding year, the system will use the value in the "Default Factor" field for calculation.

iii Click Add / Modify button to add the carbon emission factor setting for the specified year.

iv If you need to modify the carbon emission factor setting for the desired year, please input the year to be adjusted first, fill in the new carbon emission factor, then click Add / Modify button to change the setting.

v Repeat step i~step iii to complete the carbon emission factor setting for the desired years, then click “Save” button to save the changes.

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6.7 Power Meter Group Setting

The power meter group setting function allows user to create groups that contain specific loops/phases of power meters for easy group classification. These pre-set groups can be inquired in “Power Data Information” and “Historical Electricity Analysis” pages for power data analysis. The power meter group setting page is shown as below:



Figure6-23 : Power Meter Group Setting

Please refer to the following chapters to setup the group/subgroup and click the “Save” button to save the changes.

6.7.1 Group and Subgroup Viewing

Click the group or subgroup bar to expand/hide the lists.

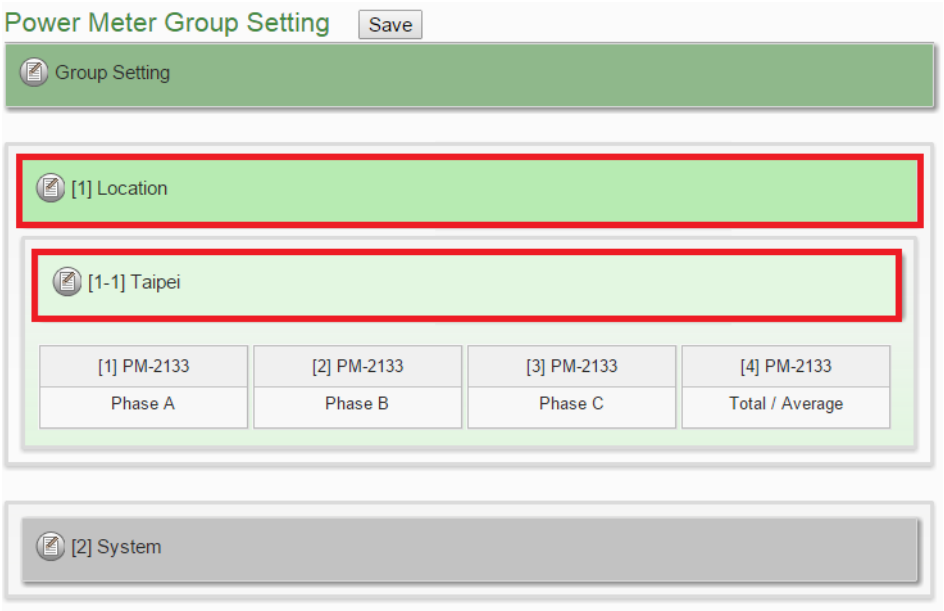


Figure6-24 : Group and Subgroup Viewing

6.7.2 Group and Subgroup Setting

i Click the “Set up” button ( ) of group or subgroup to open the setting window.

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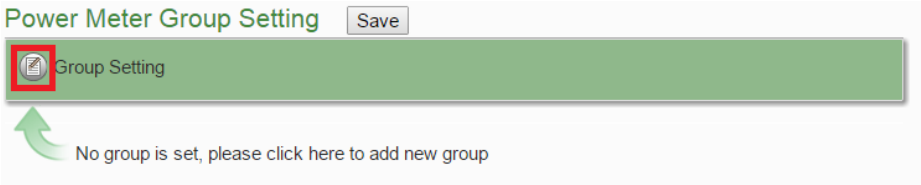


Figure6-25 : Group Setting

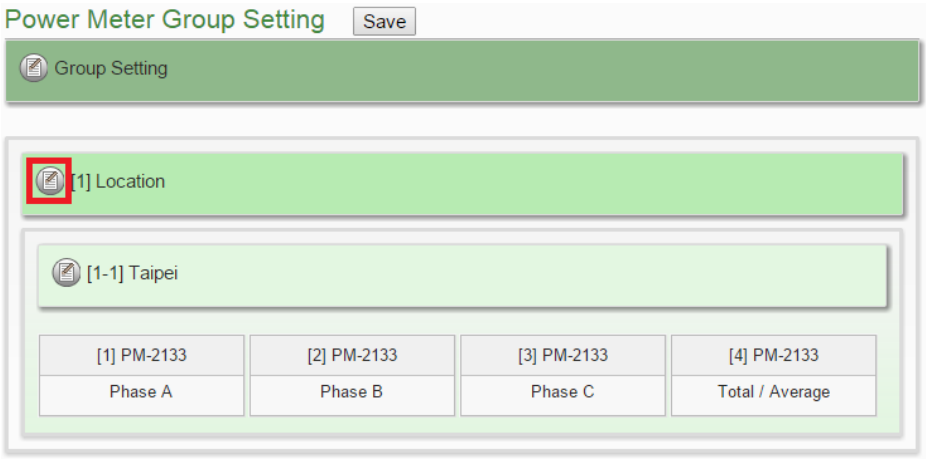


Figure6-26 : Subgroup Setting

ii Input the group/subgroup name and click ⊕ to add this group/subgroup to the lists. Click “Close” button to return to group setting page.

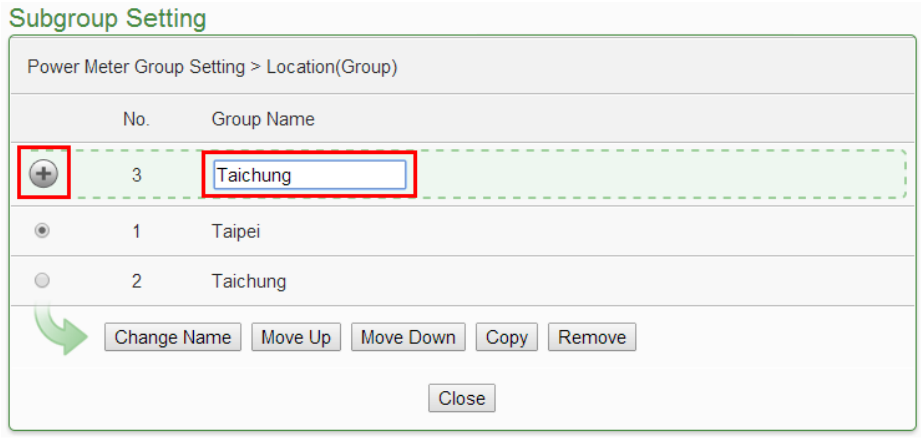


Figure6-27 : Subgroup Setting Window

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6.7.3 Group and Subgroup configuration

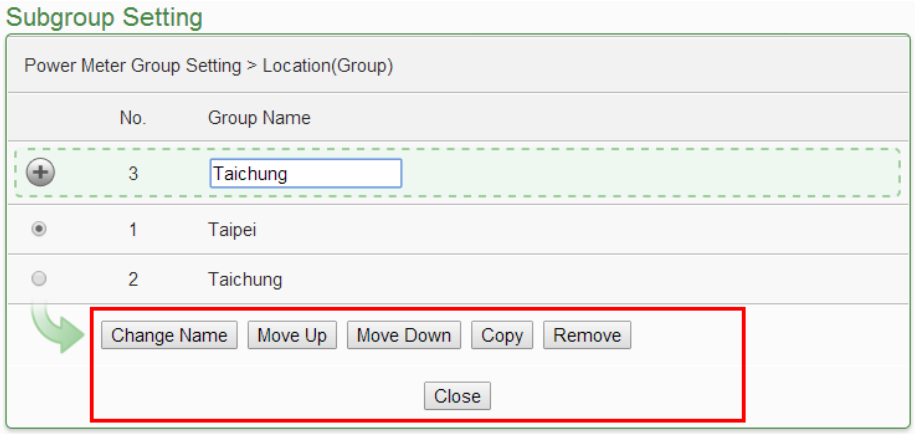


Figure6-28 : Configurations for Subgroup

The group/subgroup configurations can be done on the Group/Subgroup Setting page. Please select the group/subgroup first and click on the function button to perform the configurations:

- Change Name：Click the radio button in front of the group and click on “Change Name” to change the name of selected group. Click “OK” button to save the changes.
- Move Up：Click the radio button in front of the group name and click on “Move Up” to move the group to upper order (upper index number (No.)).
- Move Down：Click the radio button in front of the group and click on “Move Down” to move the group to lower order (lower index number (No.)).
- Copy：To copy the settings of a pre-set group to the new group, please click the radio button in front of the pre-set group and then click on “Copy”, a new group (in sequence) will be added to the list and the settings of the old group will be copied to this newly added group.
- Remove：Click the radio button in front of the group and click on “Remove” to remove the selected group.
- Close：Click the “Close” button to return to group setting page.

6.7.4 Setup the loops/phases of the subgroup

i Click the “Set up” button ( ) of subgroup to open the setting window.

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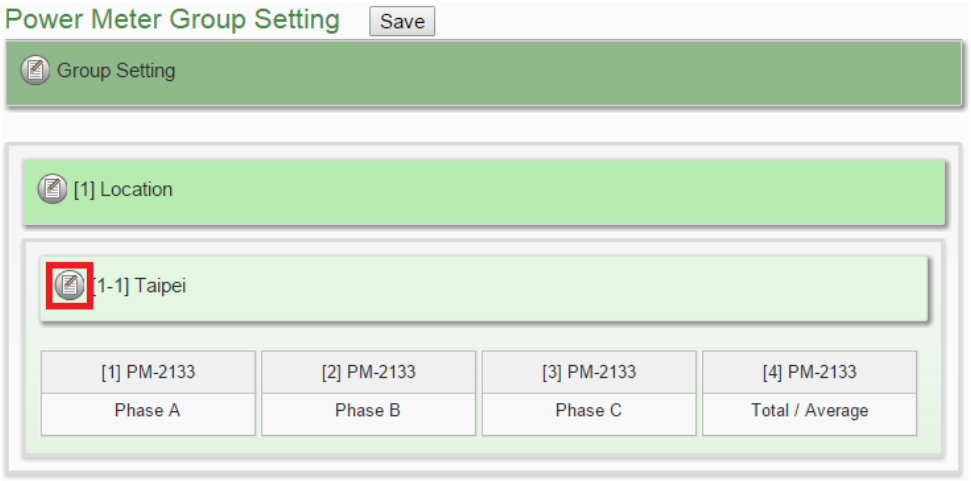


Figure6-29 : Loops/Phases of subgroup Setting

ii Select the loop/phase of the power meter and click ⊕ to add this loop/phase to the lists. Click "Close" button to return to group setting page.

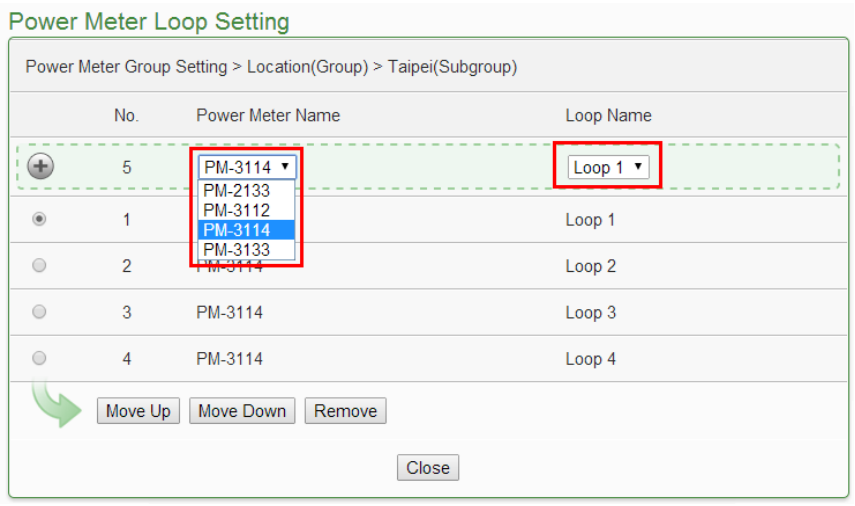


Figure6-30 : Choose Loops/Phased of Subgroup

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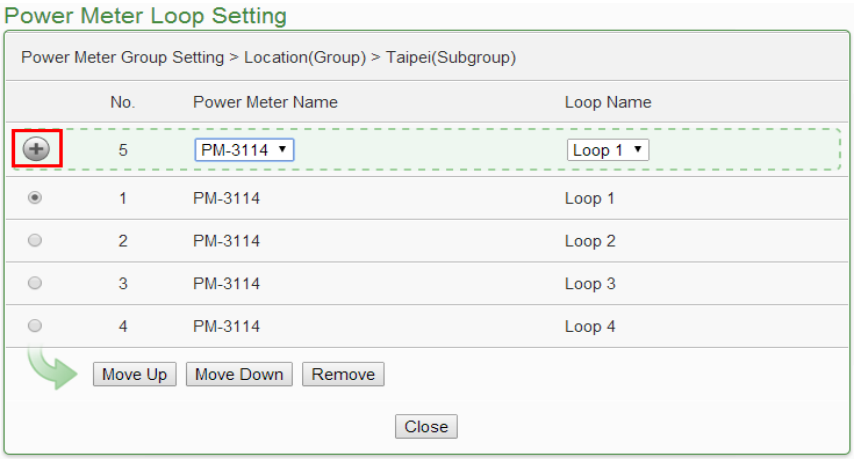


Figure6-31 : Add Loops/Phases for Subgroup

6.7.5 Loop/Phase of group configuration

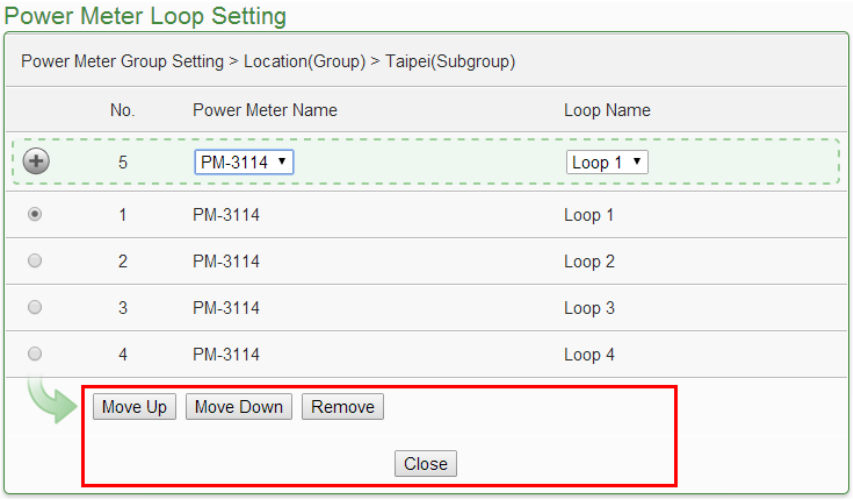


Figure6-32 : Configurations for Loops/Phased of Subgroup

The loop/phase of subgroup configurations can be done on the Power Meter Loop Setting page.. Please select the loop/phase first and click on the function button to perform the configurations:

- Move Up：Click the radio button in front of the loop/phase name and click on “Move Up” to move the loop/phase to upper order (upper index number (No.)).
- Move Down：Click the radio button in front of the loop/phase and click on “Move Down” to move the loop/phase to lower order (lower index number (No.)).
- Remove：Click the radio button in front of the loop/phase and click on “Remove” to remove the selected loop/phase.
- Close：Click the “Close” button to return to group setting page.

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6.8 Firmware Update

PMC/PMD allows to update firmware via browser, after the update is completed; the PMC/PMD doesn't require to reboot. Please follow the steps below:

i. Please contact ICP DAS service to obtain the latest version of the PMC/PMD firmware file.

ii. Go to "System Setting" page, under the "Firmware Update Setting", click on "Browse".



Figure6-33 : Firmware Update(1)

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iii. Browse through to select the new firmware file and click “Open”.

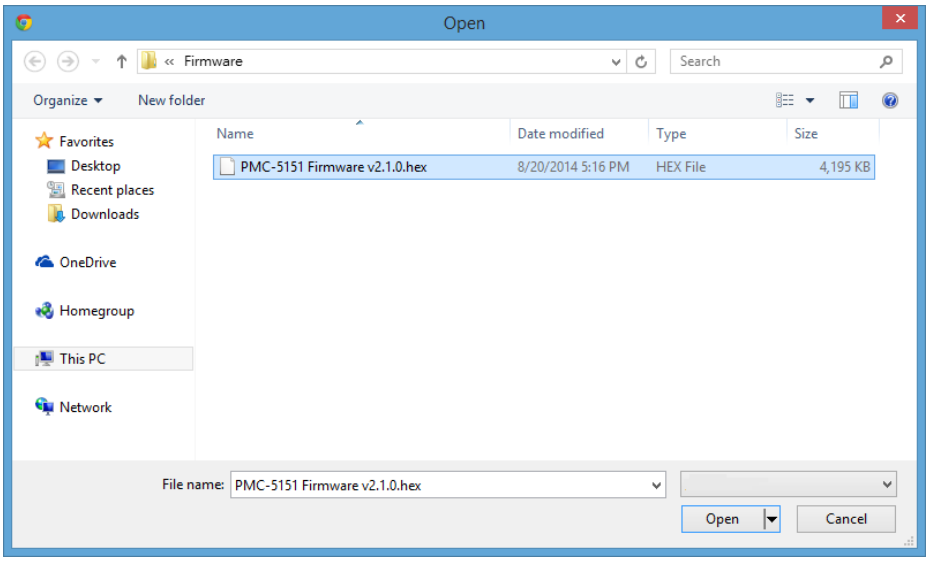


Figure6-34 : Firmware Update(2)

iv. Click “Update” to update the firmware.

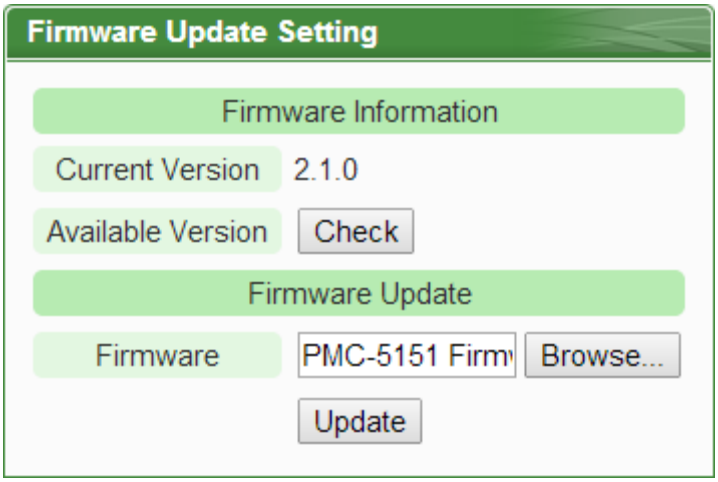


Figure6-35 : Firmware Update(3)

v. Click “OK” to start the firmware update, to cancel the firmware update, click “Cancel”.

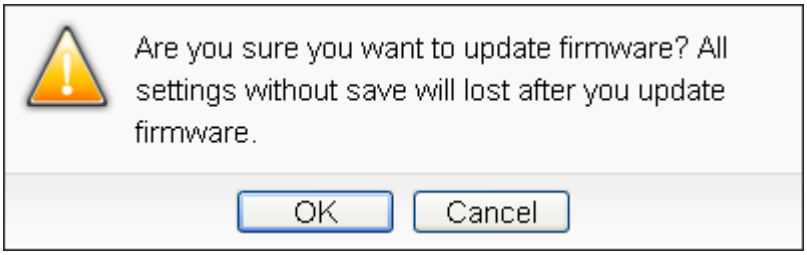


Figure6-36 : Firmware Update(4)

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vi. Updating the firmware

Please note: when the firmware update process is started, please DO NOT close the update window or perform any system modification, or may result in unexpected failures.

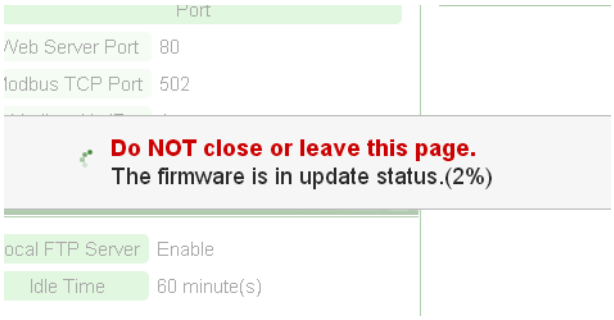


Figure6-37 : Firmware Update(5)

vii. Click “OK” to complete the update process. After the update is completed, please clear the cache and cookies on your browser. If the update process is failed, please perform the update again.

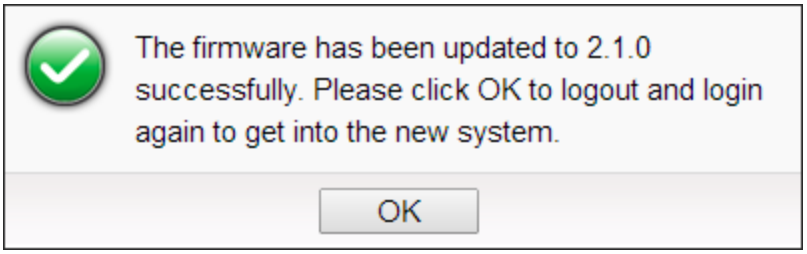


Figure6-38 : Firmware Update(6)

6.9 Rule File Import & Export

PMC/PMD can directly perform the PMC/PMD's Rule file import and export operations through the Browser to complete the update and backup of the PMC/PMD's setting. The “Export/Import Settings” operation can back up all PMC/PMD settings, but does NOT include the “Time Setting”, “Network Setting”, “SNMP Setting”, “Account Setting” and “Security Setting”. The items of the backup setting is the same as the file backup using PMC Utility, but the files backed up by the two interfaces are not compatible.

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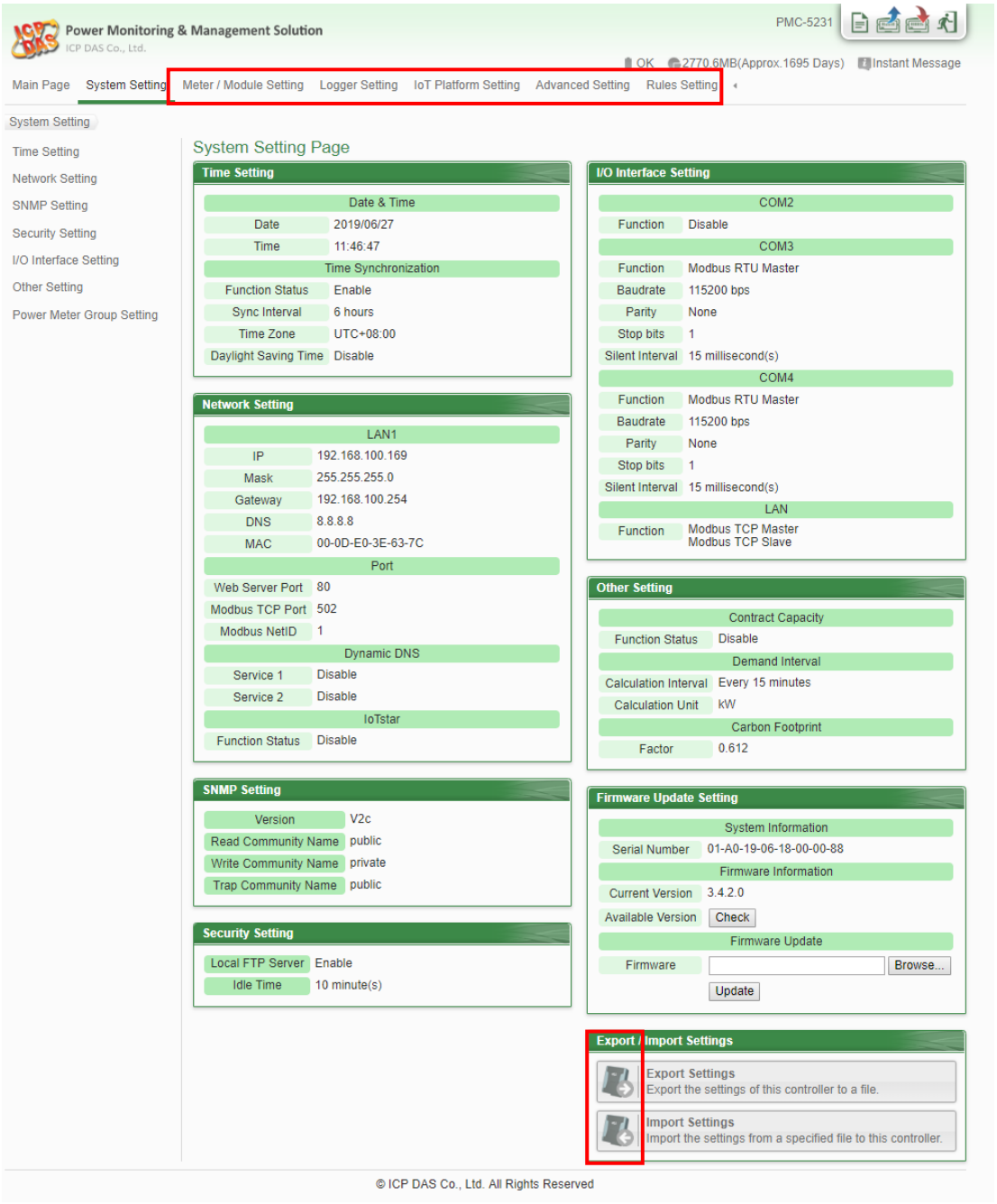


Figure6-39 : Export / Import Setting page and the settings to be backed up

- Export PMC/PMD's Rule file:
  1. After click the “Export Settings” button, the rule file would be stored in the default download path according to the browser's setting. If there was setting of PMC/PMD has not been saved before the export operation, it will ask if you want to save the setting before the export operation .
- Import PMC/PMD's Rule file:

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1. Click the “Import Settings” button and select the PMC/PMD's rule file to be imported from local PC to PMC/PMD.
2. After selecting the file to be imported, the user will be asked whether to abandon the current settings, or not. If user select “Import”, the current settings of PMC/PMD will be cleared after the import operation.
3. After the import process is done, PMC/PMD would run with the imported rule automatically. If the imported file is incomplete or is not produced via the "Export PMC/PMD's Rule file" operation of PMC/PMD web interface, the import operation will be failed.

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7 Power Meter & I/O Module Setting

Meter / Module Setting page allows to perform settings of the power meters and I/O Modules that are connected to the PMC/PMD. After getting into the setting page, the overview page will display current setting of the power meters and I/O Modules that are connected to the PMC/PMD, shown as below:

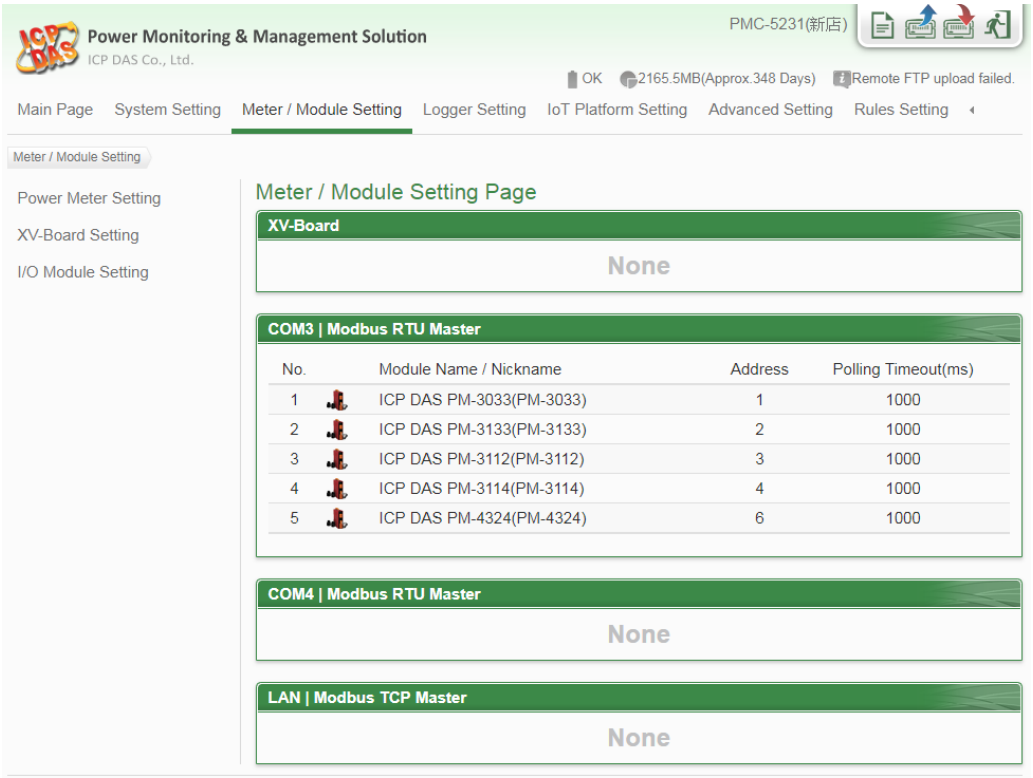


Figure7-1 : Meter / Module Setting Page

More detailed information for each function setting will be given in the following sections:

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7.1 Power Meter Setting

On the “Power Meter Setting” page, it allows to set up the settings of the Modbus RTU and Modbus TCP power meters that are connected to the PMC/PMD. The Power Meter Setting page is shown as below:

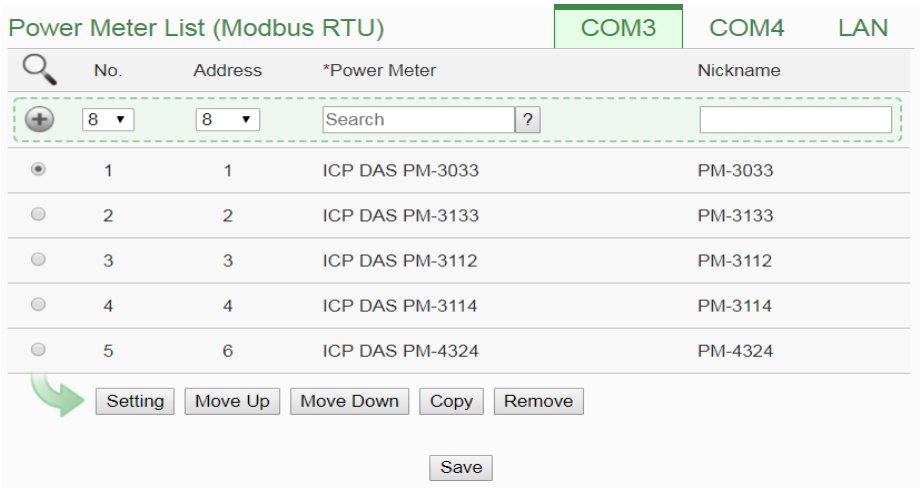


Figure7-2 : Power Meter Setting Page

On the Power Meter Setting page, a list for all power meters connected to the PMC/PMD will be displayed. Please follow the following sections to perform settings for Modbus RTU and Modbus TCP power meters. After all settings are completed, click “Save” button to save the changes.

Please note:

1. PMC/PMD provides 2 COM Port(RS-485) interface that allows connections to Modbus RTU power meters.
2. PMC/PMD provides LAN interface that allows connections to Modbus TCP power meters. For more detailed information about LAN settings please refer to “6.5 I/O Interface setting”.
3. One PMC/PMD allows connections to at most 24 ICP DAS Modbus TCP/RTU power meters (with maximum 16 Modbus TCP Power Meters), and 8 Modbus I/O modules.
   - Each RS-485 interface (with Modbus RTU Master) can connect to Max. 16 power meters.
   - Support at most 4 ICP DAS PM-4324 series Power Meters.

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7.1.1 Scan to add Modbus RTU Power Meters

Perform “Scan” to automatically build a list of Modbus RTU power meters that are connected to the PMC/PMD. The steps are as below:

i Before performing the scan of the power meters, please make sure the RS-485 wirings connecting to the PMC/PMD and the power meters function well, and make sure the settings of the addresses of the power meters are completed.

ii Click  to start the scan of Modbus RTU power meters that are connected to the PMC/PMD.

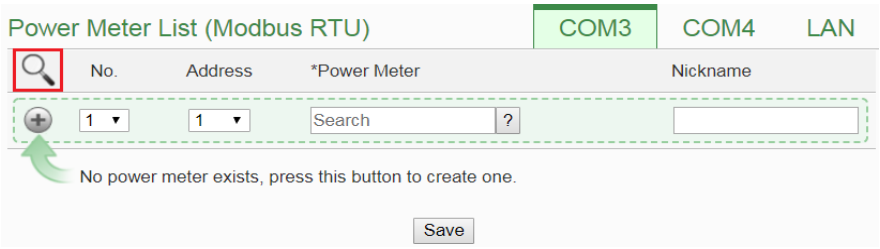


Figure7-3 : The “Scan” button to search Power Meter

iii When the Scan page appears (Figure 7-4), input the starting address and the ending address of the Modbus address that are going to perform scan. Click on “Scan”, the system will start to scan the power meters that match the settings previously set, to cancel the scan, click on “Cancel”.

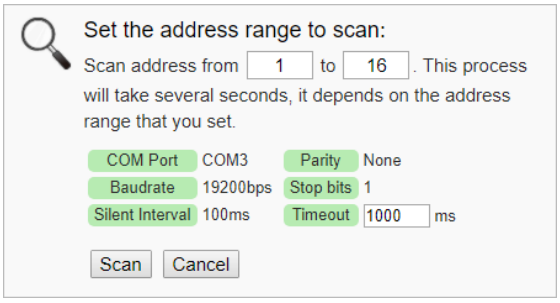


Figure7-4 : Set up the Scanning Range for the Power Meters

iv When the system is performing the scan (Figure 7-5), the address that are performing scan will be dynamically shown on the upper left side, please wait till the scan operation is completed. To stop the scan operation, click on “Cancel” to terminal the scan and leave the page.

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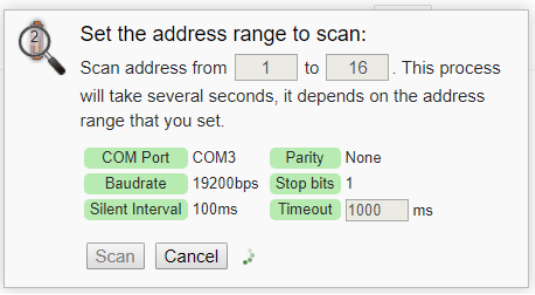


Figure7-5 : Scanning the Power Meters

v After the Scan operation is completed, a Power Meter List will appear (Figure 7-6). If the newly scanted module doesn't match the module previously set on the same address, a window will appear (Figure 7-7), please select the actual device that are connected to PMC/PMD. After all settings are completed, click "Save" button to save the changes.

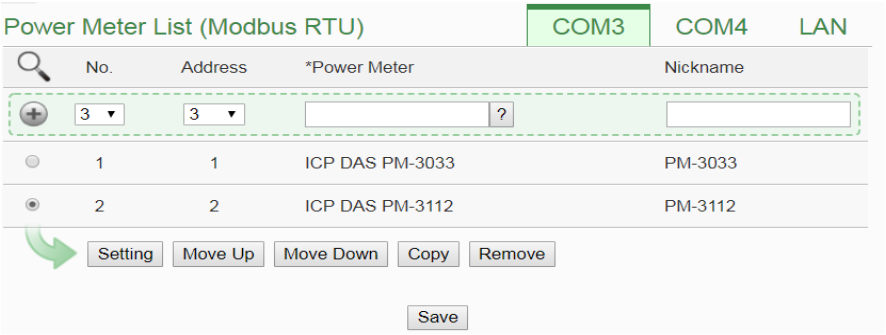


Figure7-6 : The Power Meter List after Scan operation

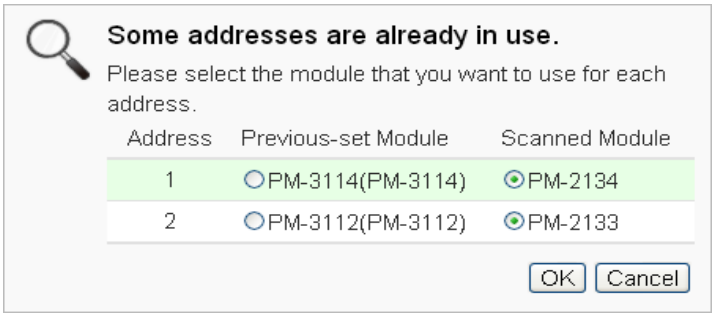


Figure7-7 : Select the actual Power Meter connected to PMC/PMD

7.1.2 Add Modbus RTU Power Meter Manually

In addition to perform Scan operation to automatically add Modbus RTU power meters to the list, the user could also add the Modbus RTU power meter manually one by one, the steps are as below:

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i No: The number will be the order that the power data of the Modbus RTU power meter being stored in the PMC/PMD Modbus Table. The range is 1~16.

ii Address: The address will be the Modbus address of this Modbus RTU power meter, please make sure the address setting is the same as the settings of the module, if the setting is not accurate, the connection for PMC/PMD to the power meter will be failed.

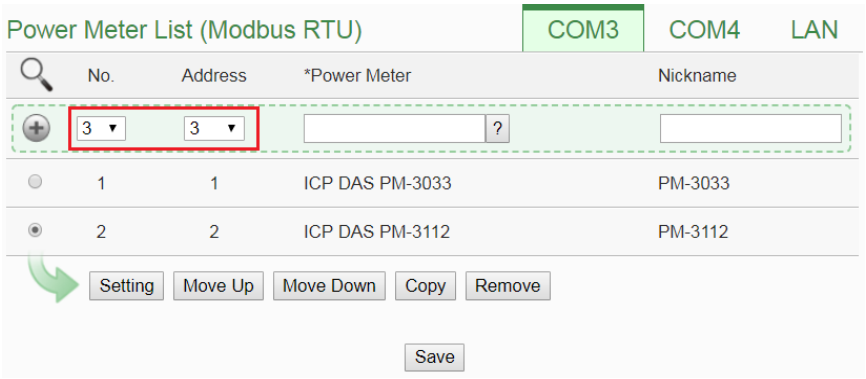


Figure7-8 : Set up the No and Address of the power meter

iii Select the Power meter model:

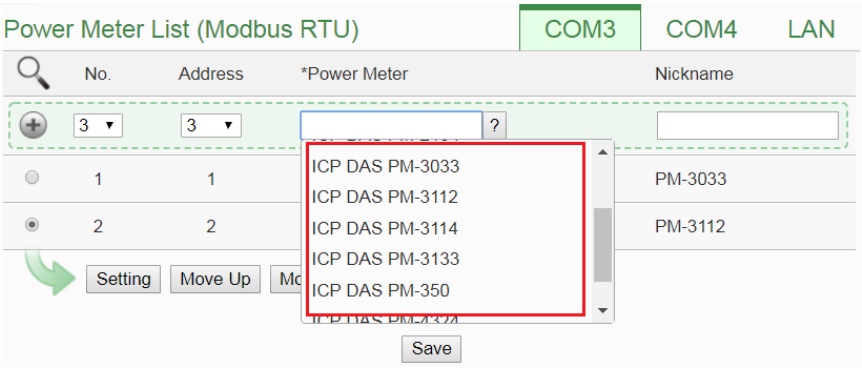


Figure7-9 : Select Modbus RTU Power Meter model

iv Nickname: For user to define a nickname for this power meter, this nickname will be displayed on the “Power meter Information” and “Rule Setting” pages. Default setting will be the model of the power meter.

v Click ⊕ to add the meter to the list (Figure 7-10). After adding the power meter, click “Save” button to save the changes.

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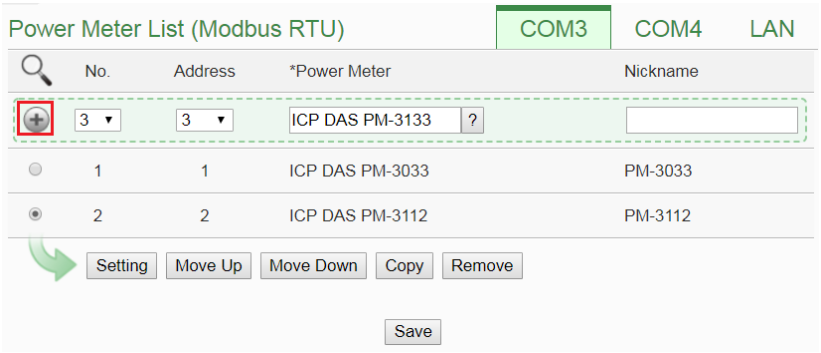


Figure7-10 : Add the Modbus RTU Power Meter manually

7.1.3 Add Modbus TCP Power Meter Manually

PMC/PMD allows connection to Modbus TCP Power Meters via Ethernet, the user could add the Modbus TCP Power meter to the list manually; the steps are as below:

i No: The Number will be the order that the power data of the Modbus TCP power meter being stored in the PMC/PMD Modbus Table. The range is 1~16.

ii Network: Set up the settings of IP, Port and NetID appropriately as required. Please make sure the network setting is the same as the settings of the module, if the setting is not accurate, the connection for PMC/PMD to the power meter will be failed.

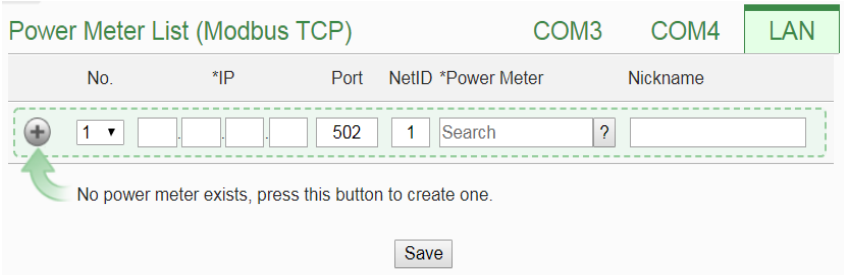


Figure7-11 : Add Modbus TCP Power Meter

iii Select the Power meter model (Figure 7-12):

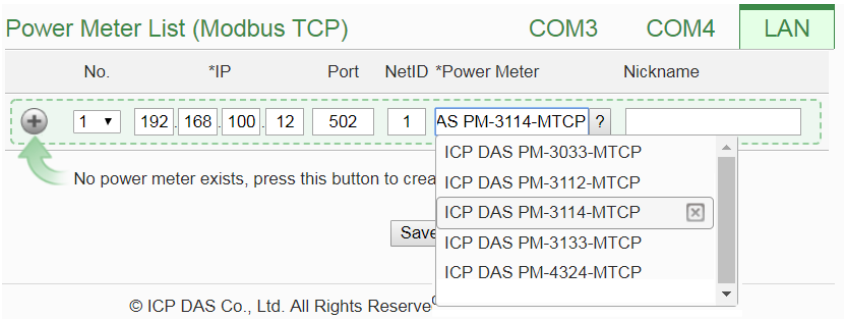


Figure7-12 : Select Modbus TCP Power Meter model

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iv Nickname: For user to define a nickname for this power meter, this nickname will be displayed on the “Power meter Information” and “Rule Setting” pages. Default setting will be the model of the power meter.

v Click ⊕ to add the meter to the list (Figure 7-13). After adding the power meter, click “Save” button to save the changes.

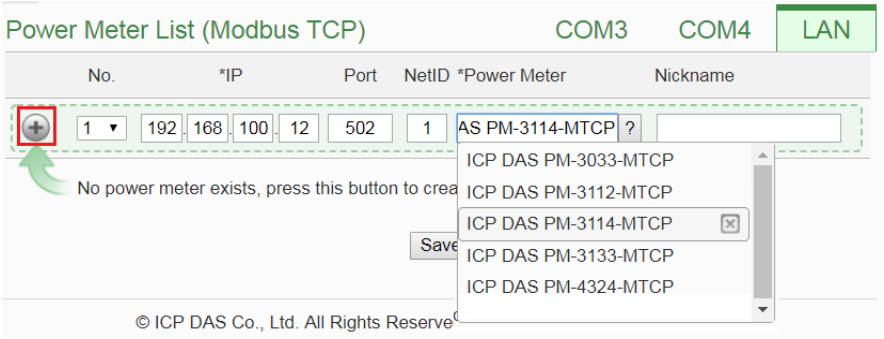


Figure7-13 : Add the Modbus TCP Power Meter manually

7.1.4 Power Meter List Interface

After the Modbus RTU/TCP Power Meters are added to the power meter list via auto scan or manual work, the Modbus RTU/TCP Power Meters will be listed as below:

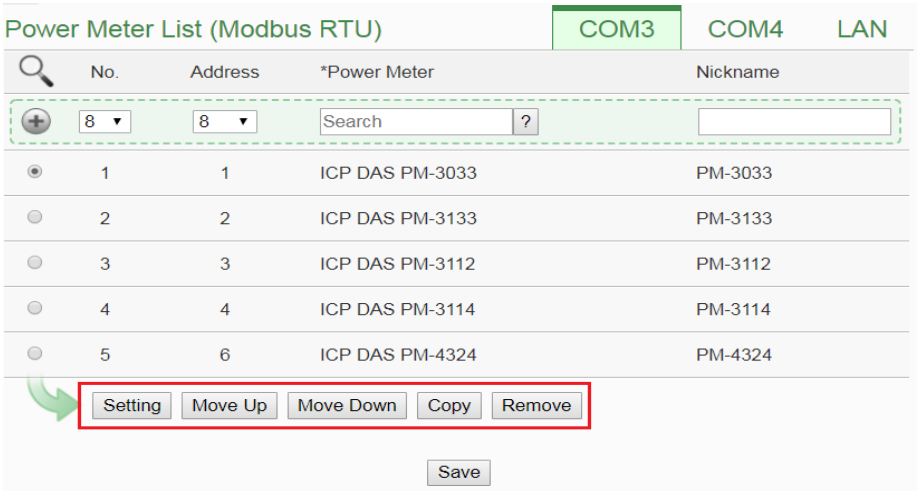


Figure7-14 : Power Meter List Interface

The following functions allow to perform settings or rearrange order of the power meters. Please select the power meter and click on the function button to perform the operations:

- Setting: Click the radio button in front of the power meter and click on “Setting” to get into the setting page of the power meter. The settings for each power meter module will be given in the

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following section.

- Move Up: Click the radio button in front of the power meter and click on “Move Up” to move the power meter to upper order (upper index number (No)).
- Move Down: Click the radio button in front of the power meter and click on “Move Down” to move the power meter to lower order (lower index number (No)).
- Copy: To copy the settings of a pre-set power meter to the new power meter, please click the radio button in front of the pre-set power meter and then click on “Copy”, a new power meter (in sequence) will be added to the list and the settings of the old power meter will be copied to this newly added power meter.
- Remove: Click the radio button in front of the power meter and click on “Remove” to remove the selected power meter.

After all settings are completed, click “Save” button to save the changes.

7.1.5 Modbus RTU Power Meter Setting

PMC/PMD support ICP DAS Single-phase and Three-phase Modbus RTU Power Meters, the following section will give more detailed settings of each power meter setting page.

- The Three-Phase Modbus RTU Power Meter Setting page is shown as follow (using PM-3133 as an example):

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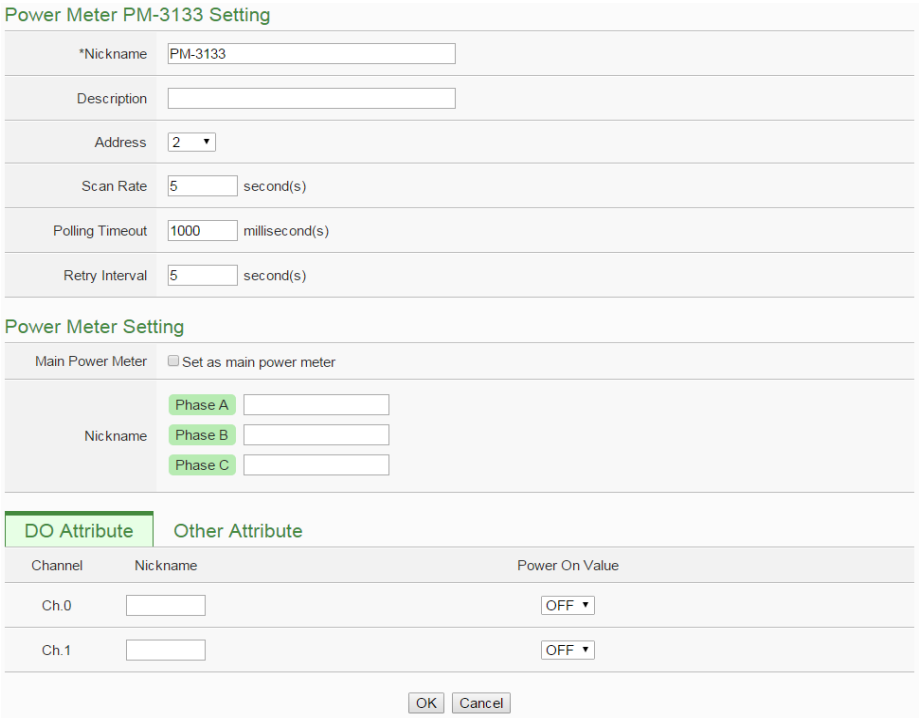


Figure7-15 : PM-3133 Setting Page

The settings are as follow:

- ◆ Nickname：For user to define nicknames for each power meter, this nickname will be displayed on the “Power Meter Information” and “Rule Setting” pages.
- ◆ Description: The Description field provides a space for the user to make a brief description of this power meter.
- ◆ Address: The address will be the Modbus address of this Modbus RTU power meter, please make sure the address setting is the same as the settings of the module, if the setting is not accurate, the connection for PMC/PMD to the power meter will be failed.
- ◆ Scan Rate: Input the time interval for PMC/PMD to periodically retrieve the power data of this Modbus RTU Power Meter, the setting range will be 0 ~ 65535 seconds.
- ◆ Polling Timeout: The time interval for PMC/PMD to send command to the Modbus RTU Power Meter and wait for the response, the unit will be ms. The setting range will be 1-10000 ms.
- ◆ Retry Interval: The time interval to wait for PMC/PMD to repeatedly send command again when PMC/PMD sends command to the Modbus RTU Power Meter and get no response. The unit will be second. the setting range will be 3 ~ 65535

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seconds.

- ◆ Main Power Meter: When the “Set as main power meter” is selected, this power meter will be set as main power meter and the power data of this meter will be displayed on the Main Power Meter area on the “Power Data Overview” page.
- ◆ CT/Phase Nickname: For user to define nicknames for each CT (or phase), this nickname will be displayed on the “Power Meter Information” and “Rule Setting” pages. For three-phase power meter, the user could give nicknames to the Phase A/B/C.

After all settings are completed, click “OK” button to return to the Power Meter List.

- ● The Single-Phase Modbus RTU Power Meter Setting page is shown as follow (using PM-3114 as an example):

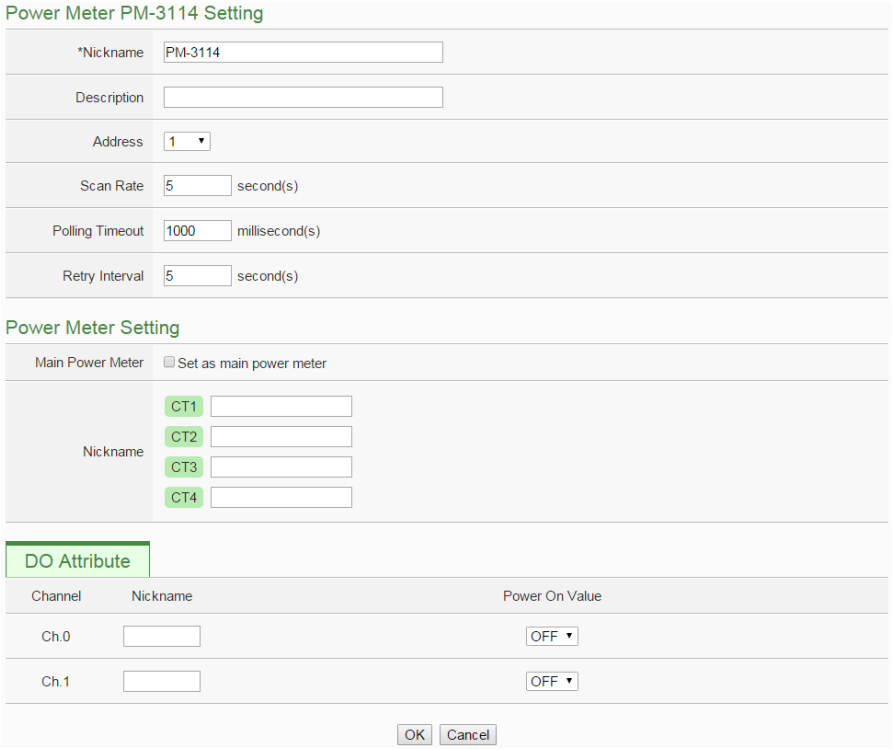


Figure7-16 : PM-3114 Setting Page

The settings are as follow:

- ◆ For the settings of Nickname, Description, Address, Scan Rate, Polling Timeout, Retry Interval and Main Power Meter, please refer to “Three-Phase Modbus RTU Power Meter Setting” section.

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- ◆ CT / Phase Nickname: For user to define nicknames for each CT (or phase), this nickname will be displayed on the “Power Meter Information” and “Rule Setting” pages. For single-phase power meter, the user could give nicknames to the CT1/CT2/ CT3/CT4.
- ◆ DO Attribute：
  - ■ Nickname：For user to define nicknames for each DO channel, this nickname will be displayed on the “Power Meter Information” and “Rule Setting” pages.
  - ■ Power On Value: Set up the initial value for the DO channels when the power meter is powered on.

After all settings are completed, click “OK” button to return to the Power Meter List.

7.1.6 Modbus TCP Power Meter Setting

PMC/PMD support ICP DAS Single-phase Modbus TCP Power Meters, the following section will give more detailed settings of the power meter setting page. (Using PM-3144-MTCP as an example):

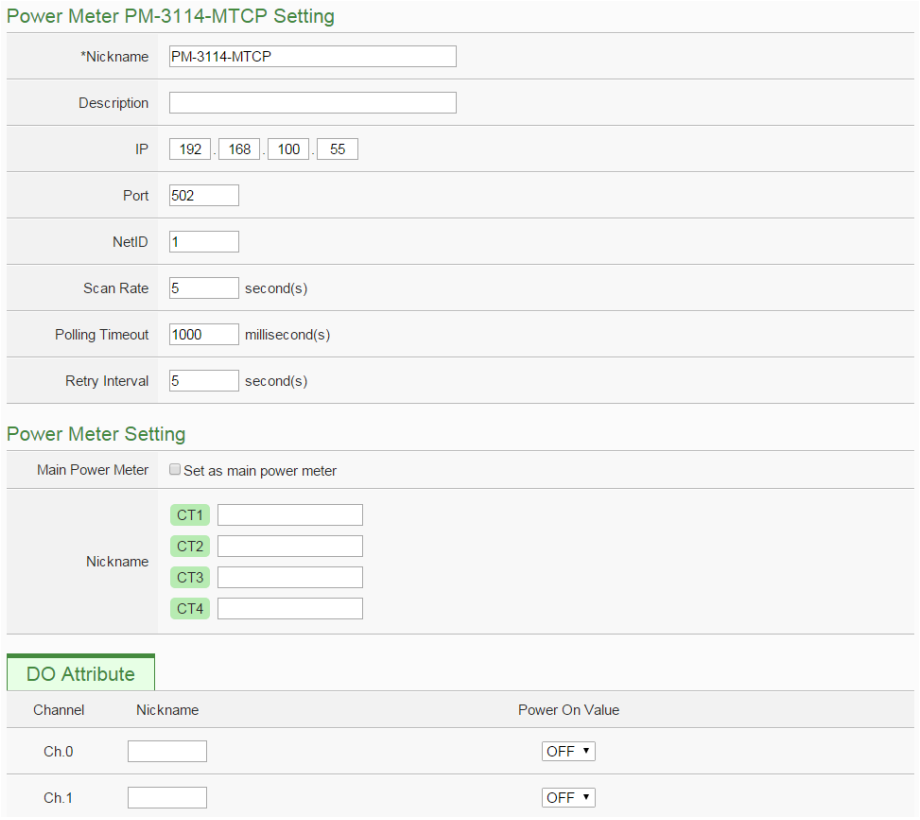


Figure7-17 : PM-3114-MTCP Setting Page

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The settings are as follow:

- Nickname：For user to define nicknames for each power meter, this nickname will be displayed on the “Power Meter Information” and “Rule Setting” pages.
- Description: The Description field provides a space for the user to make a brief description of this power meter.
- IP: The address will be the IP address of this power meter, please make sure the IP address setting is the same as the settings of the module, if the setting is not accurate, the connection for PMC/PMD to the power meter will be failed.
- Port: The setting will be the Port number of this power meter, please make sure the Port number is the same as the settings of the module, if the setting is not accurate, the connection for PMC/PMD to the power meter will be failed.
- NetID: The setting will be the NetID of this power meter, please make sure the NetID is the same as the settings of the module, if the setting is not accurate, the connection for PMC/PMD to the power meter will be failed.
- Scan Rate: Input the time interval for PMC/PMD to periodically retrieve the power data of this Modbus TCP Power Meter, the setting range will be 0 ~ 65535 seconds.
- Polling Timeout: The time interval for PMC/PMD to send command to the Modbus TCP Power Meter and wait for the response, the unit will be ms. The setting range will be 1-10000 ms.
- Retry Interval: The time interval to wait for PMC/PMD to repeatedly send command again when PMC/PMD sends command to the Modbus TCP Power Meter and get no response. The unit will be second. the setting range will be 3 ~ 65535 seconds.
- Main Power Meter: When the “Set as main power meter” is selected, this power meter will be set as main power meter and the power data of this meter will be displayed on the Main Power Meter area on the “Power Data Overview” page.
- CT/Phase Nickname: For user to define nicknames for each CT (or phase), this nickname will be displayed on the “Power Meter Information” and “Rule Setting” pages. For single-phase power meter, the user could give nicknames to the CT1/ CT2/

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CT3/ CT4.

- DO Attribute：
  - ◆ Nickname：For user to define nicknames for each DO channel, this nickname will be displayed on the “Power Meter Information” and “Rule Setting” pages.
  - ◆ Power On Value: Set up the initial value for the DO channels when the power meter is powered on.

After all settings are completed, click “OK” button to return to the Power Meter List.

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7.2 XV-Board Setting (PMD series does not support this function.)

XV-Board is used to connect with PMC. The setting page allows the user to set up the XV-Board that are connected to the PMC. The XV-Board Setting page is shown as follow:

Please note: Each PMC is allowed to connect to one XV-Board module only.

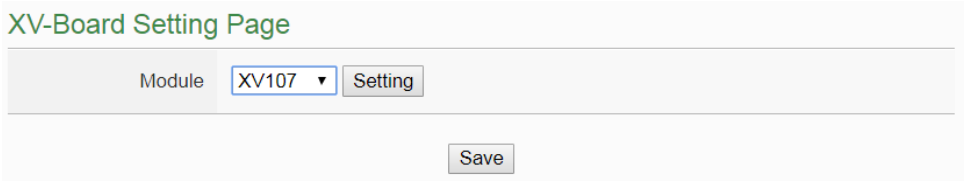


Figure7-18 : XV-Board Setting Page

Select the XV-Board that are connected to the PMC from the drop down list and click “Setting”, a window for setting up the parameters of XV-Board and its I/O channel will appear. The setting for the module is shown as below:

- Nickname: For user to define a nickname for the module, this nickname will be displayed on the “I/O Information” and “Rule Setting” pages.
- Description: The Description field provides a space for the user to make a brief description of this XV-Board.

The following section will introduce the DI, DO, AI and AO channel settings of the XV-Board. After all settings are completed, click “Save” button to save the changes.

7.2.1 XV-Board DI Channel Settings

The XV-Board DI Channel Setting page is shown as follow (using PMC-5231+XV107 as an example):

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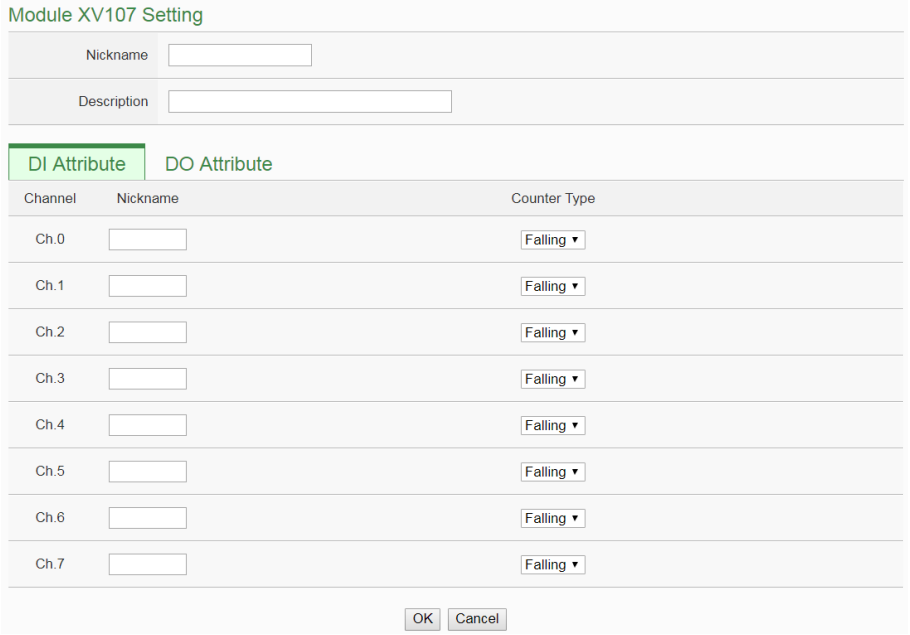


Figure7-19 : XV-Board DI attribute setting page

The settings are as follow:

- Nickname：For user to define nicknames for each I/O channel, this nickname will be displayed on the “I/O Information” and “Rule Setting” pages.
- Counter Type ： Specify the counter type to be “Falling” (ON-to-OFF) or “Rising” (OFF-to-ON); if you select “Disable” indicates that the counter of this DI channel will not function.
- Counter Initial Value：Set the initial value of the counter in the “Counter Initial Value” field. This counter will start counting from the initial count value. The default initial value is 0.

After the DI channel settings are completed, continue to perform settings of other channels, after all settings are completed click “Save” button to save the changes and return to XV-Board Setting page.

7.2.2 XV-Board DO Channel Settings

The XV-Board DO Channel Setting page is shown as follow (using PMC-5231+XV107 as an example):

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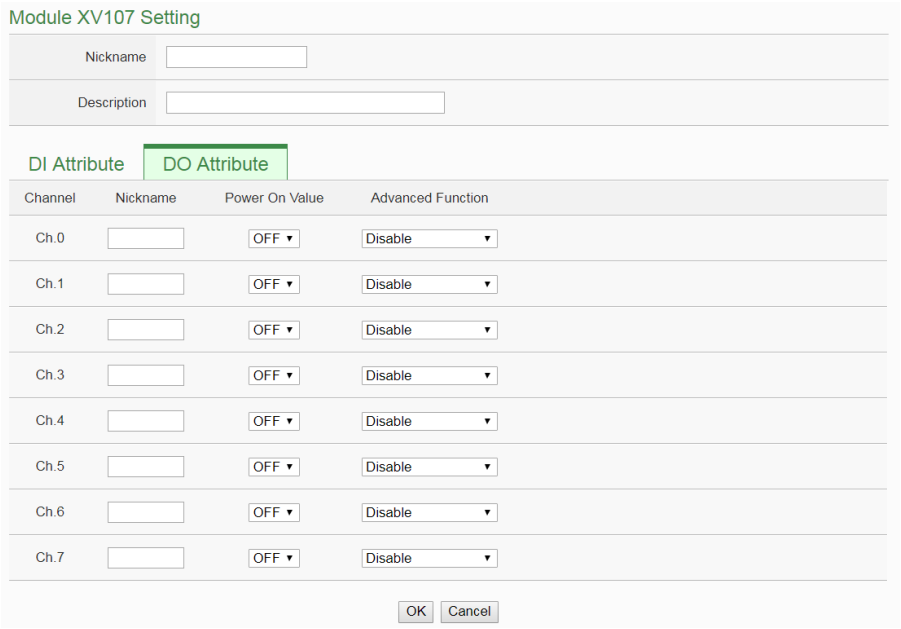


Figure7-20 : XV-Board DO attribute setting page

The settings are as follow:

- Nickname：For user to define nicknames for each I/O channel, this nickname will be displayed on the “I/O Information” and “Rule Setting” pages.
- Power On Value: Specify the initial status to be “ON” or to be “OFF” when PMC-523x power on. Select the value from the dropdown list of “Power On Value” field. The default value is “OFF”.
- PMC-523x provides 3 advanced functions, select the function from the dropdown list:
  - Pulse Output: If the Pulse Output is selected, it will allow this DO channel to perform pulse output and form a periodic pulse cycle. In Pulse Output mode, the selected DO channel will generate a square wave according to specified parameters (Pulse High and Pulse Low). Pulse High indicates the “ON” time duration and Pulse Low indicates the “OFF” time duration in a periodic Pulse cycle. The unit is 100ms.
  - Auto OFF: When “Auto OFF” is selected, it allows this DO channel to enable Auto OFF function. It is required to set up a time interval, when this DO channel is set to be “ON” and the duration of the ON status reaches the pre-set time interval , the DO will automatically be set to OFF. The unit is second.

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- DI Status Mapping: When “DI Status Mapping” is selected, the status of the DI channel with the same channel number on the XV-Board will be copied to the DO channel. For example, when the “DI Status Mapping” is enabled on DO0, when the DI0 status is ON, DO0 will set to be ON, and when the DI0 status is OFF, DO0 will set to be OFF as well.

After all settings of the channels are completed, click “OK” button to return to XV-Board Setting page.

7.2.3 XV-Board AI Channel Settings

The XV-Board AI Channel Setting page is shown as follow (using PMC-5231+XV310 as an example):

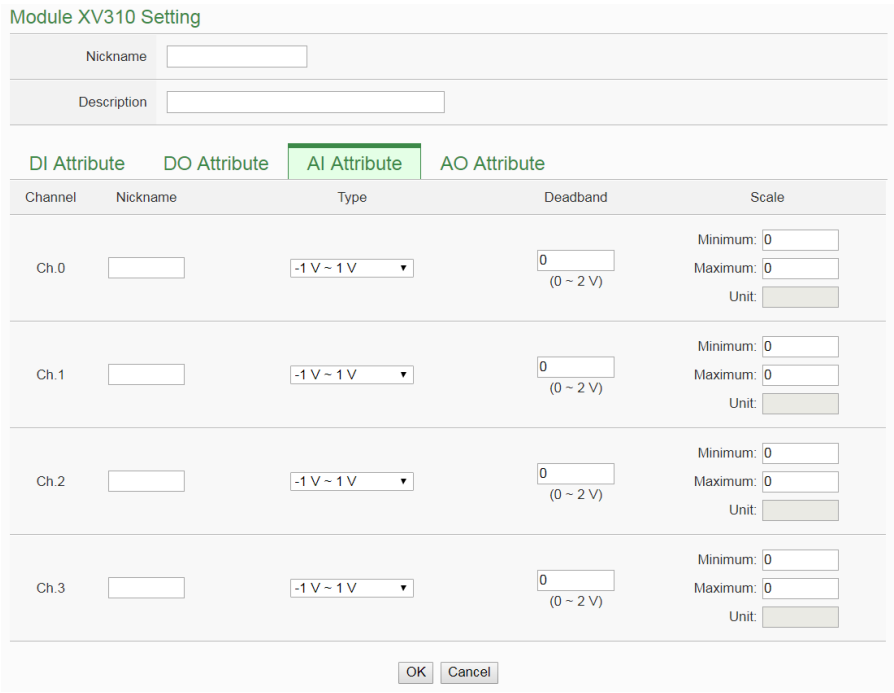


Figure7-21 : XV-Board AI attribute setting page

The settings are as follow:

- Nickname：For user to define nicknames for each I/O channel, this nickname will be displayed on the “I/O Information” and “Rule Setting” pages.
- Type: Select the input signal type of the AI channel from the dropdown list.
- Scale: In the “Scale” field, AI channel raw data can be set to operate with linear proportion between “MIN” and “MAX” values.

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The IF Condition will use this already-adjusted value in the evaluation operation, and the AI value retrieved from the "I/O Information" page or Modbus Table via PMC-523x would be the adjusted value. The default value for MAX and MIN is 0, it means the Scale function is disabled.

- Deadband: In order to avoid signal oscillation that may result in instability to the measurement of the AI channel value or system operations, the user can set up a Deadband value for the AI channel to reduce the oscillation effect to the channel value. The detailed description of Deadband operation is as below:

  There are three operation styles for AI Deadband. The AI Channel setting in following examples is 0mA ~ 20mA.

  (a) In the IF Condition, when AI > or >= a numerical value:
  Assuming the Deadband value is set to be 2 mA, and the following statements are defined in the related logic Rule: IF AI>10mA, THEN DO=ON, ELSE DO=OFF, that means, when AI receives a signal that exceed 10mA, the DO channel will change to ON immediately, however, when the AI channel value drops and becomes lower than 10mA, the DO channel will not change back to OFF immediately until the value reaches 8mA (10mA minus the Deadband value 2mA), as shown in the following figure.

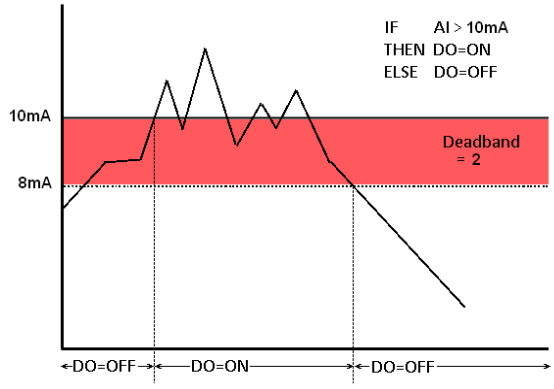


Figure7-22 : AI Deadband Operation(> or >= a numerical value)

  (b) In the IF Condition, when AI < or <= a numerical value:
  Assuming the Deadband value is set to be 2 mA, and the following statements are defined in the related logic Rule: IF

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AI<10mA, THEN DO=ON, ELSE DO=OFF, that means, when AI receives a signal which is lower than 10mA, the DO channel will change to ON immediately, however, when the AI channel value exceed 10mA, the DO channel will not change back to OFF immediately until the value reaches 12mA (10mA plus the Deadband value 2mA), as shown in the following figure.

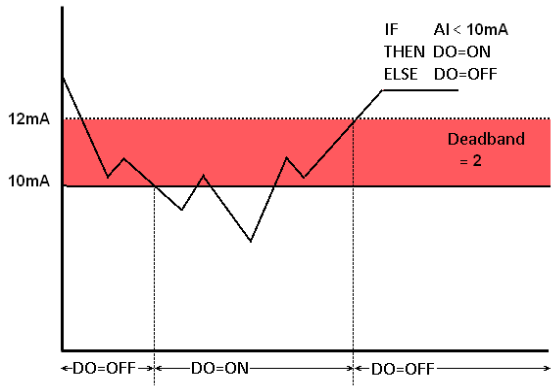


Figure7-23 : AI Deadband Operation(< or <= a numerical value)

(c) In the IF Condition, when AI = a numerical value:

Assuming the Deadband value is set to be 1 mA, and the following statements are defined in the related logic Rule: IF AI = 9mA, THEN DO=ON, ELSE DO=OFF, that means, when AI receives a signal between 8mA (9mA minus the deadband value 1mA) and 10mA (9mA plus the deadband value 1mA), the DO channel will change to ON immediately. However, when the AI channel value exceed 10mA, or is lower than 8mA, the DO channel will change to OFF, as shown in the following figure.

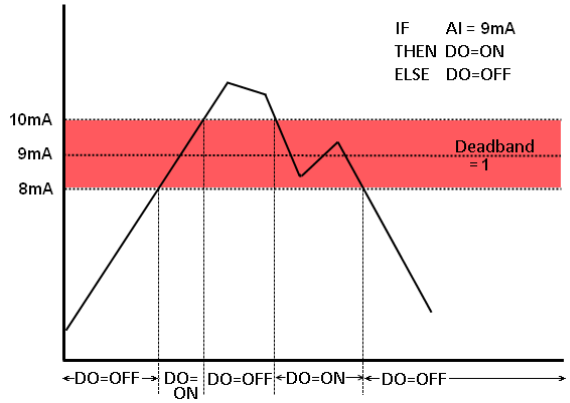


Figure7-24 : AI Deadband Operation(= a numerical value)

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After all settings of the channels are completed, click “OK” button to return to XV-Board Setting page.

7.2.4 XV-Board AO Channel Settings

The XV-Board AO Channel Setting page is shown as follow (using PMC-5231+XV310 as an example):

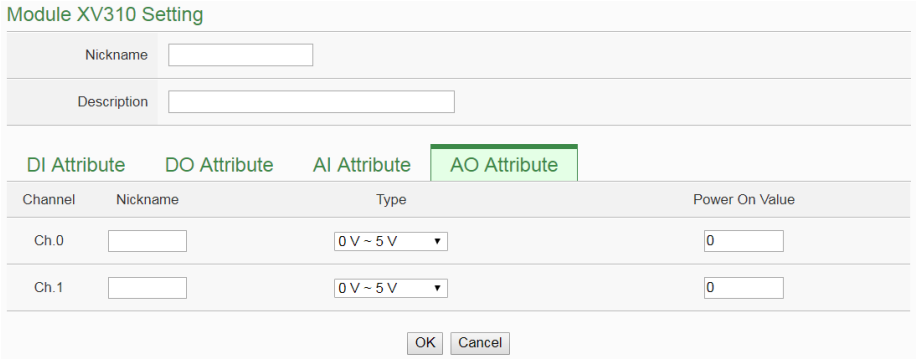


Figure7-25 : XV-Board AO attribute setting page

The settings are as follow:

- Nickname：For user to define nicknames for each I/O channel, this nickname will be displayed on the “I/O Information” and “Rule Setting” pages.
- Type: Select the output signal type of the AO channel from the dropdown list.
- Power On Value: You can set the initial value of the AO channel in the “Power On Value” field. The default initial value is 0.

After all settings of the channels are completed, click “OK” button to return to XV-Board Setting page.

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7.3 I/O Module Setting

PMC/PMD allows connections to ICP DAS M-7000/DL/IR modules. It also supports standard Modbus RTU or Modbus TCP I/O modules. The I/O Module Setting page allows user to add Modbus RTU or Modbus TCP I/O modules that are connected to the PMC/PMD to the list. After the module is added, it allows to set up the configuration of the I/O module. The setting page is shown as below:

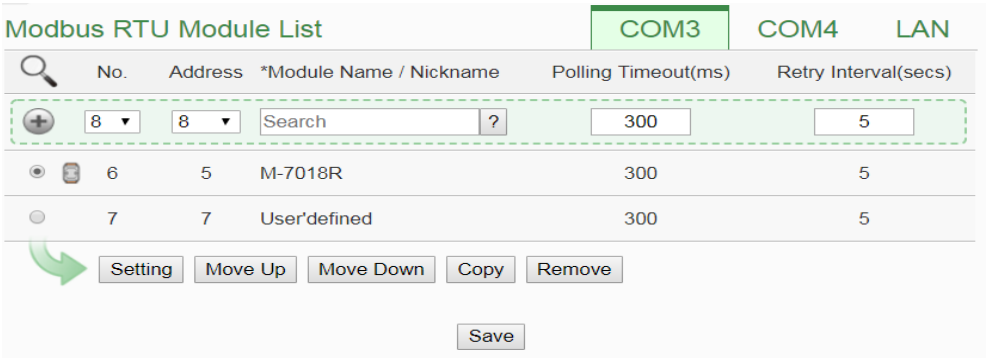


Figure7-26 : I/O Module Setting Page

The following section will give more information how to add and complete settings of Modbus RTU I/O modules and Modbus TCP I/O modules. After all settings are completed, click “Save” button to save the changes.

Please Note:

1. The 2 COM Port (RS-485) interfaces on PMC/PMD allows connections to Modbus RTU I/O modules.
2. The LAN interface on PMC/PMD allows connections to Modbus TCP I/O modules. For more detailed information of the LAN settings, please refer to “6.5 I/O Interface Setting”.
3. One PMC/PMD allows connections to at most 8 Modbus I/O modules (including M-7000/DL/IR modules, Modbus RTU I/O modules and Modbus TCP I/O modules.)
4. A single I/O interface allows connections to at most 16 devices (Power meters and I/O modules); each device requires its own index number. Therefore, if an I/O interface is connecting to both power meters and I/O modules, they will share the same set of the index numbers. For example, if COM3 is connecting to 2 Modbus RTU power meters and already takes the index numbers No.1 and No.2, the Modbus RTU I/O modules that are going to be connected to COM3 can be only set as No.3 ~ No.16 that are not occupied.

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7.3.1 Scan to Add ICP DAS M-7000/DL Modules

The user could use Scan function to add ICP DAS M-7000/DL Modules to the PMC/PMD, the steps are as below: (Please Note: The ICP DAS IR modules does not support the scan function, please add it manually.)

i Click on  button to scan the M-7000/DL modules that are connected to the PMC/PMD.

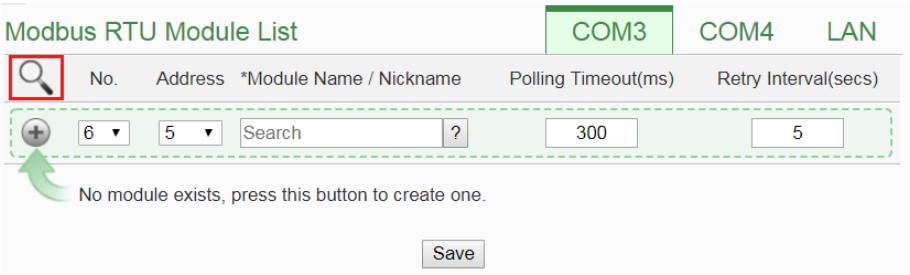


Figure7-27 : The "Scan" button to search M-7000/DL module

ii When the Scan page appears (Figure 7-28), input the starting address and the ending address of the Modbus address that are going to perform scan. Click on "Scan", the system will start to scan the M-7000/DL modules that match the settings previously set, to cancel the scan, click on "Cancel".

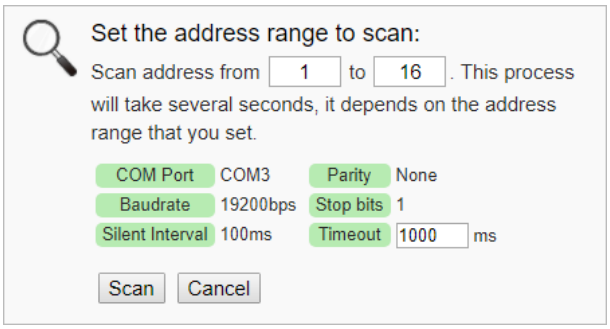


Figure7-28 : Set up the Scanning Range for the M-7000/DL module

iii When the system is performing the scan (Figure 7-29), the address that are performing scan will be dynamically shown on the upper left side, please wait till the scan operation is completed. To stop the scan operation, click on "Cancel" to terminal the scan and leave the page.

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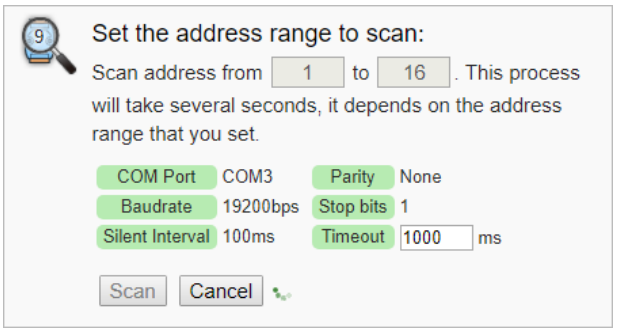


Figure7-29 : Scanning the M-7000/DL modules

iv After the Scan operation is completed, an M-7000/DL module list will appear (Figure 7-30). If the newly scanted module doesn't match the module previously set on the same address, a window will appear (Figure 7-31), please select the actual device that are connected to PMC/PMD. After all settings are completed, click "Save" button to save the changes.

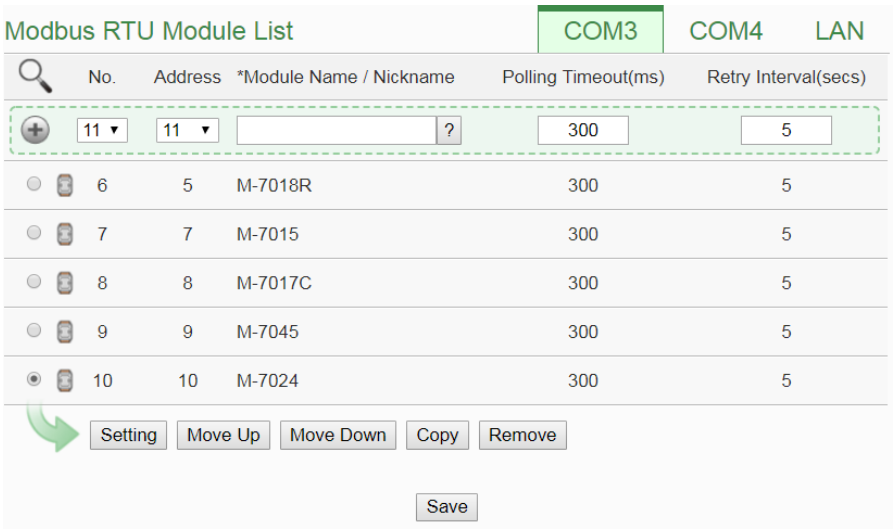


Figure7-30 : The M-7000/DL List after Scan operation

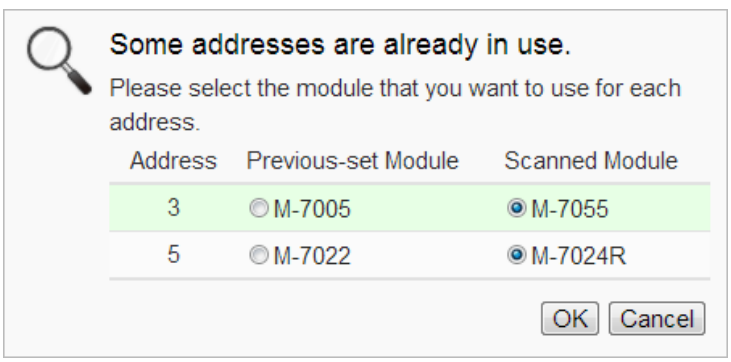


Figure7-31 : Select the actual M-7000/DL modules connected to PMC/PMD

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7.3.2 Add Modbus RTU Module (or M-7000/DL/IR Module) Manually

In addition to perform Scan operation to automatically add M-7000/DL /IR modules to the list, the user could also add the Modbus RTU module (or M-7000/DL/IR module) manually one by one, the steps are as below:

i No: The number will be the order that the I/O channel data of the Modbus RTU module being stored in the PMC/PMD Modbus Table. The range is 1~16.

ii Address: The address will be the Modbus address of this Modbus RTU module, please make sure the address is the same as the settings of the module, if the setting is not accurate, the connection for PMC/PMD to the Modbus RTU module will be failed.

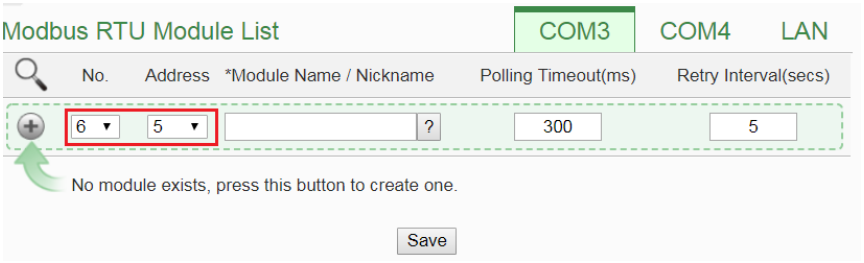


Figure7-32 : Set up the No and Address of the Modbus RTU module

iii Select the module name: For ICP DAS M-7000/DL/IR modules, the user could select the default model name from the dropdown list for further modification. For other Modbus RTU module (non M-7000/DL/IR module), please input the module name.

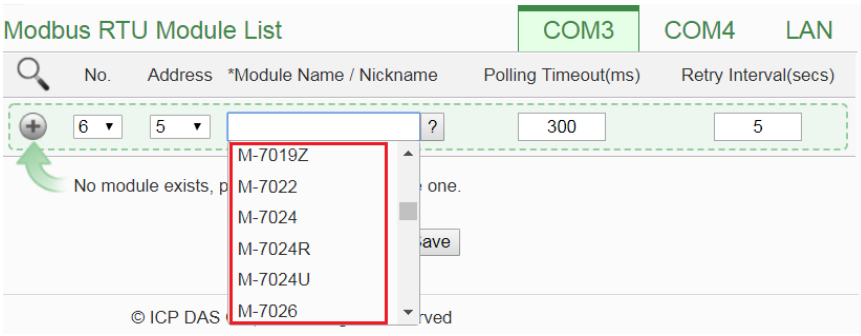


Figure7-33 : Select the model of the Modbus RTU Module

iv Polling Timeout: The time interval for PMC/PMD to send command to the Modbus RTU module and wait for the response, the unit will be ms. The setting range will be 1-10000 ms.

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v Retry Interval: The time interval to wait for PMC/PMD to repeatedly send command again when PMC/PMD sends command to the Modbus RTU module and get no response. The unit will be second. the setting range will be 3 ~ 65535 seconds.

vi Click ⊕ to add the Modbus RTU module to the list (Figure 7-34). After adding the Modbus RTU module, click "Save" button to save the changes.

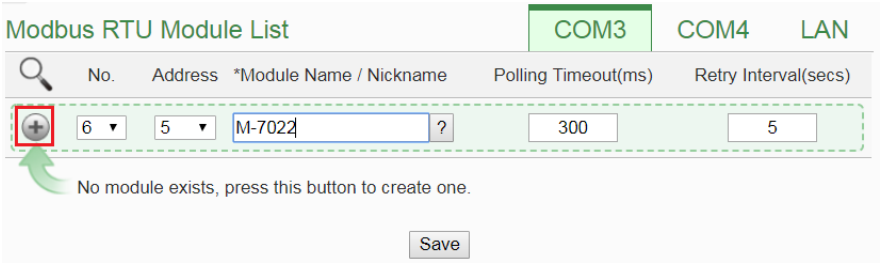


Figure7-34 : Add the Modbus RTU Module manually

7.3.3 Add Modbus TCP Module Manually

To manually add Modbus TCP modules, please follow the steps below:

i No: The number will be the order that the I/O channel data of the Modbus TCP module being stored in the PMC/PMD Modbus Table. The range is 1~16.

ii Network: Set up the settings of IP, Port and NetID appropriately as required. If the settings are not the same as the settings of the module, the connection for PMC/PMD to the Modbus TCP module will be failed.

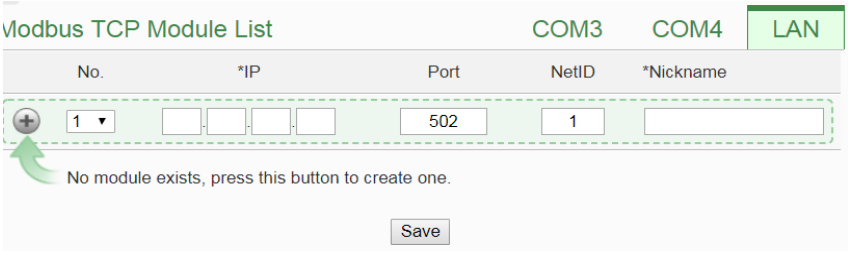


Figure7-35 : Add Modbus TCP Module

iii Nickname：For user to define nicknames for the Modbus TCP module, this nickname will be displayed on the "Module Information" pages.

iv Click ⊕ to add the Modbus TCP module to the list (Figure 7-36). After adding the module, click "Save" button to save the changes.

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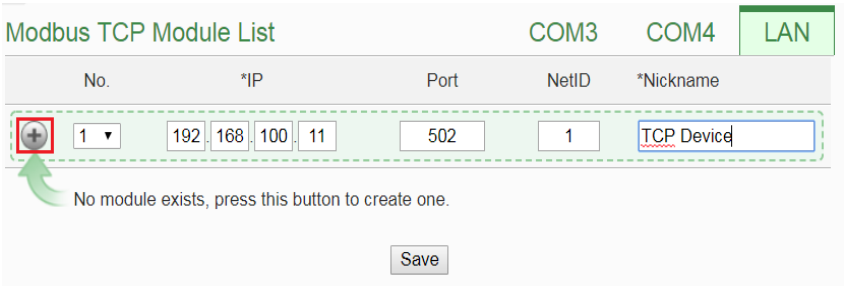


Figure7-36 : Add the Modbus RTU Power Meter manually

7.3.4 I/O Module List Interface

After the Modbus RTU I/O module or Modbus TCP I/O module are added to the I/O Module list via auto scan or manual work, the Modbus RTU I/O modules and Modbus TCP I/O modules will be listed as below:

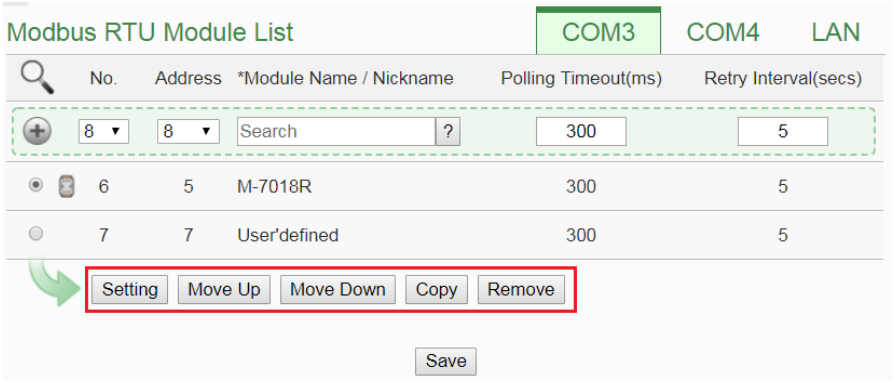


Figure7-37 : Modbus module List Interface

The following functions allow to perform settings or rearrange order of the Modbus I/O modules. Please select the Modbus I/O module and click on the function button to perform the operations:

- Setting: Click the radio button in front of the Modbus I/O module and click on “Setting” to get into the setting page of the Modbus I/O module. The settings for each Modbus I/O module will be given in the following section.
- Move Up: Click the radio button in front of the Modbus I/O module and click on “Move Up” to move the Modbus I/O module to upper order (upper index number (No)).
- Move Down: Click the radio button in front of the Modbus I/O module and click on “Move Down” to move the Modbus I/O module to lower order (lower index number (No)).
- Copy: To copy the settings of a pre-set Modbus I/O module to the new Modbus I/O module, please click the radio button in

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front of the pre-set Modbus I/O module and then click on "Copy", a new Modbus I/O module (in sequence) will be added to the list and the settings of the old Modbus I/O module will be copied to this newly added Modbus I/O module.

- Remove: Click the radio button in front of the Modbus I/O module and click on "Remove" to remove the selected Modbus I/O module.

After all settings are completed, click "Save" button to save the changes.

7.3.5 M-7000/DL/IR Module Setting

PMC/PMD support ICP DAS M-7000/DL/IR module, the following section will give more detailed settings of ICP DAS M-7000/DL/IR module setting page. (Figure 7-38)

- Nickname：For user to define nicknames for each M-7000/DL module, this nickname will be displayed on the "I/O Information " and "Rule Setting" pages.
- Description: The Description field provides a space for the user to make a brief description of this M-7000/DL module.
- Address: The address will be the Modbus address of this M-7000/DL/IR module, please make sure the address is the same as the settings of the module, if the setting is not accurate, the connection for PMC/PMD to the M-7000/DL/IR module will be failed.
- Scan Rate: Input the time interval for PMC/PMD to periodically retrieve the I/O channel data of this M-7000/DL/IR module, the setting range will be 0 ~ 65535 seconds.
- Polling Timeout: The time interval for PMC/PMD to send command to the M-7000/DL/IR module and wait for the response, the unit will be ms. The setting range will be 1-10000 ms.
- Retry Interval: The time interval to wait for PMC/PMD to repeatedly send command again when PMC/PMD sends command to the M-7000/DL/IR module and get no response. The unit will be second. the setting range will be 3 ~ 65535 seconds.

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The settings interfaces of the DI, DO, AI and AO channels on the M-7000/DL/IR Module are as below:

- The DI channel setting for M-7000 module

  The M-7000 module DI channel setting interface is shown as below (using M-7052 as an example)

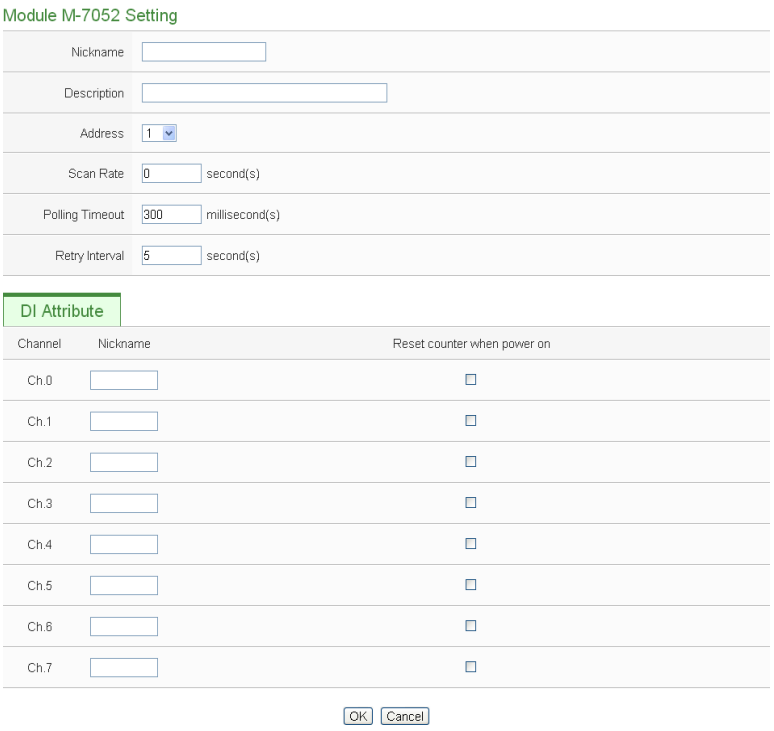


Figure7-38 : M-7000 DI Channel Setting Page

The settings are as below:

◆ Nickname：For user to define nickname for each I/O channel, this nickname will be displayed on the “I/O Information” and “Rule Setting” pages.

◆ Reset counter when power on: If the “Reset counter when power on” is selected for the DI channel, the DI channel counter of this M-7000 module will be reset to the default value when the PMC/PMD is powered on or after loading the rules.

After all settings of the DI channels are completed, continue the configuration of other channel, and after all channel settings are completed, click “OK” button to save the changes and return to Modbus RTU Module List.

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Please Note:

1. For M-7000 modules, the counting mode of the DI channel counter is Falling.
2. To set up the default value of the DI channels on M-7000 modules, please use DCON Utility to set the value.

- The DO channel setting for M-7000/DL module

The M-7000/DL module DO channel setting interface is shown as below (using M-7060 as an example)

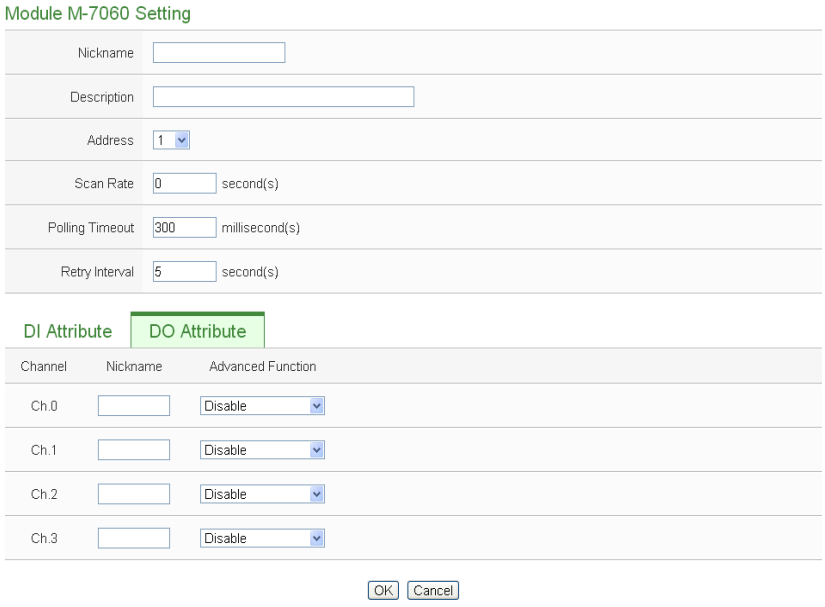


Figure7-39 : M-7000/DL DO Channel Setting Page

The settings are as below:

◆ Nickname：For user to define nickname for each I/O channel, this nickname will be displayed on the “I/O Information” and “Rule Setting” pages.

◆ For M-7000/DL DO channels, PMC/PMD provides the following options for advanced function:

- ■ Disable: Disable the advanced function
- ■ Auto OFF: When “Auto OFF” is selected, it allows this DO channel to enable Auto OFF function. It is required to set up a time interval, when this DO channel is set to be “ON” and the duration of the ON status reaches the pre-set time interval , the DO will automatically be set to OFF. The unit is second.
- ■ DI Status Mapping: When “DI Status Mapping” is selected,

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the status of the DI channel with the same channel number on the M-7000/DL module will be copied to the DO channel. For example, when the “DI Status Mapping” is enabled on DO0, when the DI0 status is ON, DO0 will set to be ON, and when the DI0 status is OFF, DO0 will set to be OFF as well.

After all settings are completed, click “OK” button to save the changes and return to Modbus RTU Module List.

Please Note:

1. To set up the Power On value of the DO channels on M-7000/DL modules, please use DCON Utility to set the value.
2. The DO channels on M-7000/DL modules do not offer Pulse Output function.

- The AI channel setting for M-7000/DL module

The M-7000/DL module AI channel setting interface is shown as below (using M-7018 as an example)

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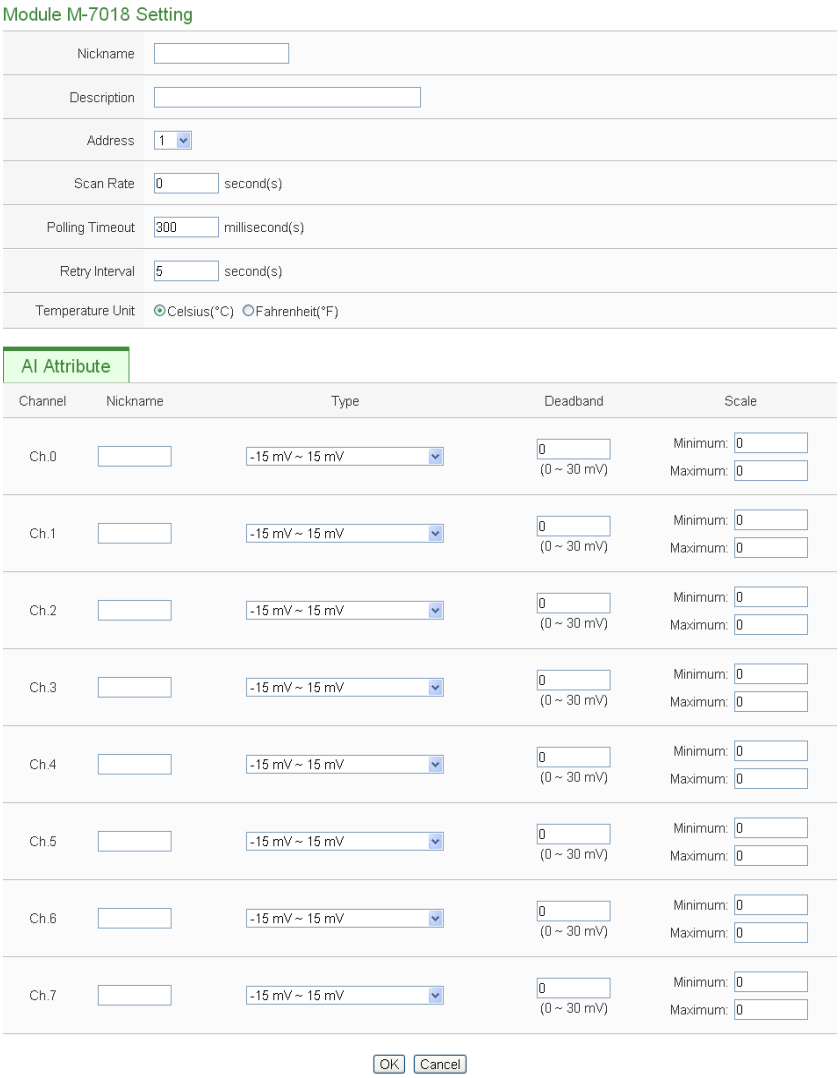


Figure7-40 : M-7000/DL AI Channel Setting Page

The settings are as below:

- ◆ Nickname：For user to define nickname for each I/O channel, this nickname will be displayed on the “I/O Information” and “Rule Setting” pages.
- ◆ Type: Select the input signal type of the AI channel from the dropdown list.
- ◆ Deadband: Please refer to Deadband section in the “7.2.3 XV-Board AI Channel Settings” for more detailed information.
- ◆ Scale: Please refer to Scale section in the “7.2.3 XV-Board AI Channel Settings” for more detailed information.

After all settings are completed, click “OK” button to save the changes and return to Modbus RTU Module List.

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- The AO channel setting for M-7000 module

The M-7000 module AO channel setting interface is shown as below (using M-7024 as an example)

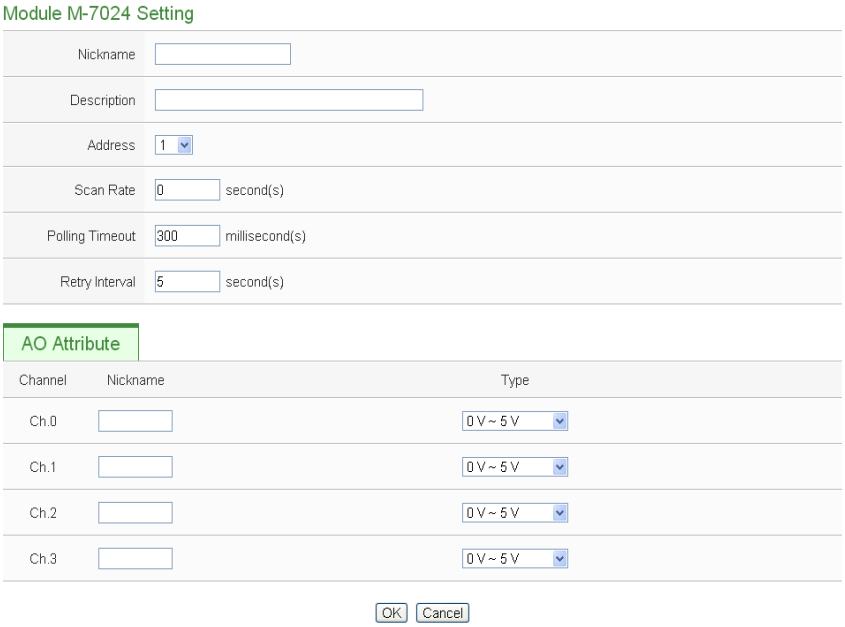


Figure7-41 : M-7000 AO Channel Setting Page

The settings are as below:

◆ Nickname：For user to define nickname for each I/O channel, this nickname will be displayed on the “I/O Information” and “Rule Setting” pages.

◆ Type: Select the output signal type of the AO channel from the dropdown list.

After all settings are completed, click “OK” button to save the changes and return to Modbus RTU Module List.

Please note: To set up the Power On value of the AO channels on M-7000 modules, please use DCON Utility to set the value.

7.3.6 Modbus RTU Module Setting

PMC/PMD allows connections to modules that support Modbus RTU Slave protocol for offering I/O interface function. Through Modbus RTU protocol, it enables to read or write 4 types of Modbus data (Coil Output, Discrete Input, Input Register and Holding Register) from the Modbus RTU Slave modules. And by PMC/PMD IF-THEN-ELSE rule

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engine, it allows to perform automation control operation on the modules. And with SCADA software, it also allows monitoring and control of the Modbus RTU modules which connect with the PMC/PMD. The Modbus RTU Slave Module setting page is shown as follow:

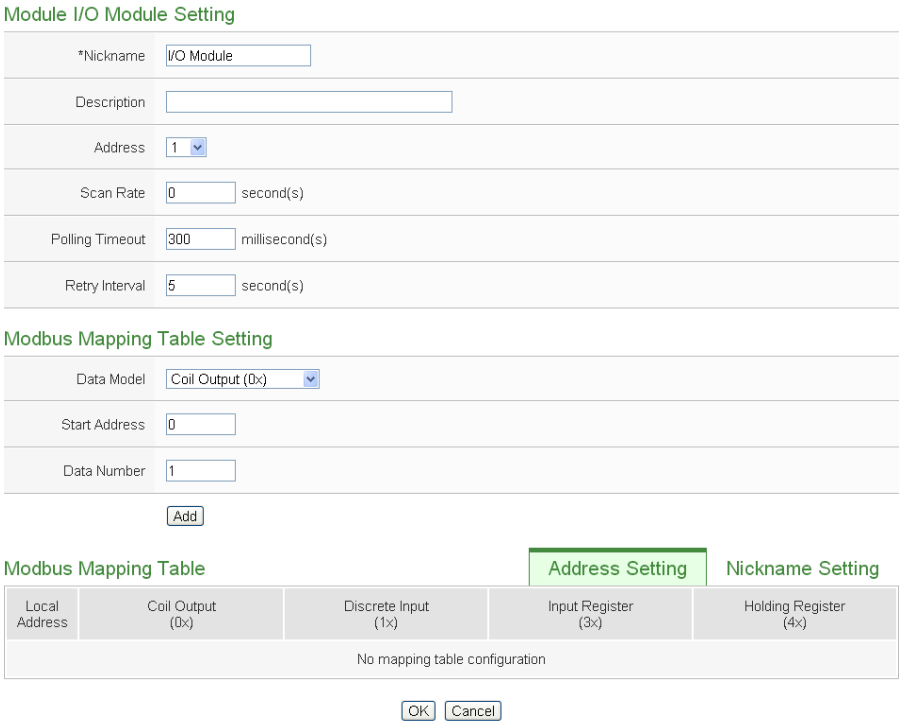


Figure7-42 : Modbus RTU Slave Module Setting Page

The settings are as below:

- Nickname：For user to define nickname for each I/O channel, this nickname will be displayed on the “I/O Information” and “Rule Setting” pages.
- Description: The Description field provides a space for the user to make a brief description of this module.
- Address: The address will be the Modbus address of this Modbus RTU module, please make sure the address is the same as the settings of the module, if the setting is not accurate, the connection for PMC/PMD to the Modbus RTU module will be failed.
- Scan Rate: Input the time interval for PMC/PMD to periodically retrieve the I/O channel data of this Modbus RTU module, the setting range will be 0 ~ 65535 seconds.
- Polling Timeout: The time interval for PMC/PMD to send

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command to the Modbus RTU module and wait for the response, the unit will be ms. The setting range will be 1-10000 ms.

- Retry Interval: The time interval to wait for PMC/PMD to repeatedly send command again when PMC/PMD sends command to the Modbus RTU module and get no response. The unit will be second. The setting range will be 3 ~ 65535 seconds.

After all settings are completed, click “Save” button to save the changes.

Please refer to the following sections for more detailed information of Coil Output, Discrete Input, Input Register and Holding Register configurations on Modbus RTU Slave module.

Please Note: The number of Modbus address setting blocks will affect the data update rate for the Modbus RTU Slave module. Please minimize the number of Modbus address setting blocks; merge the conjunctive setting blocks to speed up the data update rate for the communication between PMC/PMD and Modbus RTU Slave module.

- The Coil Output Setting of Modbus RTU Module

  The Modbus RTU Module Coil Output Setting page is shown as follow:

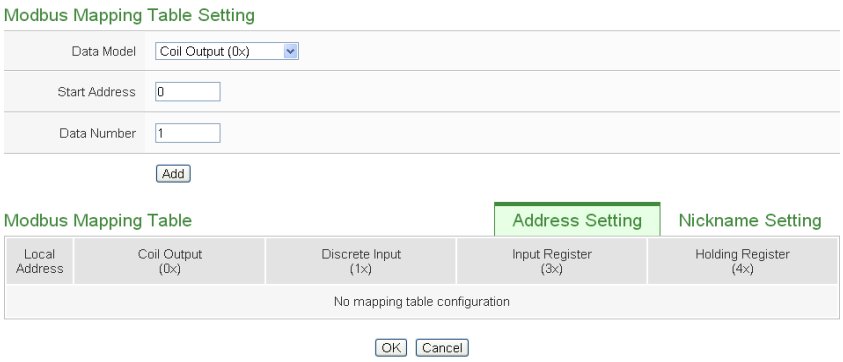


Figure7-43 : Coil Output Setting Page

The settings are as follow:

◆ Data Model: PMC/PMD offers 4 Data Model selections to match the Modbus RTU Slave module configuration. The Data Model list is as follow. In this case, please select ”Coil Output(0x)”.

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Data Model	The Modbus Address of Modbus RTU Slave Modules
Coil Output	0xxxx
Discrete Input	1xxxx
Input Register	3xxxx
Holding Register	4xxxx

- Start Address: Allows setting up the starting address of Coil Output (0x) on the Modbus RTU Slave module you would like to retrieve.
- Data Number: After finishing the Start Address setting, specify the Data Number, it is the number of Coil Output data you would like to retrieve from the Start Address.
- After finishing the "Start Address" and "Data Number" setting, click on "Add" button. A new Coil Output address block will be added to the Modbus address mapping table. All added address blocks will be located in sequences staring from the Starting Address of the Coil Output (The address number on the first column of the "Local Address" indicates the local Modbus address of PMC/PMD to keep the Coil Output data.).

  Figure7-44 is an example about Coil Output setting for a Modbus RTU Slave module. The starting Modbus address of the Coil Output block is 00050(00000 + 50), it requires to set 4 continuous Coil Output data in the setting. So that the PMC/PMD can access the 00050, 00051, 00052 and 00053 Coil Output address of the module, and these retrieved Coil Output data will be kept in PMC/PMD Modbus Address 00300, 00301, 00302 and 00303.

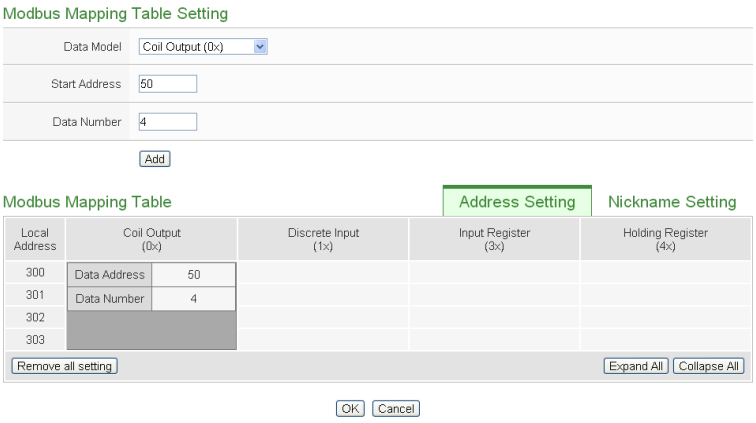
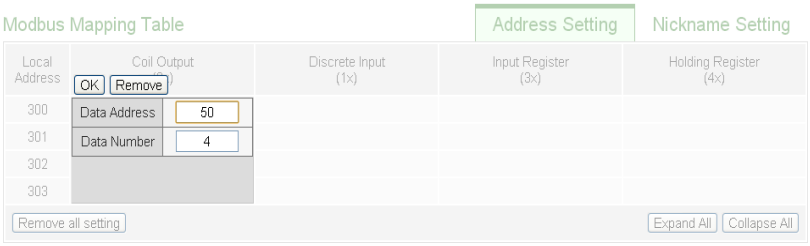


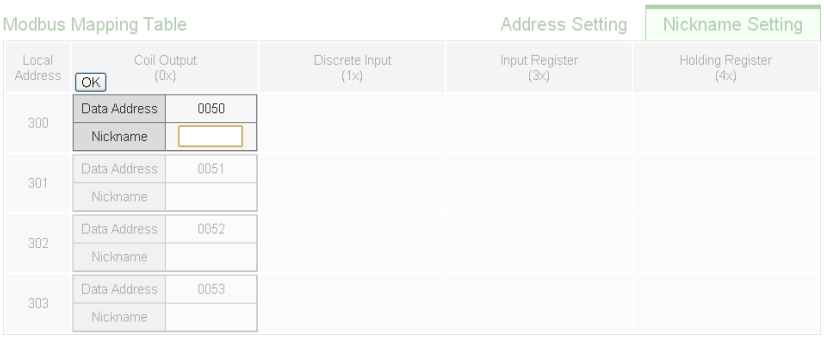
Figure7-44 : Coil Output Setting Example for Modbus RTU Module

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◆ To modify the starting address or quantity setting, please click on the setting block and input the setting. Click “OK” for modification or click “Remove” to remove the setting.



◆ If the user wants to assign a Nickname for the address blocks, the user can click on the “Nickname Setting” tab, and then input the Nickname for each address block. The Nickname will be shown in the “I/O Information” and “Rule Setting” pages.



◆ After all Coil Output settings of the Modbus RTU module are completed, click “OK” button to save the changes.

- The Discrete Input Setting of Modbus RTU Module

The Modbus RTU module Discrete Input Setting page is shown as follow:

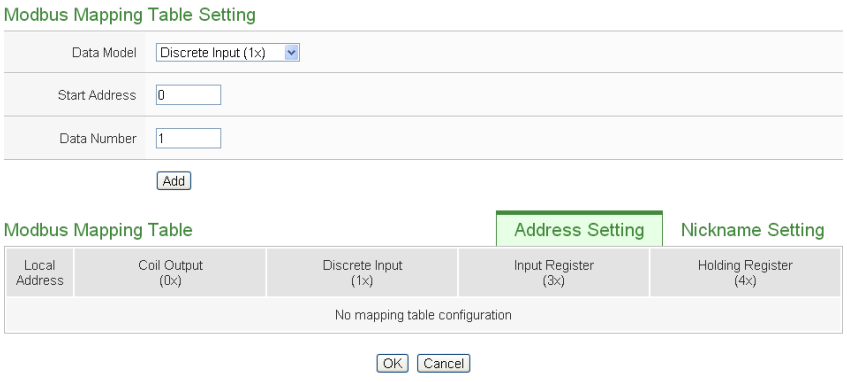


Figure7-45 : Discrete Input Setting Page

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The settings are as follow:

- Data Model: PMC/PMD offers 4 Data Model selections to match the Modbus RTU Slave module configuration. Please refer to the above section “The Coil Output Setting of Modbus RTU Module” for detailed information. In this case please select ”Discrete Input(1x)”.
- Start Address: Allows to set up the starting address of the data on the PMC/PMD that would be retrieved to the Discrete Input(1x) on the Modbus RTU module.
- Data Number: After finishing the Start Address setting, specify the Data Number, it is the number of Discrete Input data that would be retrieved from the Start Address.
- After finishing the “Start Address” and “Data Number” setting, click on “Add” button. A new Discrete Input address block will be added to the Modbus address mapping table. All added address blocks will be located in sequences staring from the Starting Address(The address number on the first column of the “Local Address” indicates the local Modbus address of PMC/PMD to keep the Discrete Input data.).

  Figure7-46 shows an example about Discrete Input setting for a Modbus RTU module. The starting Modbus address of the Discrete Input block is 10020(10000 + 20), it requires to set 6 continuous Discrete Input data in the setting. So that the PMC/PMD can access the 10020, 10021, 10022, 10023, 10024, and 10025 Discrete Input address of the module, and these retrieved Discrete Input data will be kept in PMC/PMD Modbus Address 10300, 10301, 10302, 10303, 10304 and 10305.

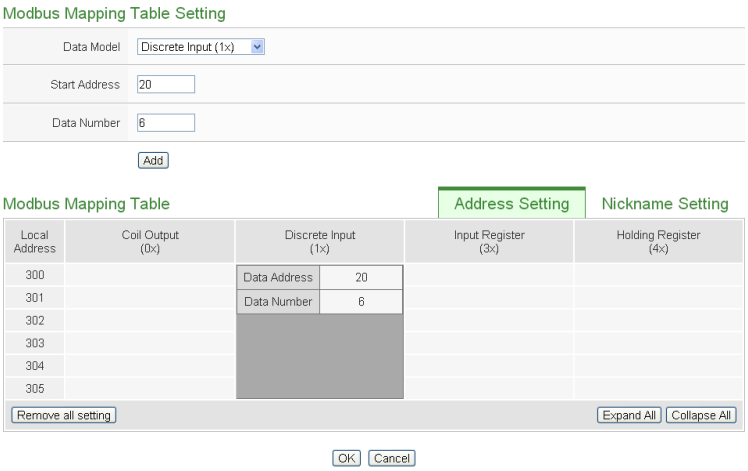
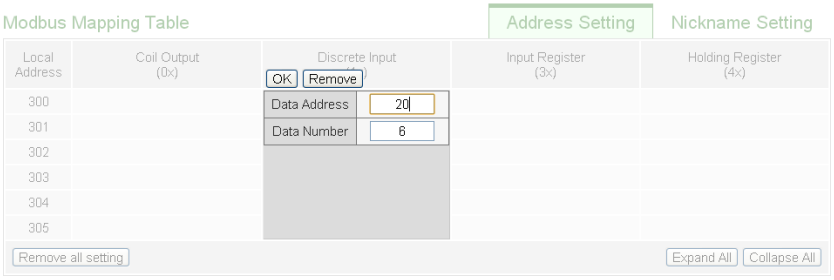


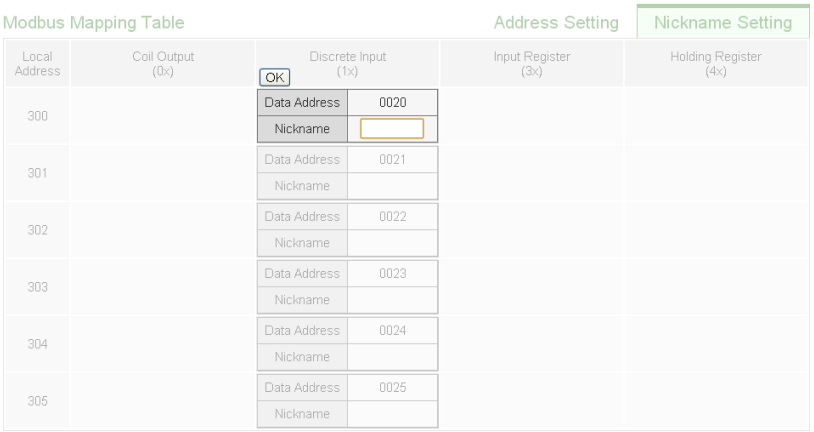
Figure7-46 : Discrete Input Setting Example for Modbus RTU Module

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◆ To modify the starting address or quantity setting, please click on the setting block and input the setting. Click “OK” for modification or click “Remove” to remove the setting.



◆ If the user wants to assign a Nickname for the address blocks, the user can click on the “Nickname Setting” tab, and then input the Nickname for each address block. The Nickname will be shown in the “I/O Information” and “Rule Setting” pages.



◆ After all Discrete Input settings of the Modbus RTU module are completed, click “OK” button to save the changes.

- The Input Register Setting of Modbus RTU Module

The Modbus RTU module Input Register Setting page is shown as follow:

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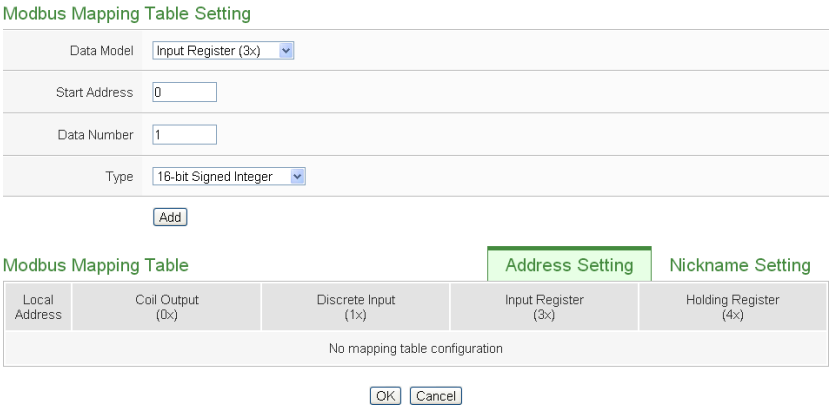
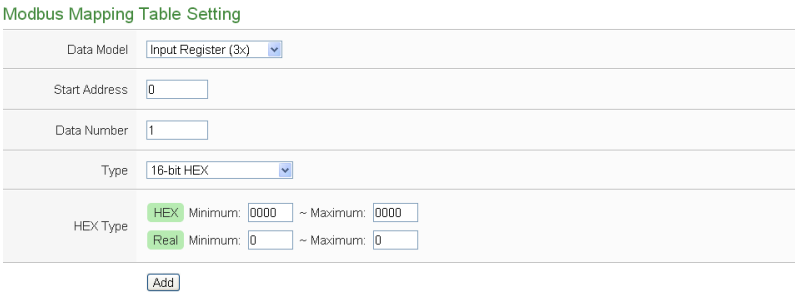


Figure7-47 : Input Register Setting Page

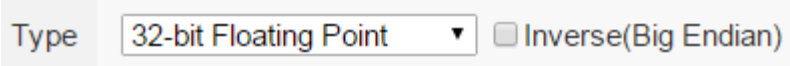
The settings are as below:

- Data Model: PMC/PMD offers 4 Data Model selections to match the Modbus RTU Slave module configuration. Please refer to the above section “The Coil Output Setting of Modbus RTU Module” for detailed information. In this case please select ”Input Register (3x)”.
- Start Address: Allows to set up the starting address of Input Register(3x) on the Modbus RTU module the user would like to retrieve.
- Data Number: After finishing the Start Address setting, specify the Data Number, it is the number of Input Register data you would like to retrieve from the Start Address.
- Type: The system support 6 kinds of data type setting for Input Register of Modbus RTU module. The 6 Data Type options are “16-bit Signed Integer”, “16-bit Unsigned Integer”, “16-bit Hex”, “32-bit Signed Long”, “32-bit Unsigned Long”, and “32-bit Floating Point”. If the “16-bit HEX” option is selected, it is required to setup the corresponding scale parameters for linear transformation from HEX value to real value. The PMC/PMD will retrieve the HEX value and transfer it to real value in floating point format, this real value could be included in the IF-THEN-ELSE rule for edition.

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If users select “32-bit Signed Long”, “32-bit Unsigned Long”, or “32-bit Floating Point”, the option “Inverse(Big Endian)” will appear. Enable “Inverse(Big Endian)” to receive the data in big endian format correctly.



◆ After finishing the “Start Address”, “Data Number”, and “Type” setting, click on “Add” button. A new Input Register address block will be added to the Modbus address mapping table (shown as below). All added address blocks will be located in sequences staring from the Starting Address (The address number on the first column of the “Local Address” indicates the local Modbus address of PMC/PMD to keep the Input Register data.).

Figure 7-48 shows an example about Input Register setting for a Modbus RTU module. The starting Modbus address of the Input Register block is 30010(30000 + 10), it requires to set 3 continuous Input Register data in the setting, and the data type is “32-bit Floating Point”. So that these retrieved Input Register data will be kept in PMC/PMD Address 30300, 30302, and 30304.

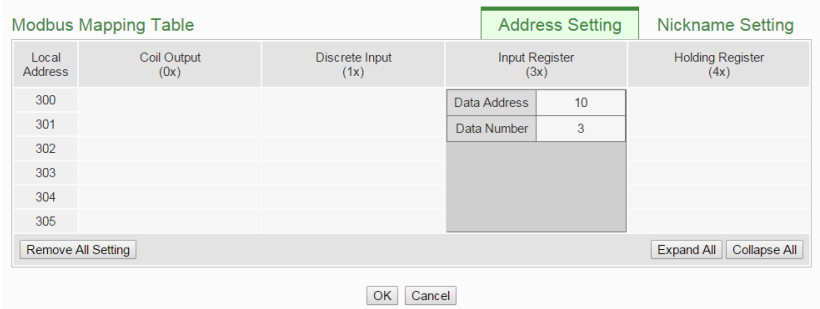


Figure7-48 : Input Register Setting Example for Modbus RTU Module

◆ To modify the starting address or quantity setting, please click

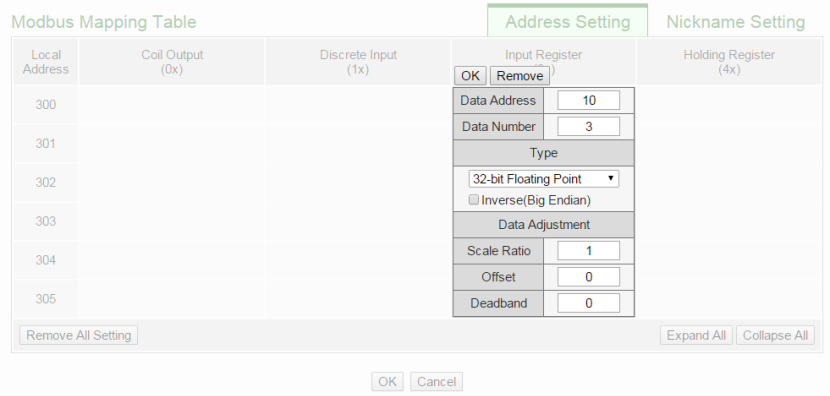
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on the setting block to perform the modification. The user could also modify Type, Scale Ratio, Offset and Deadband on this interface. The Scale Ratio setting and Offset setting allows user to transform the Input Register value in this block by linear transformation. The formula is as follow:

Transformed Value = Scale Ratio x Input Register value + Offset

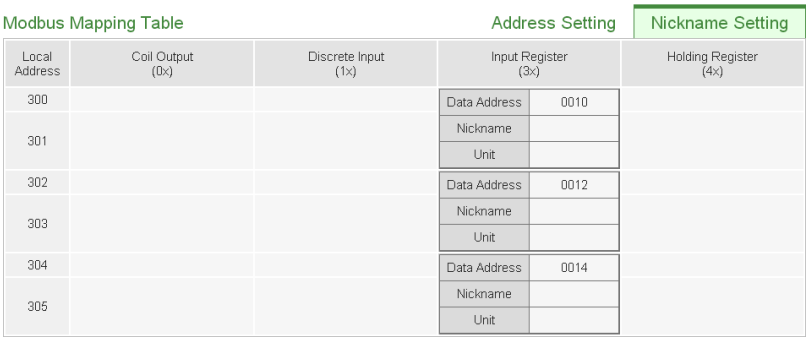
After the linear transformation, the Transformed Value will be saved in floating point format on the PMC/PMD(no matter what format the raw Input Register value was in the device). The default Scale Ratio will be 1 and the default Offset is 0, indicating not using linear transformation.

For more information about Deadband setting, please refer to "7.2.3 XV-Board AI Channel Settings". Click "OK" for modification or click "Remove" to remove the setting.



◆ If the user wants to assign a Nickname for the address blocks, the user can click on the "Nickname Setting" tab, and then input the Nickname for each address block. The Nickname will be shown in the "I/O Information" and "Rule Setting" pages.

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◆ After all Input Register settings of the Modbus RTU module are completed, click “OK” button to save the changes.

- The Holding Register Setting of Modbus RTU Module

  The Modbus RTU Slave module Holding Register Setting page is shown as follow:

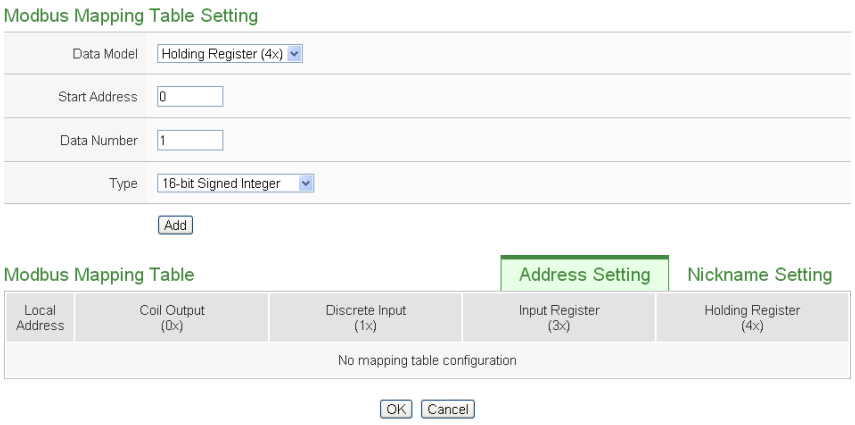


Figure7-49 : Holding Register Setting Page

The settings are as below:

◆ Data Model: PMC/PMD offers 4 Data Model selections to match the Modbus RTU Slave module configuration. Please refer to the above section “The Coil Output Setting of Modbus RTU Module” for detailed information. In this case please select ” Holding Register (4x)”.

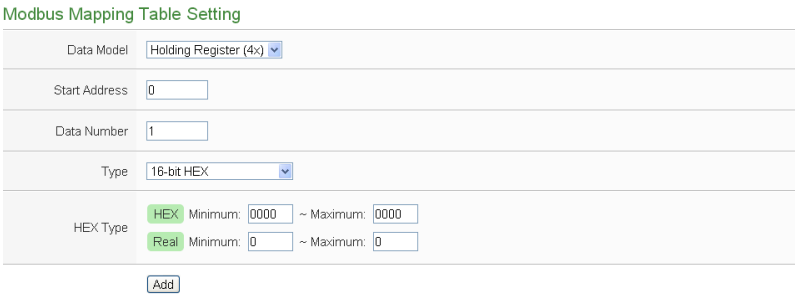
◆ Start Address: Allows to set up the starting address of Holding Register(4x) on the Modbus RTU Slave module you would like to retrieve.

◆ Data Number: After finishing the Start Address setting, specify the Data Number, it is the number of Holding Register data you would like to retrieve from the Start Address.

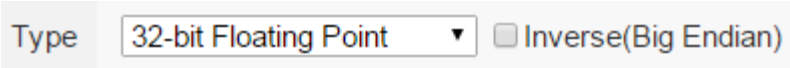
◆ Type: The system support 6 kinds of data type setting for

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Holding Register of Modbus RTU module. The 6 Data Type options are “16-bit Signed Integer”, “16-bit Unsigned Integer”, “16-bit Hex”, “32-bit Signed Long”, “32-bit Unsigned Long”, and “32-bit Floating Point”. If the “16-bit HEX” option is selected, it is required to setup the corresponding scale parameters for linear transformation from HEX value to real value. The PMC/PMD will retrieve the HEX value and transfer it to real value in floating point format, this real value could be included in the IF-THEN-ELSE rule for edition.



If users select “32-bit Signed Long”, “32-bit Unsigned Long”, or “32-bit Floating Point”, the option “Inverse(Big Endian)” will appear. Enable “Inverse(Big Endian)” to receive the data in big endian format correctly.



◆ After finishing the “Start Address”, “Data Number”, and “Type” setting; click on “Add” button. A new Holding Register address block will be added to the Modbus address mapping table. All added address blocks will be located in sequences staring from the Starting Address (The address number on the first column of the “Local Address” indicates the local Modbus address of PMC/PMD to keep the Holding Register data.).

Figure 7-50 shows an example about Holding Register setting for a Modbus RTU module. The starting Modbus address of the Holding Register block is 40060(40000 + 60), it requires to set 2 continuous Holding Register data in the setting, and the data type is “32-bit Floating Point”. So that these retrieved Holding Register data will be kept in PMC/PMD Address 40300 and 40302.

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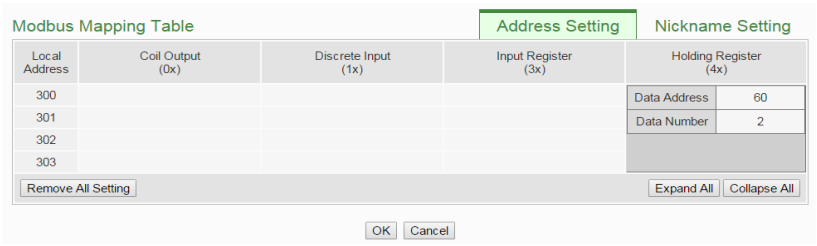
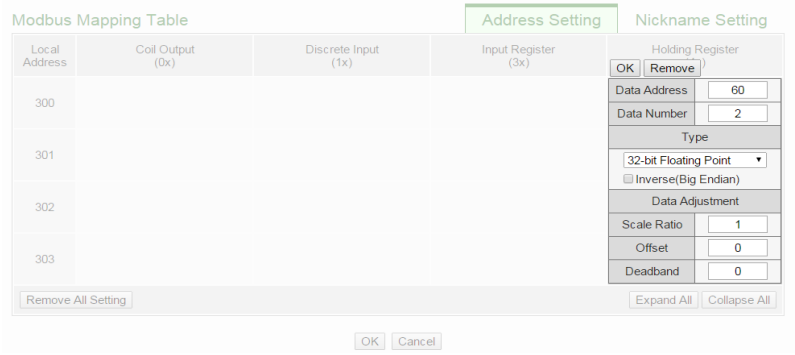


Figure7-50 : Input Register Setting Example for Modbus RTU Module

◆ To modify the starting address or quantity setting, please click on the setting block to perform the modification. The user could also modify Type, Scale Ratio, Offset and Deadband on this interface. For more detailed information, please refer to above section “The Input Register Setting of Modbus RTU Module”.



◆ If the user wants to assign a Nickname for the address blocks, the user can click on the “Nickname Setting” tab, and then input the Nickname for each address block. The Nickname will be shown in the “I/O Information” and “Rule Setting” pages.



◆ After all Holding Register settings of the Modbus RTU module are completed, click “OK” button to save the changes.

7.3.7 Modbus TCP Module Setting

PMC/PMD allows connections to modules that support Modbus TCP Slave protocol for offering I/O interface function. Through Modbus

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TCP protocol, it enables to read or write 4 types of Modbus data (Coil Output, Discrete Input, Input Register and Holding Register) from the Modbus TCP Slave modules. And by PMC/PMD IF-THEN-ELSE rule engine, it allows to perform automation control operation on the modules. And with SCADA software, it also allows monitoring and control of the Modbus TCP modules which connect with the PMC/PMD. The Modbus TCP Slave Module setting page is shown as follow:

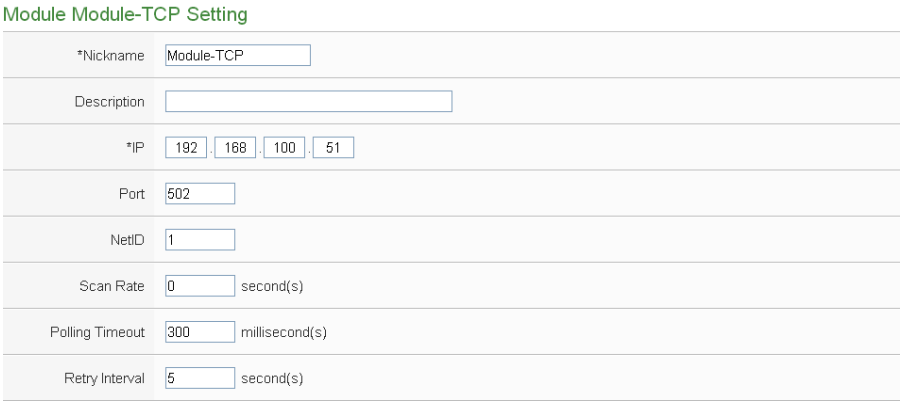


Figure7-51 : Modbus TCP Slave Module Setting Page(1)

The settings are as below:

- Nickname：For user to define nickname for each I/O channel, this nickname will be displayed on the “I/O Information” and “Rule Setting” pages.
- Description：The Description field provides a space for the user to make a brief description of this module.
- IP：Allows modification of the IP address of this Modbus TCP Slave module, make sure the IP setting is the same as the settings of the module. If the setting is not accurate, the connection for PMC/PMD to the module will be failed.
- Port：Allows modification of the Port number of this Modbus TCP Slave module, make sure the Port number is the same as the settings of the module. If the setting is not accurate, the connection for PMC/PMD to the module will be failed.
- NetID：Allows modification of the NetID of this Modbus TCP Slave module, make sure the NetID is the same as the settings of the module. If the setting is not accurate, the connection for PMC/PMD to the module will be failed.
- Scan Rate: Input the time interval for PMC/PMD to periodically

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retrieve the I/O channel data of this Modbus TCP module, the setting range will be 0 ~ 65535 seconds.

- Polling Timeout: The time interval for PMC/PMD to send command to the Modbus TCP module and wait for the response, the unit will be ms. The setting range will be 1-10000 ms.
- Retry Interval: The time interval to wait for PMC/PMD to repeatedly send command again when PMC/PMD sends command to the Modbus TCP module and get no response. The unit will be second. The setting range will be 3 ~ 65535 seconds.

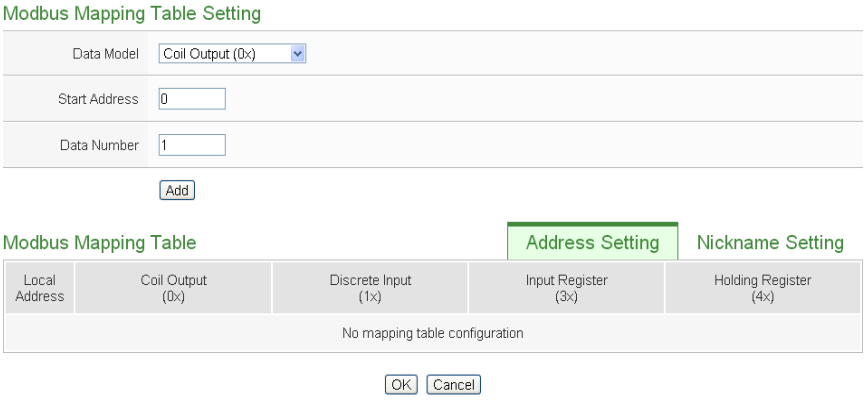


Figure7-52 : Modbus TCP Slave Module Setting Page(2)

For more detailed information about the data setting of the Coil Output, Discrete Input, Input Register and Holding Register of the Modbus TCP module, please refer to section "7.3.6 Modbus RTU Module Setting". After all settings are completed, click "Save" button to save the changes.

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8 Logger Setting

The Logger Setting function of the PMC/PMD provides recording of the power data from power meters and the I/O channel data from I/O modules. It includes Power Data Logger, I/O Data Logger and User-Defined Data Logger. The Power Data Logger is exclusive for the recording of the all power data, the I/O Data Logger is exclusive for the recording of the all I/O Channel data, and User-Defined Data Logger allows user to define his own data recording options from power data, I/O channel data or Internal Register data. The data log files of these two data loggers are both in CSV format that enables easy integration with the backend database system. In addition, PMC/PMD also provides function to set the “Log File Retention Time” to specify how long will the files be kept in the PMC/PMD, and then the file will be automatically sent to backend FTP Server at a scheduled time. The data logger setting page is shown as below:

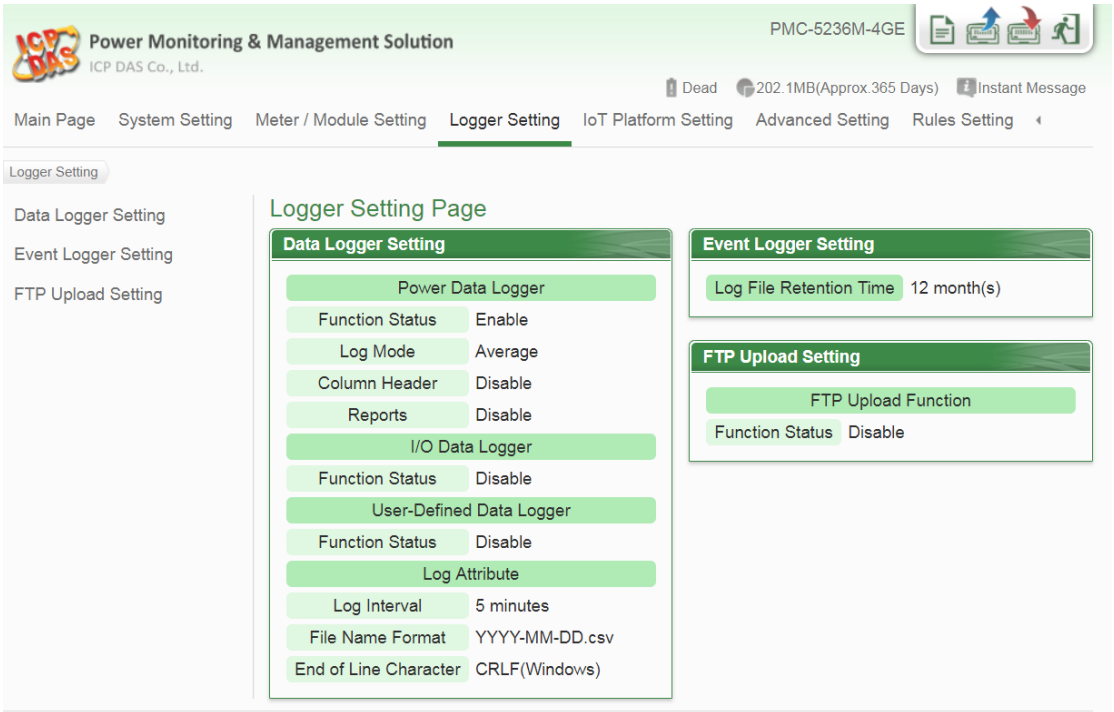


Figure8-1 : Data Logger Setting Page

There are some setting options on the Data Logger Setting page:

- Data Logger Setting
- Event Logger Setting
- FTP Upload Setting

More detailed information of these options will be given in the following section.

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8.1 Data Logger Setting

On the Data Logger Setting page, the user could enable the Power Data Logger, I/O Data Logger or User-Defined Data Logger of the PMC/PMD if required. The Power Data Logger allows recording the power data of the power meters that are connected to the PMC/PMD, the I/O Data Logger allows recording all the data of the I/O modules that are connected to the PMC/PMD, and the User-Defined Data Logger allows recording user-defined data such as: power data, I/O channel data, internal register values, etc. The setting page is shown as below:

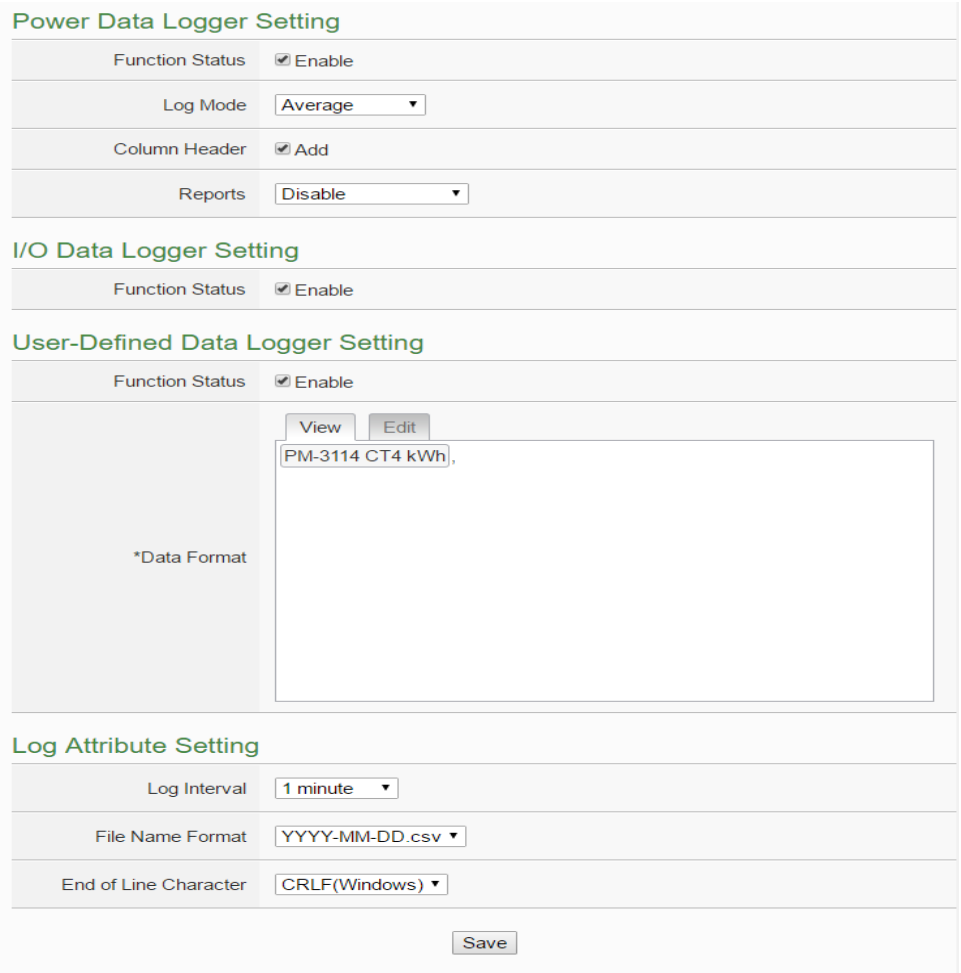


Figure8-2 : Data Logger Setting Page

Follow the steps below:

i Check “Enable” in the “Function Status” field under the Power Data Logger section to enable the Power Data Logger function.

ii Set the data log mode to be “Average” or “Instantaneous” from the

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dropdown list of the “Log Mode”. If “Average” is selected, the system will record the average value of the power data during the time interval set in “Log Interval”. If “Instantaneous” is selected, the system will record the instantaneous value of the power data when the time reaches the time interval set in “Log Interval”.

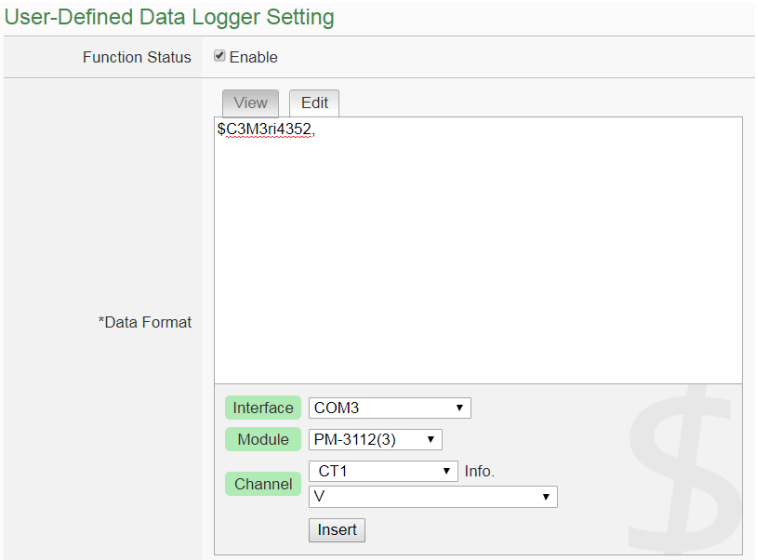
iii If user would like to add a header to the power data to specify the name of the power data; click “Add” in the “Column Header”; the system will add the “Column Header” at the beginning of the power data logger file to specify the name of the power data. Please note：After enable this function, the User-Defined Data Logger will also add the “Column Header” at the beginning of the data logger file to specify the name of the data.

iv Set the language of Excel format file of the report from the dropdown list of the “Reports”. If “Disable” is selected, the system will stop generating the Excel format file of report.

v Check “Enable” in the “Function Status” field under the I/O Data Logger section to enable the I/O Data Logger function.

vi Check “Enable” in the “Function Status” field under the User-Defined Data Logger section to enable the User-Defined Data Logger function.

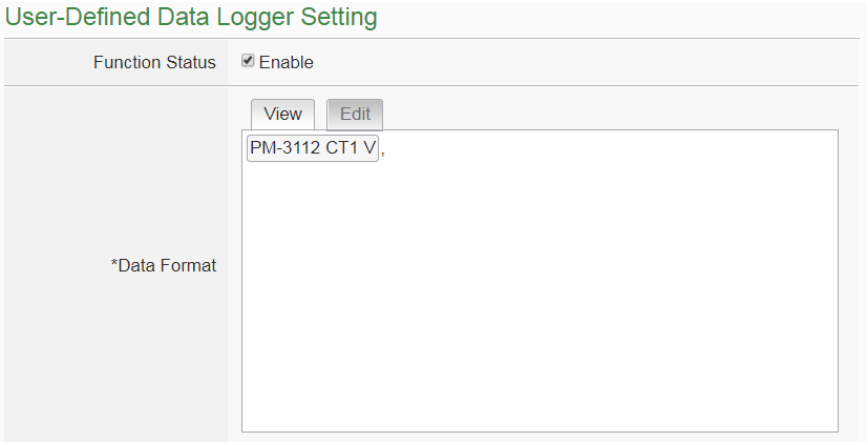
vii Set up the data format in the “Data Format” field in the “User-Defined Data Logger” section. The User-Defined Data Logger provides encoded strings for user to add real-time power data or I/O channel data to the Data Format content. User can select the “Edit” tab or click on any blank area in the “Data Format” field, and then the “Real-time variable editor” will be shown as below.



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Select the “Source”, “Module” and “Channel” from the dropdown list and click “Insert” to add channel value encoded string into the “Data Format” content. The system will record the data the user pre-set in the Data Format, and will save the real data values in the data log file. When editing the content, the user can select the “View” tab , and then the channel encoded string will be displayed in the real index format of the channel for user to check the settings in an easy way.

The figure above shows an example of the encoded strings, the variable $C3M3ri4352 indicates the V value of PM-3112 CT1 on the module 3 connected to COM3. When user select the “View” tab, the channel value encoded string will be displayed as “PM-3112 CT1 V” for user to check if the setting is appropriate (please refer to the figure as below).



viii In the “Log Interval” field, select from the dropdown list to set the time interval of the recording session. The Log Interval could be 1 min, 5 mins, 15 min, 1 hour, 3 hours, 6 hours, 12 hours and 24 hours. Default is 5 mins. Each time when reaches the Log Interval, it will perform one-time data recording for the Power Data and User-Defined Data.

ix In the “File Name Format” field, select the File Name Format of the log file from the dropdown list, YYYY indicates western year, MM indicates month, DD indicates date, and the file format is CSV.

x In the “End of Line Character” field, select the appropriate End of Line Character format from the dropdown list: CRLF (applies to Windows), LF (applies to Unix/Linux) or CR (applies to Mac).

xi After all settings are completed, click “Save” button to save the changes.

Please Note:

1. The settings in “Log Attribute Setting” section apply to both Power

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Data Logger and User-Defined Data Logger.

2. The data logger files of Power Data Logger, I/O Data Logger and User-Defined Data Logger all are saved in the micro SD card. If the micro SD card's free space is less than the required space of one day data recording operation of the Power Data Logger, I/O Data Logger and User-Defined Data Logger, then PMC/PMD will delete some old log files to keeps the data logger operation work continuously.

8.2 Event Logger Setting

The Event Logger allows to record system event of the PMC/PMD, the setting page is shown as below:



Figure8-3 : Event Logger Setting Page

Follow the steps below:

i In the "Log File Retention Time" field, select the file retention time for the log file from the dropdown list. The retention time can be 1 month, 6 months or 12 months. The default setting will be12 months.

ii After all settings are completed, click "Save" button to save the changes.

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8.3 FTP Upload Setting

Power Data logger files, I/O Power Data logger files and User-Defined Data logger files can be upload to remote FTP server of the manage center via FTP protocol. The FTP Upload Setting page allows to set up parameters for FTP Upload, the setting page is shown as below:

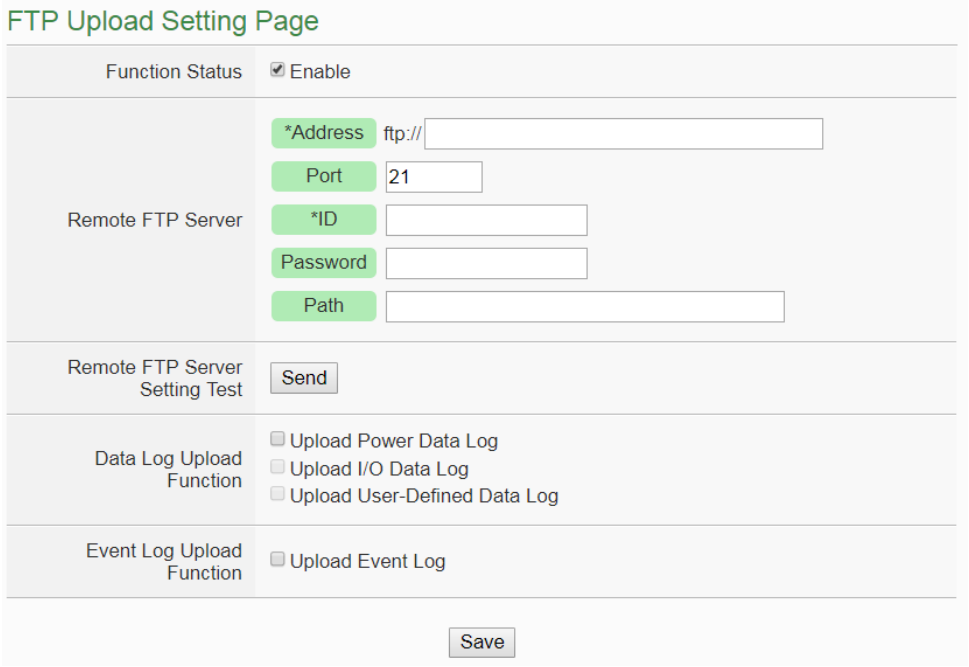


Figure8-4 : FTP Upload Setting Page

Follow the steps below:

i In the “Function Status”, check “Enable” to enable the FTP Upload function.

ii In the “Remote FTP Server” section, input Address, Port, ID, Password and Path

iii The user could test if the FTP settings are correct in the "Remote FTP Server Setting Test" section. After clicking “Send”, the system will create a folder on the remote FTP server and will generate a test file under this folder.

iv In the “Data Log Upload Function” section, select the data log type user would like to upload. The data log type could be “Power Data Log”, “I/O Data Log” or “User-Defined Data Log”. And then select the Frequency from the dropdown list of the “Frequency” field. The Frequency can be set as: 5 mins, 15 mins, 1 hour, 3 hours, 6 hours, 12 hours, or 24 hours. The default setting will be 1 hour.

v In the Event Log Upload Function section, if the user would like to

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enable the Upload Event Log function, check “Upload Event Log” field. And then select the Frequency from the dropdown list of the “Frequency” field. The Frequency can be set as: once a day, once a week or once a month.

vi After all settings are completed, click “Save” button to save the changes.

Please Note:

1. All data logger files of PMC/PMD will be saved in the microSD card. Before enable the Data Logger function, please make sure the microSD card you use for PMC/PMD is FAT32 format.
2. The microSD card given with the PMC/PMD is in FAT32 format already before delivery.

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8.4 Report Sending Setting Page

The power information report can be sent to the user via email, and the relevant parameters of the function can be set in the "Report Sending Setting Page".

8.4.1 Sending Setting

The "Send Setting" function can automatically send an email to the recipient when the report is generated by PMC/PMD. The setting page is shown as below:

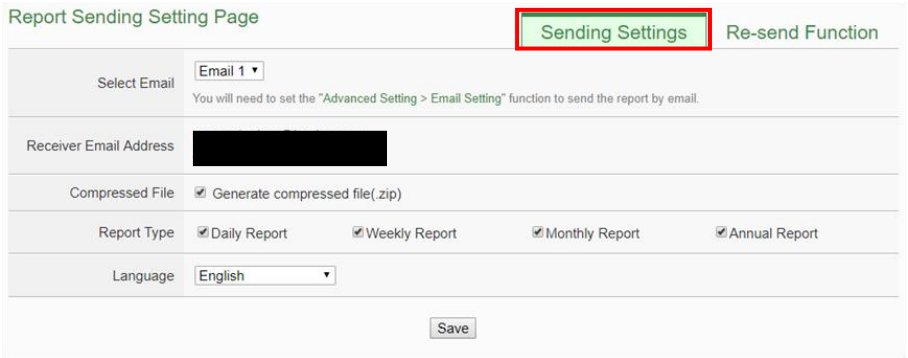


Figure8-5 : Report Sending Setting page – Sending Setting

Follow the steps below:

i. In the "Select Email" field, Select the Email setting in the "Advanced Setting -> Email Setting" section, then the "Receiver Email Address" will automatically import the recipient list from the information of the Email you select.

ii. In the "Compressed File" field, verify if the attachment report file of the email have to be compressed, or not.

iii. In the "Report Type" field, check which type of report need to be sent. There are 4 options as "Daily Report", "Weekly Report"," Monthly Report", and "Annual Report" for selection. After complete the setting, PMCPMD Will automatically send the report file when it is generated. (ex: The daily report will be sent at the end of the day.).

iv. In the "Language" field, select the language of the report .

v. After complete all setting, click "Save" button to save the setting.

8.4.2 Re-send Function

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The "Re-send Function" can send the corresponding historical power information reports to recipients immediately by the date user assign. The settings page is shown as below:

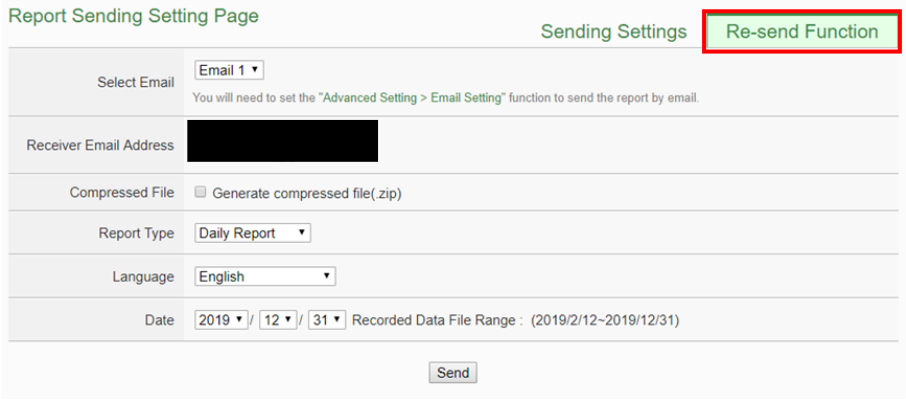


Figure8-6 : Report Sending Setting page – Sending Setting

Follow the steps below:

i. In the "Select Email" field, Select the Email setting in the "Advanced Setting -> Email Setting" section, then the "Receiver Email Address" will automatically import the recipient list from the information of the Email you select.

ii. In the "Compressed File" field, verify if the attachment report file of the email have to be compressed, or not.

iii. In the "Report Type" field, select the report type which need to be sent. There are 4 options as "Daily Report", "Weekly Report"," Monthly Report", and "Annual Report" for selection.,

iv. In the "Language" field, select the language of the report.

v. In the "Date" field, please select the date range of the current historical report prompted by the system.
Please note: If there is no log file in the date range you select., the inquiry operation will not be performed.

vi. Click the "Send" button, then PMC/PMD will send the report immediately.

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8.5 The Path of Data Log File

The data logger files of PMC/PMD will all be saved in the microSD card. The following section will explain the path of the data logger files saved in the microSD card:

- The power data files will be saved in the Log file folder, each power meter will create a specific file folder with the name of its ID, the data file architecture is shown as below:
  - Modbus RTU Power Meter

    Power Meter Data File

    Log \ 01A3851F140000D3_2[3133]7 _info.txt

    Historical Data

    Log \ 01A3851F140000D3_2[3133]7 \ 2013-05-23.csv

    Daily Report

    Log \ 01A3851F140000D3_2[3133]7 \ 2013-05-23Rpt.csv

    Monthly Report

    Log \ 01A3851F140000D3_2[3133]7 \ 2013-05Rpt.csv

    01A3851F140000D3_2[3133]7 is the ID of this power meter. 01A3851F140000D3 indicates the serial number of the PMC/PMD; 2 indicates the power meter is connected to the COM2 of the PMC/PMD; [3133] indicates the module type of the power meter; 7 is the Modbus Address of the power meter; and 2013-05-23 indicates the date the data is recorded. The power meter information file (_info.txt) is used to record the nickname of the power meter and the related information of the PMC/PMD which connect to the power meter.

  - Modbus TCP Power Meter

    Power Meter Data File

    Log \ 192.168.100.20_502_00D3 [3112]1 _info.txt

    Historical Data

    Log \ 192.168.100.20_502_00D3 [3112]1 \ 2013-05-23.csv

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Daily Report

Log \ 192.168.100.20_502_00D3 [3112]1 \ 2013-05-23Rpt.csv

Monthly Report

Log \ 192.168.100.20_502_00D3 [3112]1 \ 2013-05Rpt.csv

192.168.100.20_502_00D3[3112]1 為該電表的 ID；
192.168.100.20_502_00D3[3112]1 is the ID of this power meter. 192.168.100.20 indicates the connection IP of the power meter; 502 indicates the port number of the power meter; 00D3 indicates the last 4 digits of the serial number of PMC/PMD; [3112] indicates the module type of the power meter; 1 indicates the NetID of the power meter; and 2013-05-23 indicates the date the data is recorded. The power meter information file (_info.txt) is used to record the nickname of the power meter and the related information of the PMC/PMD which connect to the power meter.

- The I/O Data Log file is also saved under the Log file folder; the data file architecture is shown as below:

  Log \ IO_01A3851F140000D3 \ 2013-05-23.csv

  IO indicates this file folder is for IO Data Log; 01A3851F140000D3 indicates the serial number of the PMC/PMD and 2013-05-23 indicates the date the data is recorded.

- The User-Defined Data Log file is also saved under the Log file folder; the data file architecture is shown as below:

  Log \ Custom_01A3851F140000D3 \ 2013-05-23.csv

  Custom indicates this file folder is for User-Defined Data Log; 01A3851F140000D3 indicates the serial number of the PMC/PMD and 2013-05-23 indicates the date the data is recorded.

- The Event Log file is saved under the EventLog folder, the data file architecture is shown as below:

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EventLog \ Event-2013-05-23.log

20130523 indicates that the first event recorded in the Event Log file is starting from May 23, 2013

8.6 The format of the Power Data Logger file

The power data logger files generated are in CSV format. Each line represents one record; each field in the line is separated by a comma. The data sequences from left to right in the line of the power data are as follows:

PM-2133 / PM-3133(-MTCP) / PM-3033(-MTCP) Data Logger Field

Date, Time, Power meter ID, **Phase A** **[** Voltage, Current, kW, kvar, kVA, PF, kWh, kvarh, kVAh, Daily tot. Electricity(kWh), Current demand(15/30/60 mins) **]**, **Phase B** **[** Voltage, Current, kW, kvar, kVA, PF, kWh, kvarh, kVAh, Daily tot. Electricity(kWh), Current demand(15/30/60 mins) **]**, **Phase C** **[** Voltage, Current, kW, kvar, kVA, PF, kWh, kvarh, kVAh, Daily tot. Electricity(kWh), Current demand(15/30/60 mins) **]**, **Average/Total** **[** Voltage, Current, kW, kvar, kVA, PF, kWh, kvarh, kVAh, Daily tot. Electricity(kWh), Current demand (15/30/60 mins) **]**, [Reserved Field].

PM-2134 / PM-3112(-MTCP) / PM-3114(-MTCP) Data Logger Field

Date, Time, Power meter ID, **CT1** **[** Voltage, Current, kW, kvar, kVA, PF, kWh, kvarh, kVAh, Daily tot. Electricity(kWh), Current demand(15/30/60 mins) **]**, **CT2** **[** Voltage, Current, kW, kvar, kVA, PF, kWh, kvarh, kVAh, Daily tot. Electricity(kWh), Current demand(15/30/60 mins) **]**, **.....** , **CTN** **[** Voltage, Current, kW, kvar, kVA, PF, kWh, kvarh, kVAh, Daily tot. Electricity(kWh), Current demand(15/30/60 mins) **]**, [Reserved Field].

PM-4324(-MTCP) / PM-4324A(-MTCP) Data Logger Field

Date, Time, Power meter ID,**Submeter 1** **Phase A/CT1** **[** Voltage, Current, kW, kvar, kVA, PF, kWh, kvarh, kVAh, Daily tot. Electricity(kWh), Current demand(15/30/60 mins) **]**, **Phase B/CT2** **[** Voltage, Current, kW, kvar, kVA, PF, kWh, kvarh, kVAh, Daily tot. Electricity(kWh), Current demand(15/30/60 mins) **]**, **Phase C/CT3** **[** Voltage, Current, kW, kvar, kVA, PF, kWh, kvarh, kVAh, Daily tot. Electricity(kWh), Current demand(15/30/60 mins) **]**, **Average/Total** **[** Voltage, Current, kW, kvar, kVA, PF, kWh, kvarh, kVAh, Daily tot. Electricity(kWh), Current demand (15/30/60 mins) **]**, **Submeter 2**

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Phase A/CT4 **[** Voltage, Current, kW, kvar, kVA, PF, kWh, kvarh, kVAh, Daily tot. Electricity(kWh), Current demand(15/30/60 mins) **]**, **Phase B/CT5** **[** Voltage, Current, kW, kvar, kVA, PF, kWh, kvarh, kVAh, Daily tot. Electricity(kWh), Current demand(15/30/60 mins) **]**, **Phase C/CT6** **[** Voltage, Current, kW, kvar, kVA, PF, kWh, kvarh, kVAh, Daily tot. Electricity(kWh), Current demand(15/30/60 mins) **]**, **Average/Total** **[** Voltage, Current, kW, kvar, kVA, PF, kWh, kvarh, kVAh, Daily tot. Electricity(kWh), Current demand (15/30/60 mins) **]** , **.....** , **Submeter 8** **Phase A/CT22** **[** Voltage, Current, kW, kvar, kVA, PF, kWh, kvarh, kVAh, Daily tot. Electricity(kWh), Current demand(15/30/60 mins) **]**, **Phase B/CT23** **[** Voltage, Current, kW, kvar, kVA, PF, kWh, kvarh, kVAh, Daily tot. Electricity(kWh), Current demand(15/30/60 mins) **]**, **Phase C/CT24** **[** Voltage, Current, kW, kvar, kVA, PF, kWh, kvarh, kVAh, Daily tot. Electricity(kWh), Current demand(15/30/60 mins) **]**, **Average/Total** **[** Voltage, Current, kW, kvar, kVA, PF, kWh, kvarh, kVAh, Daily tot. Electricity(kWh), Current demand (15/30/60 mins) **]** , [Reserved Field].

8.7 The format of the Power Report file

The power report files are saved in CSV format. Each line represents one record; each field in the line is separated by a comma. The data sequences from left to right in the line of the power report are as follows.

PM-2133 / PM-3133(-MTCP) / PM-3033(-MTCP) Daily Report

Index of hour, Date, Power meter ID, Timing of hourly max kW, hourly max kW, Hourly total Electricity, Average hourly PF, Average hourly current(Phase A), Average hourly current(Phase B), Average hourly current(Phase C), Average hourly voltage(Phase A), Average hourly voltage(Phase B), Average hourly voltage(Phase C), Total hourly kVA, Total hourly kvar, [Reserved Field].

PM-2133 / PM-3133(-MTCP) / PM-3033(-MTCP) Monthly Report

Index of Date, Date, Power meter ID, Timing of daily max kW, Daily max kW, Daily total Electricity, Average daily PF, Average daily current(Phase A), Average daily current(Phase B), Average daily current(Phase C), Average daily voltage(Phase A), Average daily voltage(Phase B), Average daily voltage(Phase C), Total daily kVA, Total daily kvar, [Reserved Field].

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PM-2134 / PM-3112(-MTCP) / PM-3114(-MTCP) Daily Report

Index of hour, Date, Power meter ID, CT1 [Timing of hourly max kW, hourly max kW, Hourly total Electricity, Average hourly PF, Average hourly current, Average hourly voltage, Average hourly kVA, Average hourly kvar], CT2 [Timing of hourly max kW, hourly max kW, Hourly total Electricity, Average hourly PF, Average hourly current, Average hourly voltage, Average hourly kVA, Average hourly kvar], ... ,CTN [Timing of hourly max kW, hourly max kW, Hourly total Electricity, Average hourly PF, Average hourly current, Average hourly voltage, Average hourly kVA, Average hourly kvar] ,[Reserved Field].

PM-2134 / PM-3112(-MTCP) / PM-3114(-MTCP) Monthly Report

Index of date, Date, Power meter ID, CT1 [Timing of daily max kW, daily max kW, daily total Electricity, Average daily PF, Average daily current, Average daily voltage, Average daily kVA, Average daily kvar], CT2 [Timing of daily max kW, daily max kW, daily total Electricity, Average daily PF, Average daily current, Average daily voltage, Average daily kVA, Average daily kvar] , ... , CTN [Timing of daily max kW, daily max kW, daily total Electricity, Average daily PF, Average daily current, Average daily voltage, Average daily kVA, Average daily kvar], [Reserved Field].

PM-4324(-MTCP)/PM-4324A(-MTCP) Daily Report

Date, Time, Power meter ID, Submeter 1 CT1 [Timing of hourly max kW, hourly max kW, hourly total Electricity, Average hourly PF, Average hourly current, Average hourly voltage, Average hourly kVA, Average hourly kvar], CT2 [Timing of hourly max kW, hourly max kW, hourly total Electricity, Average hourly PF, Average hourly current, Average hourly voltage, Average hourly kVA, Average hourly kvar], CT3 [Timing of hourly max kW, hourly max kW, hourly total Electricity, Average hourly PF, Average hourly current, Average hourly voltage, Average hourly kVA, Average hourly kvar], Average/Total [Timing of hourly max kW, hourly max kW, hourly total Electricity, Average hourly PF, Average hourly current, Average hourly voltage, Total hourly kVA, Total hourly kvar], Submeter 2 CT4 [Timing of hourly max kW, hourly max kW, hourly total Electricity, Average hourly PF, Average hourly current, Average hourly voltage, Average hourly kVA, Average hourly kvar], CT5 [Timing of hourly max kW, hourly max kW, hourly total Electricity, Average hourly PF, Average hourly current, Average hourly voltage, Average hourly kVA, Average

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hourly kvar], CT6 [Timing of hourly max kW, hourly max kW, hourly total Electricity, Average hourly PF, Average hourly current, Average hourly voltage, Average hourly kVA, Average hourly kvar], Average/Total [Timing of hourly max kW, hourly max kW, hourly total Electricity, Average hourly PF, Average hourly current, Average hourly voltage, Total hourly kVA, Total hourly kvar] , ... , Submeter 8 CT22 [Timing of hourly max kW, hourly max kW, hourly total Electricity, Average hourly PF, Average hourly current, Average hourly voltage, Average hourly kVA, Average hourly kvar], CT23 [Timing of hourly max kW, hourly max kW, hourly total Electricity, Average hourly PF, Average hourly current, Average hourly voltage, Average hourly kVA, Average hourly kvar], CT24 [Timing of hourly max kW, hourly max kW, hourly total Electricity, Average hourly PF, Average hourly current, Average hourly voltage, Average hourly kVA, Average hourly kvar], Average/Total [Timing of hourly max kW, hourly max kW, hourly total Electricity, Average hourly PF, Average hourly current, Average hourly voltage, Total hourly kVA, Total hourly kvar] , [Reserved Field].

PM-4324(-MTCP)/PM-4324A(-MTCP) Monthly Report

Date, Time, Power meter ID, Submeter 1 CT1 [Timing of daily max kW, daily max kW, daily total Electricity, Average daily PF, Average daily current, Average daily voltage, Average daily kVA, Average daily kvar], CT2 [Timing of daily max kW, daily max kW, daily total Electricity, Average daily PF, Average daily current, Average daily voltage, Average daily kVA, Average daily kvar], CT3 [Timing of daily max kW, daily max kW, daily total Electricity, Average daily PF, Average daily current, Average daily voltage, Average daily kVA, Average daily kvar], Average/Total [Timing of daily max kW, daily max kW, daily total Electricity, Average daily PF, Average daily current, Average daily voltage, Total daily kVA, Total daily kvar], Submeter 2 CT4 [Timing of daily max kW, daily max kW, daily total Electricity, Average daily PF, Average daily current, Average daily voltage, Average daily kVA, Average daily kvar], CT5 [Timing of daily max kW, daily max kW, daily total Electricity, Average daily PF, Average daily current, Average daily voltage, Average daily kVA, Average daily kvar], CT6 [Timing of daily max kW, daily max kW, daily total Electricity, Average daily PF, Average daily current, Average daily voltage, Average daily kVA, Average daily kvar], Average/Total [Timing of daily max kW, daily max kW, daily total Electricity, Average daily PF, Average

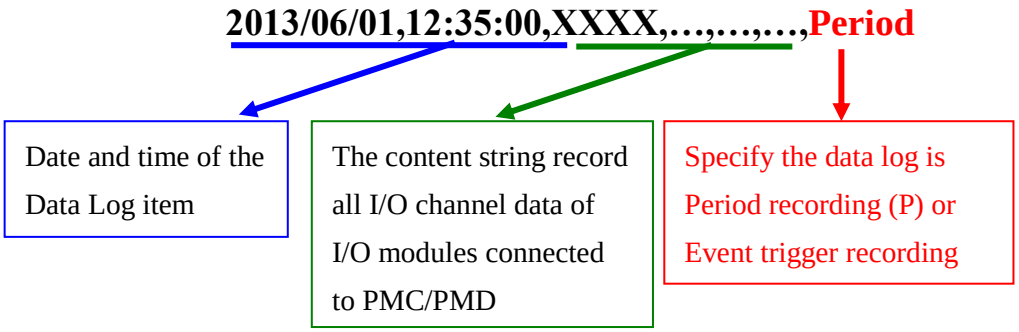
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daily current, Average daily voltage, Total daily kVA, Total daily kvar**]** , **.....** , **Submeter 8** **CT22** **[**Timing of daily max kW, daily max kW, daily total Electricity, Average daily PF, Average daily current, Average daily voltage, Average daily kVA, Average daily kvar**]**, **CT23** **[**Timing of daily max kW, daily max kW, daily total Electricity, Average daily PF, Average daily current, Average daily voltage, Average daily kVA, Average daily kvar **]**, **CT24** **[**Timing of daily max kW, daily max kW, daily total Electricity, Average daily PF, Average daily current, Average daily voltage, Average daily kVA, Average daily kvar**]**, **Average/Total** **[**Timing of daily max kW, daily max kW, daily total Electricity, Average daily PF, Average daily current, Average daily voltage, Total daily kVA, Total daily kvar**]** , [Reserved Field].

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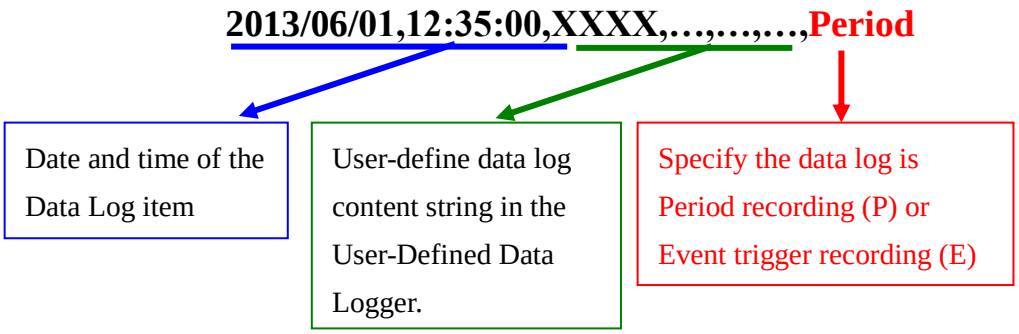
8.8 The Format of I/O Data File

The I/O data logger files generated are in CSV format. Each line represents one record; each field in the line is separated by a comma. The data sequences from left to right in the line of the I/O data are as follows:



8.9 The Format of User-Defined Data File

The User-Defined Data files are saved in CSV format. Each line represents one record, after the log format of the data being set in User-Defined Data Logger, the User-Defined Data Logger will record the data according to the data format and content set by the user. In addition, the system will tag each data log with information such as: date, time and type of the data, etc. The log type could be Period Recording that will record the file periodically or Trigger Recording that will record the file when an event is triggered. The User-Defined Data log file format is shown as below:



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9 IoT Platform Setting

The IoT Platform Setting function of the PMC/PMD allows to build a connection to Microsoft Azure or IBM Bluemix directly. It can also connect to MQTT Brokers. Based on the IoT Platform Setting function, PMC/PMD can publish the power data and I/O channel data of the power meter and I/O modules that are connected to PMC/PMD to the IoT Cloud Platform for future data analysis, and receive the command message from IoT Cloud Platform to trigger the corresponding actions of PMC/PMD at the field side. With the IoT Platform Setting function the PMC/PMD provides, it helps users to implement an IoT system in a easy way.

In additional, PMC/PMD supports to connect to the IoT cloud management software: IoTstar designed by ICP DAS. The supported functions for IoTstar includes Real-Time Data Sending Setting, Historical Data Sending Setting, Bot Service Setting and Alarm Setting can also be set in this page. About the connecion setting of IoTstar, please refer to the section "6.2 Network Setting".

The IoT Platform Settingg page includes the following setting options. More detailed information of these options will be given in the following sections.

- Microsoft Azure Setting
- IBM Bluemix Setting
- MQTT Setting
- IoTstar relative functions:
  - Real-Time Data Sending Setting
  - Historical Data Sending Setting
  - Bot Service Setting
  - Alarm Setting

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9.1 Microsoft Azure Setting

On the Microsoft Azure Setting page, the connection to Microsoft Azure IoT Cloud Platform can be built if required. The setting page is shown as below:

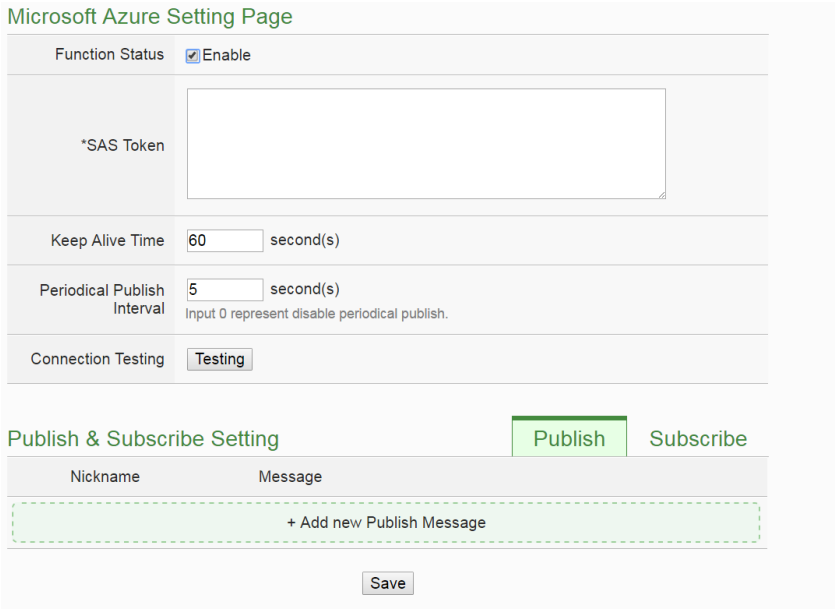


Figure9-1 : Microsoft Azure Setting Page

Follow the steps below:

i Check “Enable” in the “Function Status” field to enable the connection to Microsoft Azure IoT Cloud Platform.

ii In the “SAS Token” field, input the SAS Token which you previously registered for this PMC/PMD from Microsoft Azure. For the procedure to generate a SAS Token, please refer to the “Documentation →Azure IoT Hub→IoT Hub MQTT support” section on the Microsoft Azure Web Site for detailed information.

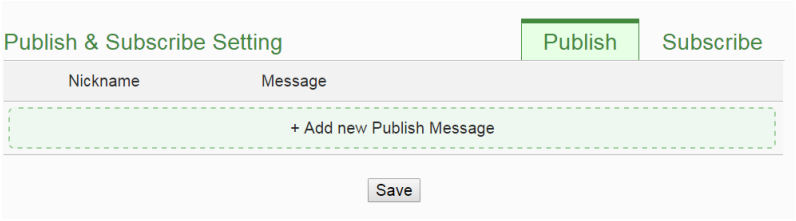
iii The value in “keep alive Time” field defines the maximum amount of time in second that pass away without communication between the PMC/PMD and Microsoft Azure. The “keep alive interval” enables Microsoft Azure to detect if the connection to the PMC/PMD is no longer available without having to wait for the long TCP/IP timeout.

iv The value in “Periodical Publish Interval” field defines the time interval to automatically and periodically send the Publish Messages which are with the “Periodical Publish” attribute. If the value of the “Periodical Publish Interval” field is 0, it means the “Periodical Publish” operation is disabled. The unit of the value is second.

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v To verify whether the SAS Token setting is correct, click “Testing” in the “Connection Testing” field, then PMC/PMD will try to connect Microsoft Azure with the SAS Token setting, and reply the connection status.

vi The lower half section on the Microsoft Azure Setting Page is for the Publish Message and Subscribe Topic setting. User can click the tab of “Publish” or “Subscribe” to edit the Publish Message and Subscribe Topic. The Interface will be shown as below:



vii Click the “Publish” tab to edit the Publish Message. User can click on “Add new Publish Message” to add a new Publish Message.

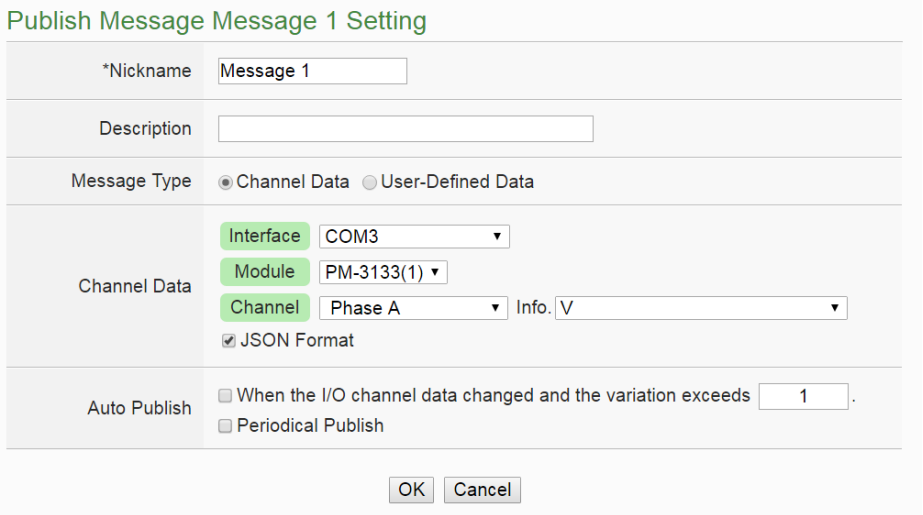


Figure9-2 : Microsoft Azure Publish Message setting page

viii Input a name in the “Nickname” field and you could also input the description of this Publish Message in the “Description” field.

ix In the “Message Type” field, select the “Channel Data” to prepare a Publish Message with the power data or I/O channel value. Based on the “Channel Data” interface, the user can select a specific power data (or I/O channel value) or “All” power data (and I/O channel values) for the Publish Message. If the user selects a specific channel, it means the specific power data (or I/O channel value) of the module will be bound with the Publish Message. If user select “All” channels, it mean all

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power data (and I/O channel values) of the module will be added in the Publish Message List. If the user click the "JSON Format" check box, the content of the Publish Message will be packaged in JSON format; if the “JSON” is not selected, the content of the Publish Message will only include the I/O channel value. (For the I/O Channel information in JSON Format, please refer to Appendix VII for more details.) The user can select “User-Defined Data” in “Message Type” field to edit the Publish Message on the free style editing interface. The user interface is shown as below.

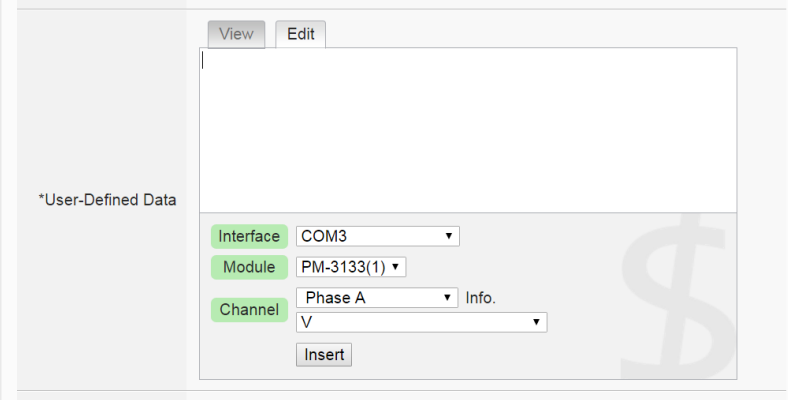


Figure9-3 : “User-Defined Data” Setting Interface of IoT Platform

x The timing to publish message is set in the “Auto Publish” field, there are two options: “When the I/O data changed and the variation exceeds xxx” and “Periodical Publish”. If the “When the I/O data changed and the variation exceeds xxx” is selected, the system will automatically publish the message when the power data or I/O data value is changed and exceeds the evaluation value (This option only support “Channel Data” setting in “Message Type”). If the user selects “Periodical Publish”, it means the message will be published at periodic time schedule based on the value in "Periodical Publish Interval" field at Step iv.

xi After completing all settings of Publish Message, please click “OK” button to add the Publish Message to the Publish Message List.

xii Click the “Subscribe” tab to edit the Subscribe Topic. The user interface is shown as below:

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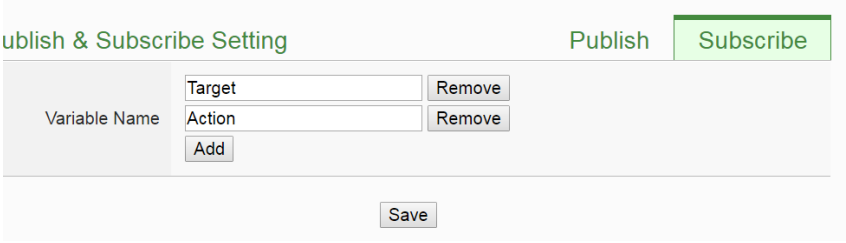


Figure9-4 : Microsoft Azure Subscribe Topic setting page

xiii In the “Variable Name” field, user can input the name of the variable which is defined in the message of the Subscribe Topic. After completing the settings, click the "Add" button to add the variable. For the message the PMC/PMD receives from Microsoft Azure is based on JSON format, the PMC/PMD will get the corresponding value of the variable from the received message. The following is an example of a message the PMC/PMD receives:

```
{
    "Target":"door",
    "Action":"open",
    "Timestamp":"2016/10/17 15-17-22"
 }
```

In this example, the “Target” and “Action” variable setting will be performed first. Each time when the PMC/PMD receives the message, it will retrieve the corresponding value of the “Target” and “Action” variables from the message. The value of the variables can be used in the evaluation criteria of IF Condition to trigger THEN/ELSE Action for logic operation.

xiv After completing all settings on the Microsoft Azure Setting Page, please click “Save” button to save the settings. After downloading the settings to PMC/PMD, PMC/PMD will initiate the connection to the Microsoft Azure, and start the data communication with the Microsoft Azure.

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9.2 IBM Bluemix Setting

On the IBM Bluemix Setting page, the user could enable the connection to IBM Bluemix IoT Cloud Platform if required. The setting page is shown as below:

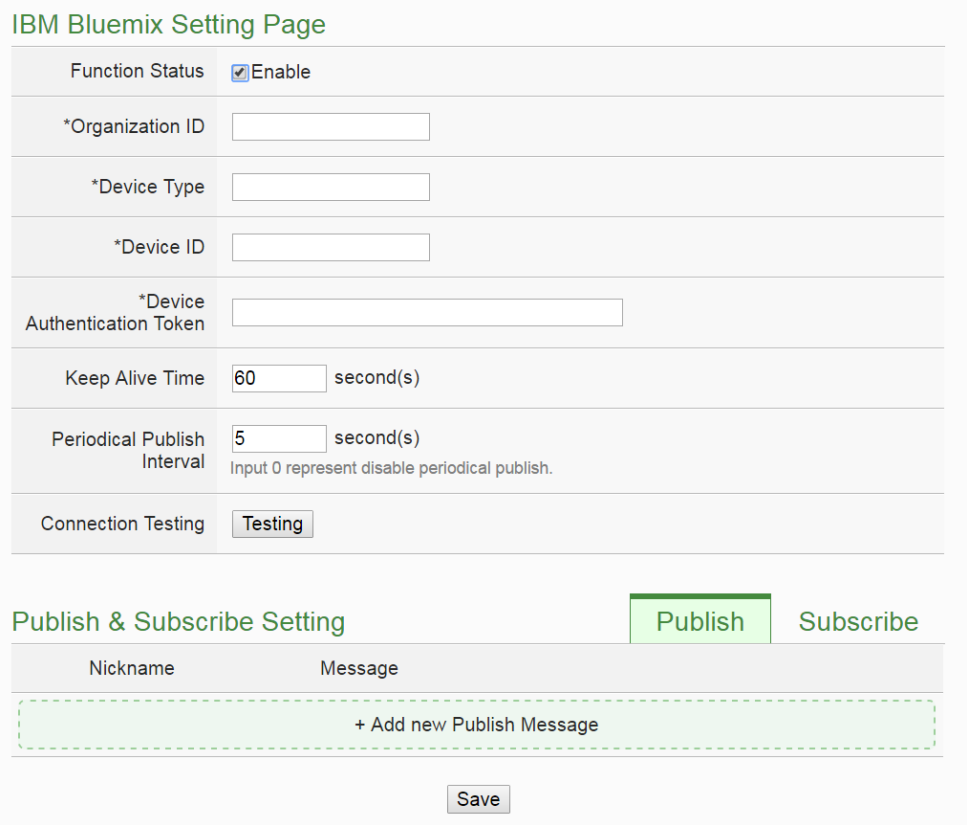


Figure9-5 : IBM Bluemix Setting page

Follow the steps below:

i Check “Enable” in the “Function Status” field to enable the connection to IBM Bluemix IoT Cloud Platform.

ii In the “Organization ID”, “Device Type”, “Device ID” and “Device Authentication Token” fields, input the data you previously registered for this PMC/PMD from IBM Bluemix. After you completing the device settings on IBM Bluemix for the PMC/PMD, IBM Bluemix will reply you the device information similar as below. Just refer to the information and complete the setting at PMC/PMD Web page.



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iii The value in “keep alive Time” field defines the maximum amount of time in second that pass away without communication between the PMC/PMD and IBM Bluemix. The “keep alive interval” enables IBM Bluemix to detect if the connection to the PMC/PMD is no longer available without having to wait for the long TCP/IP timeout.

iv The value in "Periodical Publish Interval" field defines the time interval to automatically and periodically send the Publish Messages which are with the “Periodical Publish” attribute. If the value of the "Periodical Publish Interval" field is 0, it means the “Periodical Publish” operation is disabled. The unit of the value is second.

v Click “Testing” in the “Connection Testing” section, then PMC/PMD will try to connect IBM Bluemix, and reply the connection status to verify the setting is correct, or not.

vi The lower half section on the IBM Bluemix Setting Page is for the Publish Message and Subscribe Message setting. User can click the tab of “Publish” or “Subscribe” to edit the Publish Message and Subscribe Message. For the settings of the Publish Message, please refer to “9.1 Microsoft Azure Setting” section.

vii Click the “Subscribe” tab to edit the Subscribe Message. The user interface is shown as below:

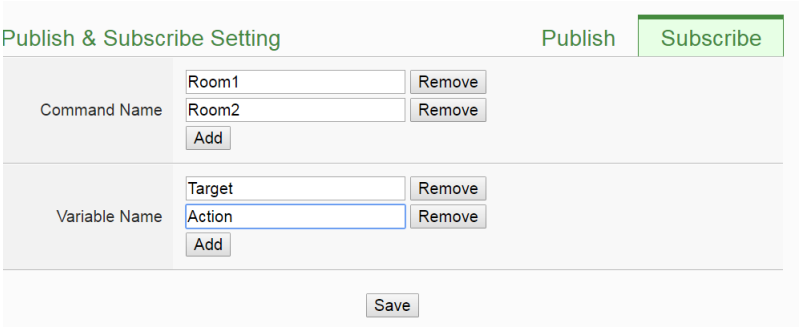


Figure9-6 : IBM Bluemix Subscribe Message setting page

viii In the “Command Name” field, the user can specify the command strings to be sent from the IBM Bluemix to the PMC/PMD. The content of “Command Name” setting can be used as the IF Condition of IF-THEN-ELSE logic rule to filter the commands sent from IBM Bluemix. PMC/PMD can be set to only receive the commands that are pre-defined in the field, the other commands will be ignored by PMC/PMD.

ix In the “Variable Name” field, user can input the name of the variable which is defined in the message of the Subscribe Topic. After

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completing the setting, click the "Add" button to add the variable. For the message the PMC/PMD receives from IBM Bluemix is based on JSON format, the PMC/PMD can also get the corresponding value of the variable from the received message. Following is an example of the message which PMC/PMD receives:

```
{
    "Target":"door",
    "Action":"open",
    "Timestamp":"2016/10/17 15-17-22"
}
```

In this example, the “Target” and “Action” variable setting will be performed first. Each time when the PMC/PMD receives the message, it will retrieve the corresponding value for the “Target” and “Action” variables from the message. The value of the variables can be used in the evaluation criteria of IF Condition to trigger THEN/ELSE Action for logic operation.

- After completing all settings on the IBM Bluemix Setting Page, please click “Save” button to save the settings. After downloading the settings to the PMC/PMD, the PMC/PMD will initiate the connection to IBM Bluemix, and start the Publish Message/Subscribe Message mechanism with IBM Bluemix.

9.3 MQTT Setting

PMC/PMD provides complete MQTT Client function. The MQTT Client can connect with two (Maximum) MQTT Brokers concurrently. In order to enable the MQTT Client function, user has to complete the setting of the PMC/PMD’s Publish Topic and its message content with the MQTT Brokers, and also the setting of the PMC/PMD’s Subscribe Topics. In addition, PMC/PMD provides the “Topic Import/Export” function. It will help user to organize the MQTT topics from different MQTT devices in an easy way. The configuration page for MQTT setting is shown as below.

9.3.1 Broker Setting

PMC/PMD provides the setting for two (Maximum) MQTT Brokers. It can Publish/Subscribe the Topic with the two MQTT Brokers at the same time, and the Topic setting for the two Brokers is also independent. The configuration page of MQTT Broker setting is shown as below:

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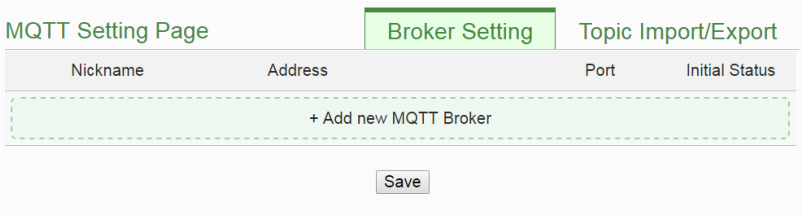


Figure9-7 : MQTT Setting Page (Broker)

The settings steps are as below:

i. Click the "Broker Setting" tab on the right-top corner of "MQTT Setting Page".

ii. Click on "Add new MQTT Broker" to add the new MQTT Broker. After clicking the "Add new MQTT Broker", the MQTT Broker Setting Page will appear. The upper half area of the setting page is about the Broker parameters setting. It will be shown as below:

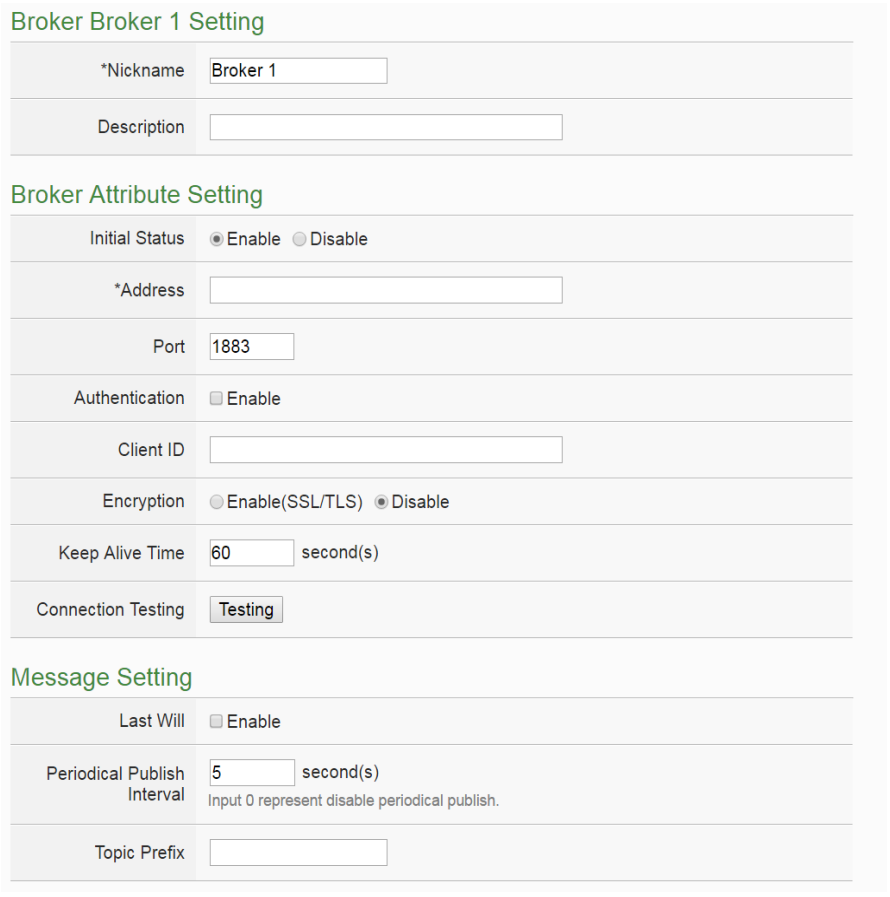


Figure9-8 : MQTT Broker Parameter setting page

iii. In the Broker parameters setting page, you can input the name of the Broker in the "Nickname" field and you could also input the description of this Broker in the "Description" field.

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iv. Check “Enable” or “Disable” in the “Initial Status” field to enable the initial connection status with the Broker. If the user clicks “Enable”, it means the PMC/PMD will start the communication with the Broker after it is powered on.

v. Enter the Broker IP address (or domain name) in the “Address” field.

vi. Enter the Broker Port number in the “Port” field.

vii. If the Broker requires account and password validation, please select the “Enable” checkbox in the “Authentication” field, and enter the login ID and password in the “ID” and “Password” fields to login into the Broker. If the Broker doesn’t need account and password validation, uncheck the “Enable” checkbox and go directly to next step.

viii. Enter the Client ID information in the “Client ID” field. The Client ID is used for Broker to verify if the MQTT Client is allowed to connect to the Broker or not. If the Broker does not require Client ID for the connection, this field can be ignored.

ix. If the SSL/TLS encryption mechanism is required for the connection between the Broker and the PMC/PMD via MQTT, click the "Enable" checkbox of the "Encryption" field to enable this function.

x. The value in "keep alive Time" field defines the maximum time that should pass without communication between the PMC/PMD and the Broker. The PMC/PMD will ensure that at least one message travels across the network within each keep alive period. In the absence of a data-related message during the time period, the PMC/PMD sends a very small MQTT "ping" message, which the Broker will acknowledge. The keep “alive interval” enables the PMC/PMD to detect when the Broker is no longer available without having to wait for the long TCP/IP timeout. The unit of the value is second.

xi. To verify whether your Broker setting is correct, click “Testing” in the “Connection Test” section, then PMC/PMD will try to connect to the Broker and reply the connection status.

xii. Click the “Enable” checkbox in the “Last Will” field to allow the Broker to send the alarm Topic to other MQTT client devices when PMC/PMD lost connection to the Broker. After clicking the “Enable” checkbox, the setting of Last Will Topic, Message content and QoS will be brought up.

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xiii. The value in "Periodical Publish Interval" field defines the time interval (in second) to send all Publish Topics with the “Periodical Publish” attribute automatically and periodically. If the value of the "Periodical Publish Interval" field is 0, it means the “Periodical Publish” operation is disabled.

xiv. The “Topic Prefix” field is for setting up a string as Topic Prefix. The prefix can be used in the Publish Topic or Subscribe Topic to simply the Topic editing. The default string of the “Topic Prefix” will be the model name of the PMC/PMD. If there are more than one PMC/PMD controllers in a system for MQTT connection, please remember to change the “Topic Prefix” setting to distinguish the Publish Topic/Subscribe Topic setting of each PMC/PMD controller.

xv. The lower half area of the MQTT Broker Setting Page is for the Publish Message and Subscribe Topic setting. User can click the “Publish” tab or “Subscribe” tab on the right-top corner of “Publish & Subscribe Setting” to edit the Publish Message and Subscribe Topic. The Interface will be shown as below:

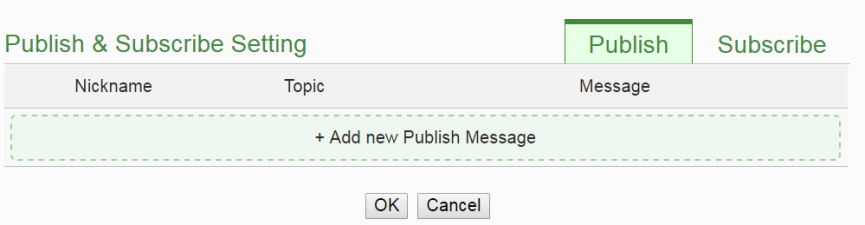


Figure9-9 : Publish Message and Subscribe Topic setting page

xvi. Click the “Publish” tab to edit the Publish Message. Click on “Add new Publish Message” to add a new Publish Message. The Interface will be shown as below:

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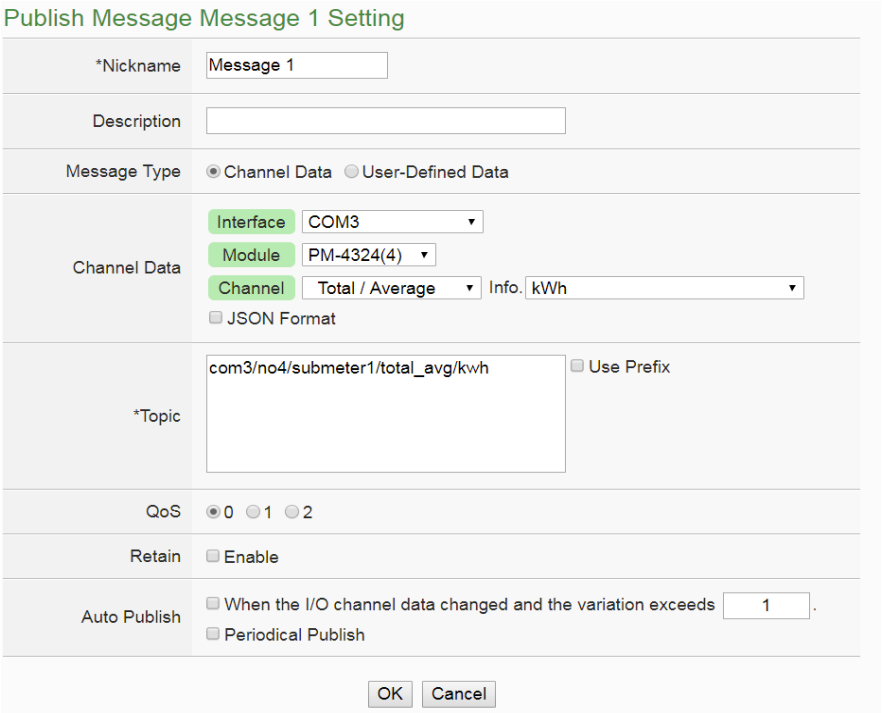


Figure9-10 : Publish Message Setting Page

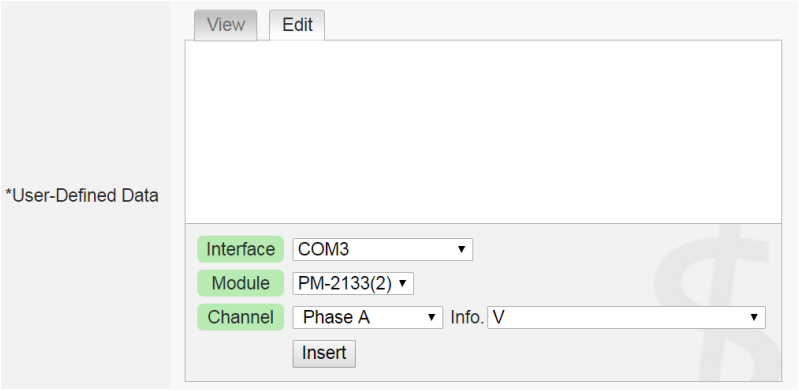
xvii. Input a name in the “Nickname” field and you could also input the description of this Publish Message in the “Description” field.

xviii. In the “Message Type” field, select the “Channel Data” to prepare a Publish Message with the power data or I/O channel value. Based on the “Channel Data” interface, the user can select a specific power data (or I/O channel value) or “All” power data (and I/O channel values) for the Publish Message. If the user selects a specific channel, it means the specific power data (or I/O channel value) of the module will be bound with the Publish Message. If user select “All” channels, it mean all power data (and I/O channel values) of the module will be added in the Publish Message List. If the user click the "JSON Format" check box, the content of the Publish Message will be packaged in JSON format; if the “JSON” is not selected, the content of the Publish Message will only include the I/O channel value (For the I/O Channel information in JSON Format, please refer to Appendix VII for more details.). After completing the “Channel Data” setting, the system will automatically generate the default Topic content in the “Topic” field. User can modify the content of the “Topic” field if require. If the "Use Prefix" checkbox is enabled, the string in the “Topic Prefix” field will be used as the prefix of the Publish Topic.

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The user can select “User-Defined Data” in “Message Type” field to edit the Publish Topic and its binding message on the free style editing interface. The user interface is shown as below.



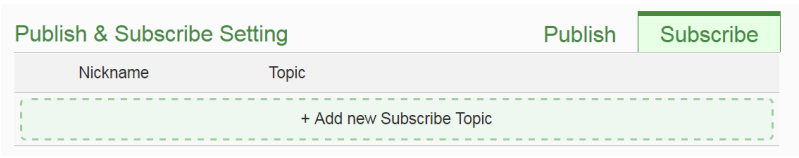
xix. In the “QoS” field, user can select 0, 1, 2 for the QoS(Quality of Service) setting for the Publish Message.

xx. In the “Retain” field, user can click the “Enable” checkbox to keep the Publish Message in the Broker.

xxi. The timing to publish message is set in the “Auto Publish” field, there are two options: “When the I/O channel data changed and the variation exceeds xxx” and “Periodical Publish”. If the “When the I/O channel data changed and the variation exceeds xxx” is selected, the system will automatically publish the topic when the power data or I/O channel data is changed and exceeds the evaluation value (This option only support “Channel Data” setting in “Message Type”). If user selects “Periodical Publish”, it mean the topic will be published at periodic time schedule base on the value in “Periodical Publish Interval” field.

xxii. After completing all settings of Publish Topic, please click “OK” button to add the Publish Topic to the Publish Message List.

xxiii. Click the “Subscribe” tab to edit the Subscribe Topic. The user interface is shown as below.



xxiv. Click on “Add new Subscribe Topic” to add a new Subscribe Topic.

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The Interface will be shown as below:

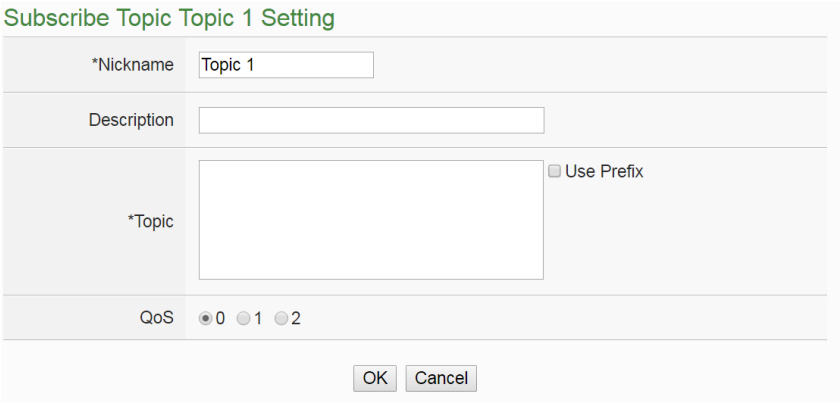


Figure9-11 : Subscribe Topic Setting Page

xxv. Input a name of the Subscribe Topic in the “Nickname” field, and you could also input the description of this Subscribe Topic in the “Description” field. In the “Topic” field, user can input the content of the Subscribe Topic. After completing all settings of Subscribe Topic, please click “Add” button to add the Subscribe Topic to the Subscribe Topic List.

The value of the Subscribe Topic can be used in the IF-THEN-ELSE logic evaluation. In addition, all Internal Registers, power meters and I/O modules connected to PMC/PMD have their own default definition of Subscribe Topic. It allows user to change the value of the Internal Register and the value of the output channel of I/O module or power meter by MQTT protocol. Please refer to Appendix VI for detailed information.

xxvi. After completing all settings of the Broker, please click “OK” button to return to add the MQTT Setting Page. And then click “Save” button to save all MQTT Broker settings.

9.3.2 Topic Import/Export Setting

PMC/PMD provides the Topic Import function so the users can import the MQTT Topics settings from other MQTT client devices easily. Click on “Topic Import/Export” tab, and click “+ Import Topic” to add new MQTT Topic setting into the PMC/PMD. And select the topics to be imported. The Topic Export function allows to export the MQTT Topics that the PMC/PMD is using to a document file, and it can be a reference for integration with the back-end Server. The Topic Import/Export Setting page is shown as below.

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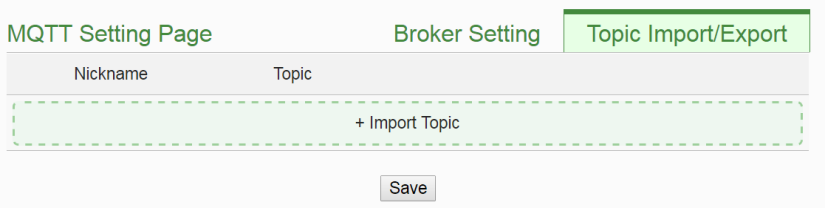


Figure9-12 : MQTT Topic Import/Export setting page

All MQTT Publish Topics and Subscribe Topics that the PMC/PMD is using now will be shown in the setting page. Click the “Export” button will collect all topics into the “topics.csv” file. The format of the “topics.csv” file is “The_nickname_of_Topic, Topic message”. Please refer to the following figure:



Figure9-13 : The Export of MQTT Topic

To use the Topic Import function, please prepare a document with the same format as “The_nickname_of_Topic, Topic message”. Click the “+ Import Topic” button, then browse through to select the document which includes the MQTT Topic and click “Open”. If the format is correct and the import process is successful, the system will show an “Import successfully” message box.

After importing the MQTT Topic successfully, there the Imported Topic list will be shown in the “Topic” field of the Publish & Subscribe Setting page. The user can select a specific topic from the Imported Topic list, and click “Use” button to use this imported topic.

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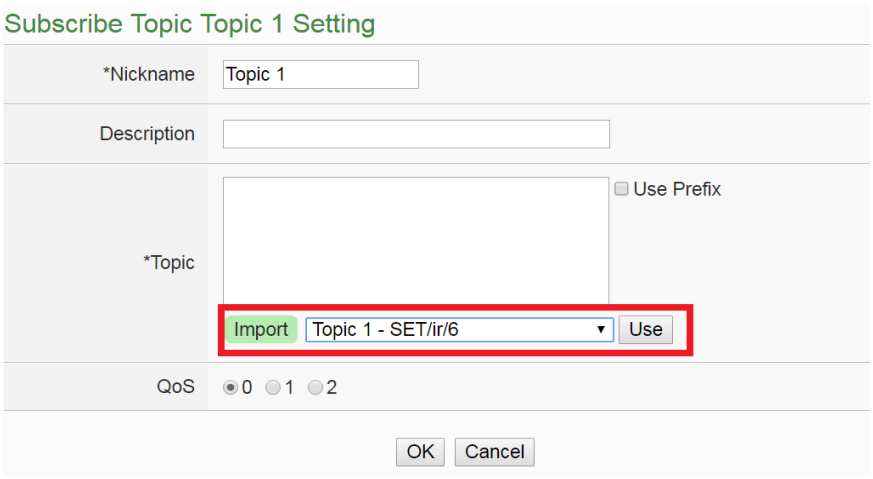


Figure9-14 : The Import of MQTT Topic

9.4 IoTstar Real-Time Data Sending Setting

IoTstar can receive the real-time power data (and I/O data) uploaded by PMC/PMD, and import these data into the database it created. The setting page is shown as below:

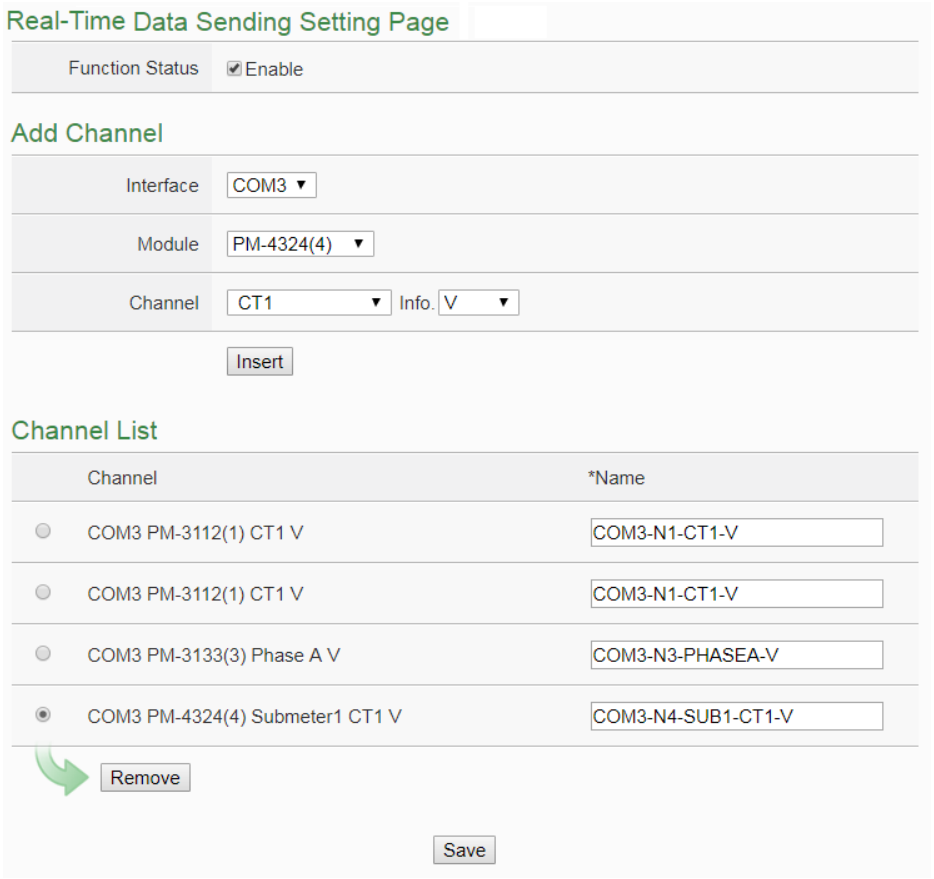


Figure9-15 : IoTstar Real-Time Data Sending Setting page

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Follow the steps below:

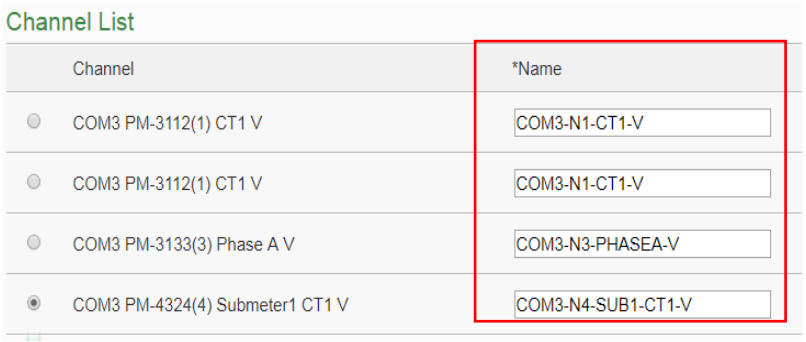
i. In the “Function Status” field, check “Enable” to enable the Real-Time data upload operation.

ii. In the "Add Channel" section, select the “Interface”, “Module” and “Channel” from the dropdown list and click “Insert” to add the power meter loop or I/O channel into the “Channel List" section. User can select "All" in “Channel” field to insert all power meter loops and I/O channels of the power meter or I/O module at once.

iii. PMC/PMD will actively send the Real-Time power data and I/O data which is located in the “Channel List" section to IoTstar. User can modify the database field name of the power data (or I/O channel data) in the "*Name" field. To remove a pre-set power meter loop or I/O channel, please click the radio button in front of the pre-set power meter loop or I/O channel and then click “Remove” button.

Please Note:

1. The name inputted in the "*Name" field must be a unique name.
2. The name set in the "*Name" field will be saved in the "Name" field of the Real-Time Data Table that IoTstar creates for the PMC/PMD (Please refer to Appendix VI of IoTstar User Manual). These names can be used later for further query operations of the Database.

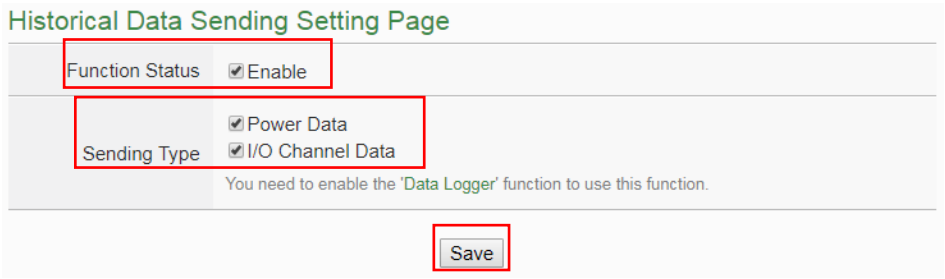


iv. After all settings are completed, click “Save” button to save the setting.

9.5 IoTstar Historical Data Sending Setting

IoTstar can receive the historical power data (and I/O data) uploaded by PMC/PMD, and import these data into the database it created. The setting page is shown as below:

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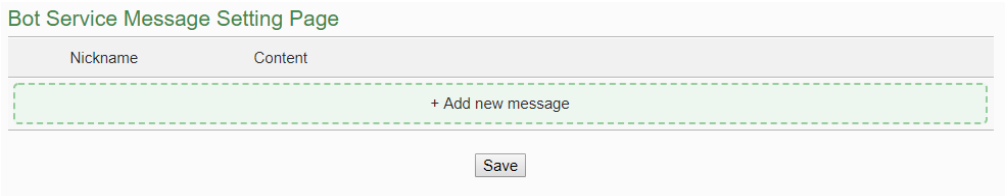
Follow the steps below:

i. To enable PMC/PMD's historical data upload operation, users need to enable Data Logger function of PMC/PMD first. More detailed setting information please refers to the section"8.1 Data Logger Setting".
ii. In the "Function Status" field, check "Enable" to enable the data file upload function and select the type of data log file you would like to upload.
iii. After all settings are completed, click "Save" button to save the setting.

9.6 IoTstar Bot Service Setting

The v3.3.0 (and later version) firmware of PMC/PMD supports the message sending function to IoTstar Bot. When PMC/PMD is set to connect to an IoTstar server and the IoTstar server enables IoTstar Bot function, PMC/PMD can send message to the LINE App or Telegram App that bind with the IoTstar server. About the detail of IoTstar Bot, please check the IoTstar web page. The configuration page for message setting is shown as below.

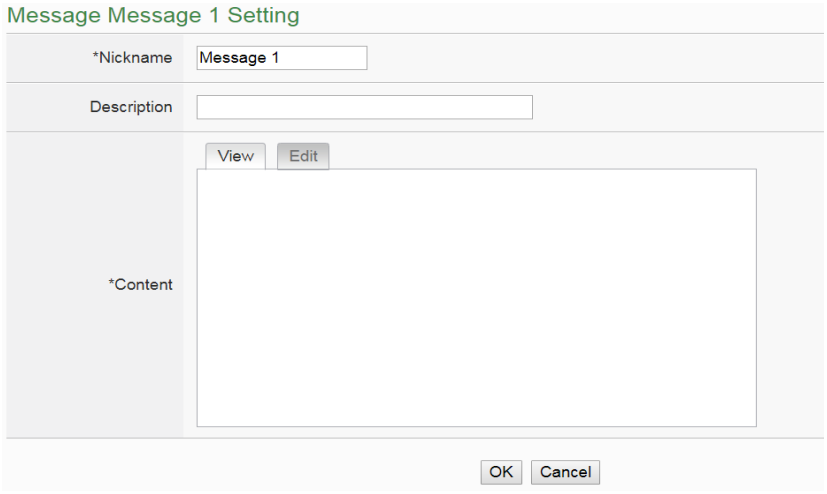
In the Message setting page, users can edit the messages which would be sent to IoTstar Bot with the pre-input strings, Power data, I/O channel data and Internal Register value. The configuration page is shown as below:



Follow the steps below:

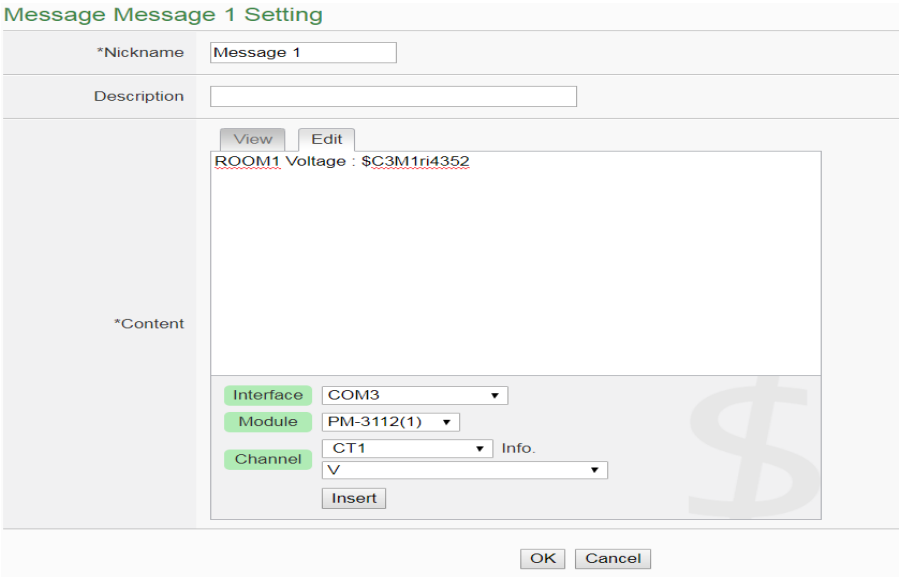
i. Click "Add new message", the Bot Service Message Setting page will appear as following:

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ii. Input name in the “Name” field and you could input the description of this message in the “Description” field.

iii. Enter the message content in the “Content” field. PMC/PMD provides encoded strings for users to add current I/O channel value, power data or Internal Register value into the messages. To make it easy to add the encoded string, PMC/PMD provides “Real-time variable editor”. Please refer to “8.1 Data Logger Setting” for more detailed information of the “Real-time variable editor”.



iv. After complete all settings, click the “OK” button to confirm the message setting, and return to the Message Setting page.

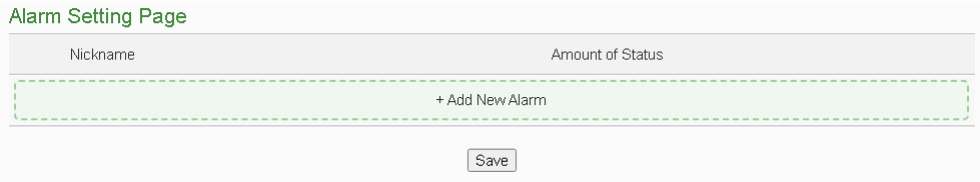
v. Repeat steps ii~ vi to complete settings of all messages for IoTstar Bot.

vi. After you finish all the Message settings, click “Save” button to save the settings.

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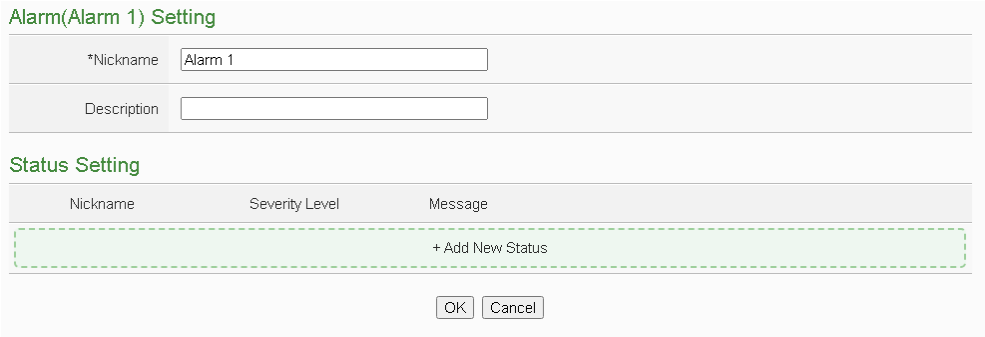
9.7 IoTstar Alarm Setting

When users configure PMC/PMD to connect to the IoTstar server, alarm messages can be sent to IoTstar to alert the control center in specific situations. The alarms can include a severity level, helping administrators prioritize which alerts require immediate attention. Each alarm can independently display five different statuses: **Critical**, **Severe**, **Moderate**, **Minor**, and **No Impact**. Users can adjust the urgency of the alarm by sending corresponding statuses and messages. The configuration page is shown as below:



Follow the steps below:

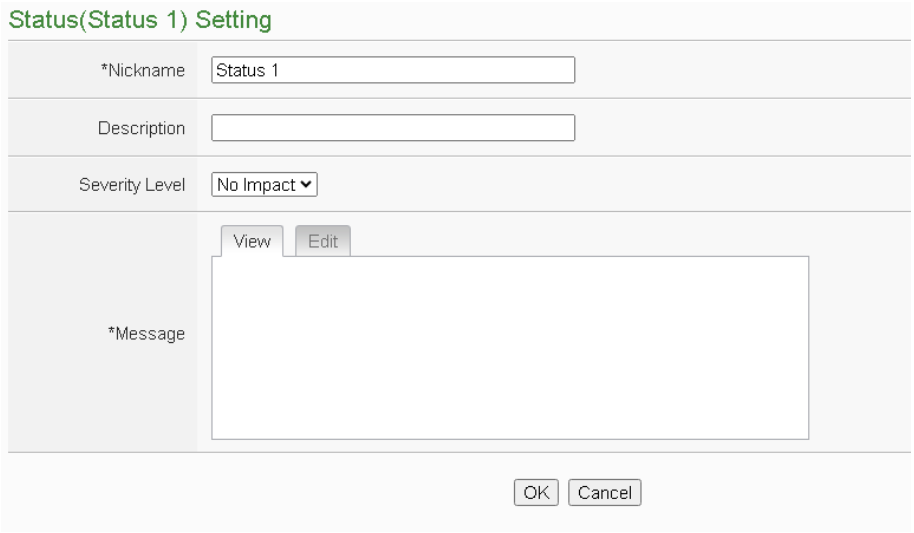
i. Click “Add New Alarm” to open the alarm settings page, as shown below:



ii. Input the name in the “Nickname” field and you could also input the description of this alarm in the “Description” field.

iii. Click “Add New Status” to open the Status setting page for the alarm. You can add a status and the desired alarm message, as shown below:

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iv. Input the name in the “Nickname” field and you could also input the description of this status in the “Description” field.
v. In the “Severity Level” field, set the severity level represented by this status.
vi. Enter the message content in the “Message” field. PMC/PMD provides an “Real-time variable editor” to add current I/O channel value, power data or Internal Register value into the messages.
vii. After complete all settings, click the “OK” button to confirm the status setting, and return to the Alarm Setting page.
viii. Repeat steps iii ~ vii to complete settings of all statuses for the alarm.
ix. Repeat steps i ~ viii to complete settings of all alarms.
x. After you finish all the Alarm settings, click “Save” button to save the settings.

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10 Advanced Setting

Advanced Setting provides additional features and allows you to perform more setting on the PMC devices. Click on the Advanced Setting button, a column of buttons will appear on the left of the page:

- Email Setting
- SMS Setting
- SNMP Trap Setting
- LINE Notify Setting (The service will end on March 31, 2025.)
- LINE Messaging API Setting
- Telegram Setting
- Timer Setting
- Schedule Setting
- PUE Setting
- Internal Register Setting(Include Math Formula Editing Function)
- Ping Setting

After complete the Advanced Setting, all the setting you define in the section will be the property in the IF-THEN-ELSE rule setting page. Please note: In order to avoid possible error when performing rule definition (IF-THEN-ELSE), please always finish configuration in Advanced Setting before starting to define Rules. Avoid unnecessary change in Advanced Setting after you finish rule definition. Unexpected errors might occur if you violate this sequence: Advanced Setting→ Rule Setting. In case you make any modification, please double check your settings and Rules definition to make sure no errors are present. The following sections will describe more detailed information for these configurations.

10.1 Email Setting

PMC/PMD support Email messages sending function. This function allows sending pre-input Email message(s) to pre-set Email receiver(s) under certain conditions. The configuration page is shown as below:

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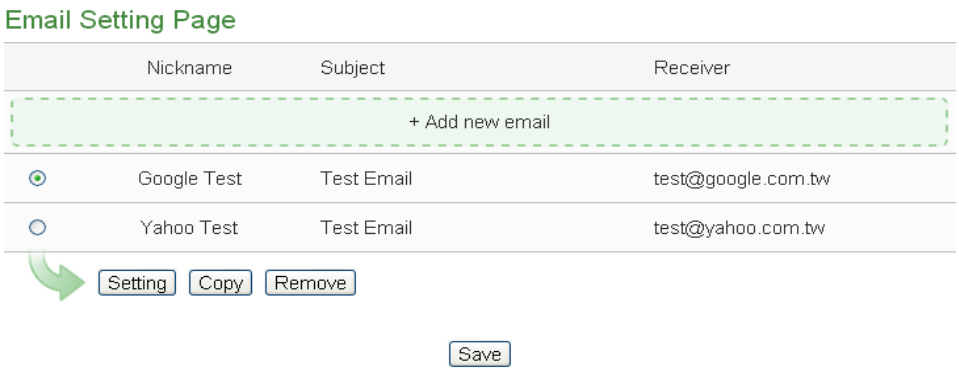


Figure10-1 : Email setting page

The settings steps are as below:

i Click on “Add new email” to add a new email setting.

ii After clicking the “Add new email”, a setting page will appear, input name in the “Name” field and you could also input the description of this email in the “Description” field; shown as below:

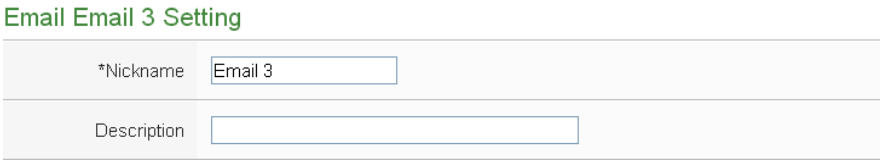


Figure10-2 : Email setting page(Name & Description))

iii In the “SMTP Server” field, enter the IP or the domain name of the SMTP server; or select the SMTP server from the dropdown list. In the dropdown list, PMC/PMD provide four public SMTP servers for selection as below:

- Google Gmail
- Yahoo Mail
- Microsoft Outlook / Hotmail
- AOL Mail

After select SMTP server from the dropdown list, PMC will automatically complete the “Port Number” and “Security” setting related to the SMTP server you select. The SMTP Setting page is shown as below:

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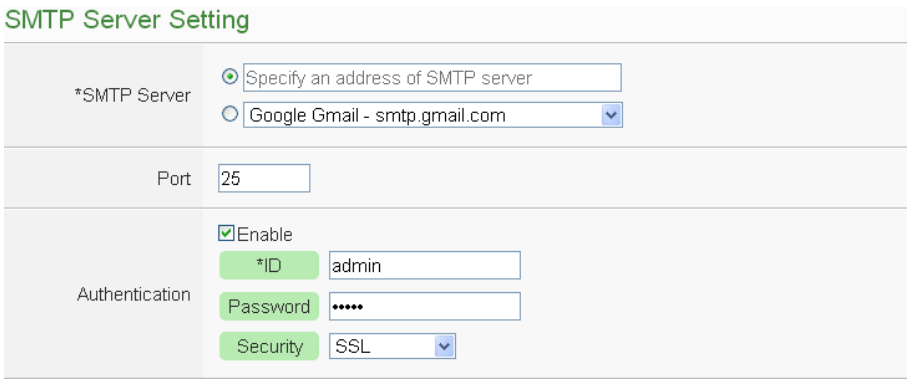


Figure10-3 : Email setting page(SMTP Server)

iv Input the Port number, the default port number is set as 25.

v If the SMTP server requires account and password validation, please select the "Enable" checkbox, and continue steps vi~viii to login into the SMTP server. If the SMTP server doesn't need account and password validation, uncheck the "Enable" checkbox and go directly to step ix.

vi Enter the SMTP server login ID in the "Login ID" field.

vii Enter the SMTP server password in the "Password" field.

viii In the "Security" field, select the security setting to be "No Security", "TLS", or "SSL" from the dropdown list.

ix After complete SMTP server setting, continue to input Email address setting. In the "Sender Name" field, input the name of the sender. The Email Address Setting page is shown as below:

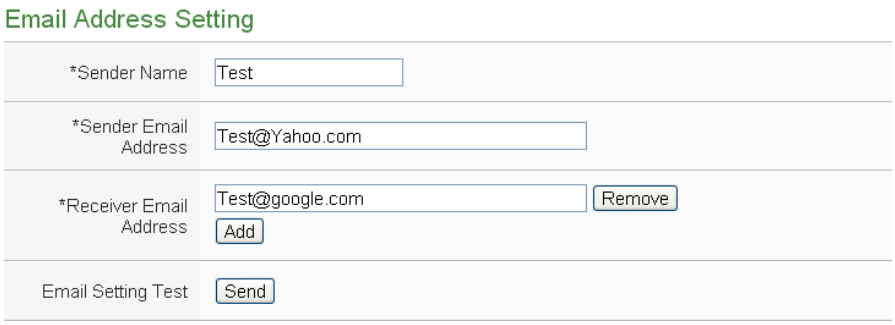


Figure10-4 : Email setting page(Email Address)

x Enter the sender's email address in the "Sender Email Address" field.

xi In the "Receiver Email Address" section, click on "Add" to add the receiver's email address. At least one email address has to be entered.

xii To verify whether your email setting is correct to send the Email, click "Send" in the "Email Setting Test" section, then PMC/PMD will send a test Email to the receiver's email address.

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After complete Email Address setting, continue to input Email Content setting. Enter the email subject in the “Subject” field. The Email Content Setting page is shown as below:

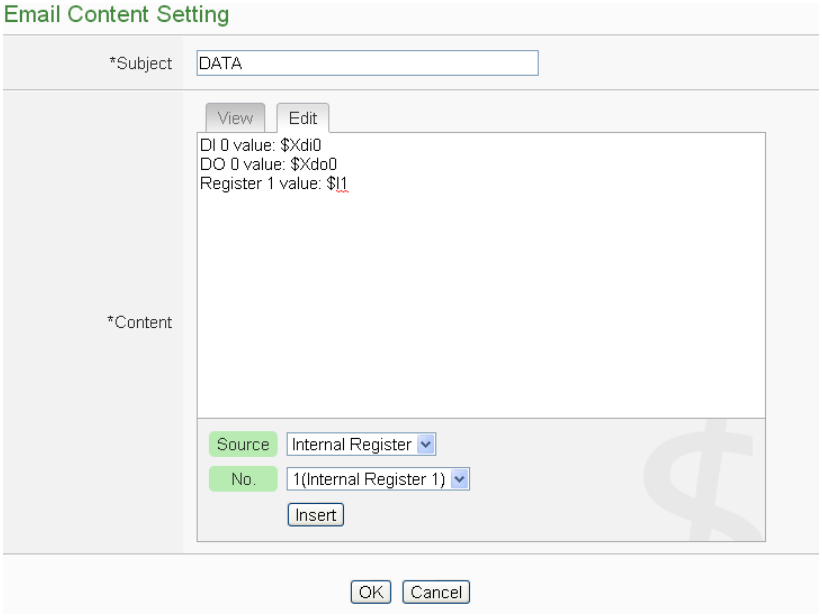


Figure10-5 : Email setting page(Email Content)

xiii Enter the content in the “Content” section. In addition, it provides encoded strings for users to add current I/O channel value, power data or Internal Register value into the Email content. To make it easy to add the encoded string, PMC provides “Real-time variable editor”. Please refer to "8.1 Data Logger Setting“ for more detailed information of the “Real-time variable editor”.

xiv Click on “OK” to confirm the setting and leave the setting page.

xv Repeat steps i~ xv to complete settings of all Emails

To modify the settings of a pre-set Email, please click on the radio button in front of the Email, and then click on “Setting” to modify the settings.

xvi To copy the settings of a pre-set Email to the new Email, please click the radio button in front of the pre-set Email and then click “Copy”, a new Email will be added to the list and the settings of the old Email will be copied to this newly added Email.

xvii To remove a pre-set Email, please click the radio button in front of the pre-set Email and then click “Remove”.

xviii After you finish all the Email selections and settings, click “Save” button to save the settings.

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10.2 SMS Setting

PMC-5231M-4GE/PMC-5231M-4GC/PMC-5231M-3GWA/PMC-2241M/PMD offers SMS Alarm message sending and SMS Command receiving functions (PMD must equip ICP DAS GTM-203M-3GWA modem. Please refer to Appendix III for detail). For SMS Alarm function; it allows to send pre-set SMS alarm message to specific phone numbers. For SMS command function; it allows to set up authorized phone numbers to receive SMS commands. PMC/PMD will execute the commands received from authorized phone numbers only. There are 2 types of SMS commands:

- **Retrieve channel data (GET):** The user can retrieve specific channel real-time data. One SMS Command message can require up to 10 channel data values. The user could add the encoded string to the message to retrieve the related channel data.
- **Modify channel data (SET):** The user could modify channel data by SMS command. Each SMS command message allows to modify one channel value.

10.2.1 SMS Alarm Setting

The SMS Alarm Setting page is shown as below:

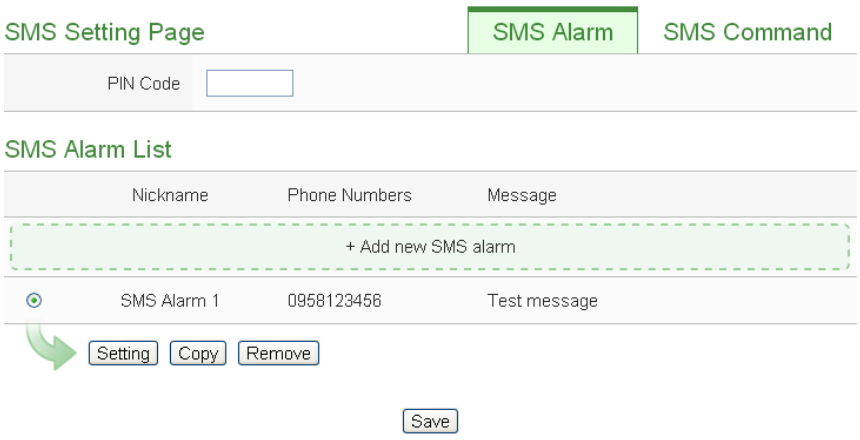


Figure10-6 : SMS Setting Page (1)

Please follow the steps below:

i Make sure the “SMS Alarm” Tab is selected.

ii In the PIN field, input the 4 digit SIM card PIN code. If the PIN code is not required, leave the field blank.

iii Click “Add new SMS alarm”, the SMS Alarm Setting page will appear as follow:

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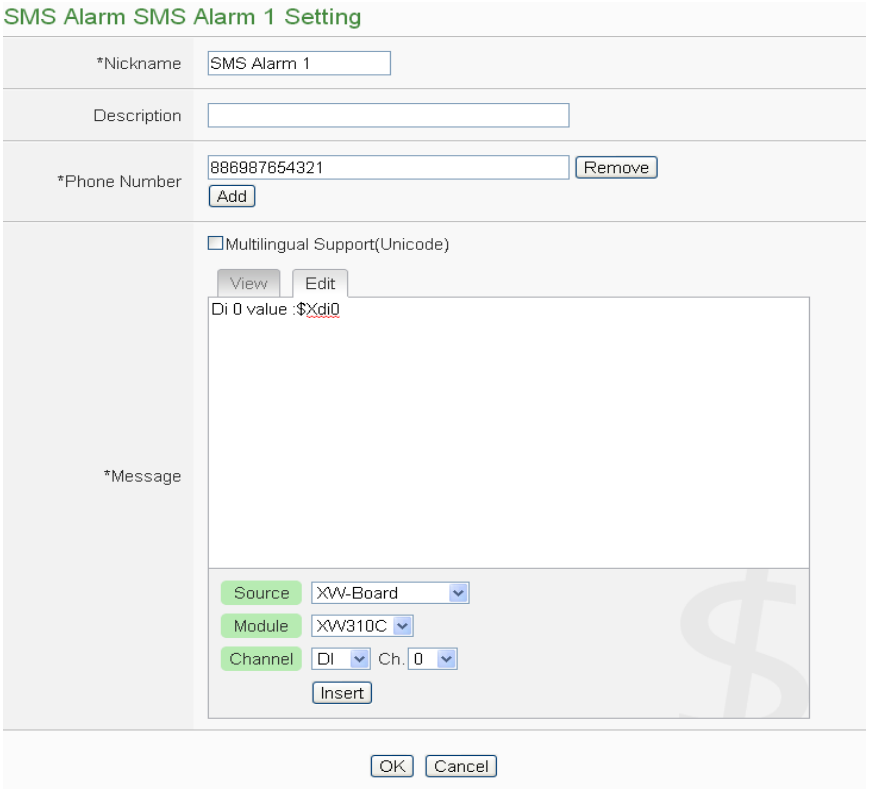


Figure10-7 : SMS Setting Page (2)

iv Input name in the "Name" field and you could also input the description of this SMS Alarm in the "Description" field.

v In the "Phone Number" section, click on "Add" to input the phone numbers **t**o receive the SMS Alarm messages. The SMS can be sent to multiple receivers. Keep on clicking "Add" to add all phone numbers to receive the Alarm message, click "Remove" to remove the phone numbers you want to delete.

vi Enter the content in the "Message" field. If the Unicode mode is adopted, the length of the content cannot exceed 70 characters. If the Unicode mode is not selected (will support English characters only), the length of the content limit is 160 characters. SMS Alarm provides an encoded string for you to add current I/O channel data, power data or Internal Register data into SMS Alarm message. To make it easy to add the encoded string, PMC provides "Real-time variable editor". Please refer to "8.1 Data Logger Setting" for more detailed information of the "Real-time variable editor".

vii Click on "OK" to confirm the setting and leave the setting page.

viii Repeat steps iii~vii to complete settings of all SMS Alarm setting.

ix To modify the settings of a pre-set SMS Alarm, please click on the

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radio button in front of the SMS Alarm, and then click on “Setting” to modify the settings.

x To copy the settings of a pre-set SMS Alarm to the new SMS Alarm, please click the radio button in front of the pre-set SMS Alarm and then click “Copy”, a new SMS Alarm will be added to the list and the settings of the old SMS Alarm will be copied to this newly added SMS Alarm.

xi To remove a pre-set SMS Alarm, please click the radio button in front of the pre-set SMS Alarm and then click “Remove”.

xii After you finish all the SMS Alarm selections and settings, click “Save” button to save the settings.

10.2.2 SMS Command Setting

The SMS Command Setting page is shown as below:

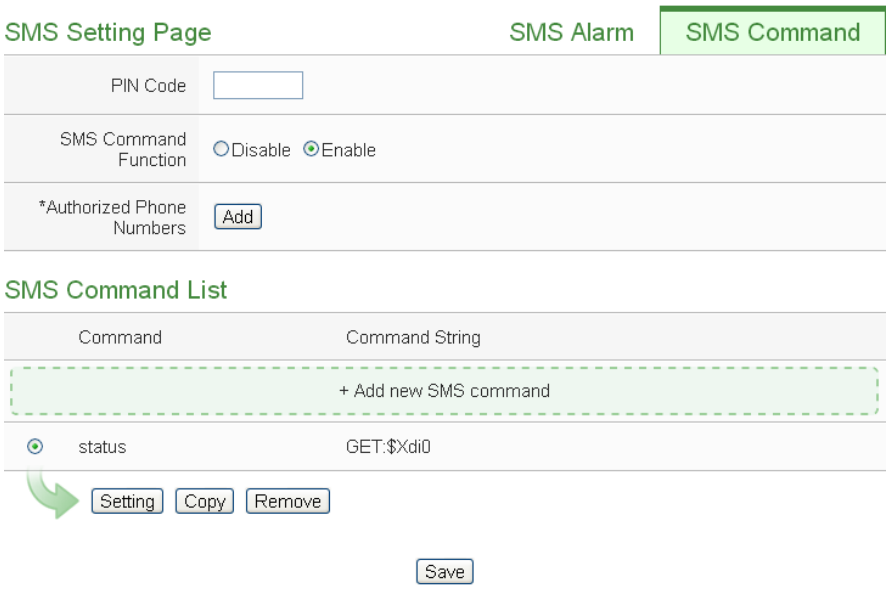


Figure10-8 : SMS Command Setting Page (1)

Please follow the steps below:

i Make sure the “SMS Command” Tab is selected.

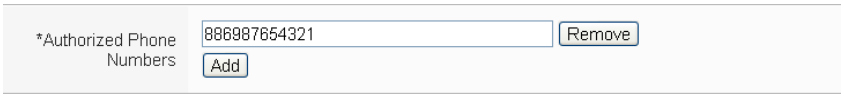
ii In the PIN field, input the 4 digit SIM card PIN code. If the PIN code is not required, leave the field blank.

iii In the “SMS Command Function” section, click on “Enable” to enable SMS Command function. The SMS Command list will be displayed. If “Disable” is selected, the SMS Command list will be disabled.

iv In the “Authorized Phone Number” field, click on “Add” to input

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the phone numbers you would like to authorize to send SMS commands to PMC/PMD. Keep on clicking “Add” to add all phone numbers to send the SMS commands to PMC/PMD, click “Remove” to remove the phone numbers you want to delete. Please note: the Authorized Phone Number has to be input in the format: “Country code, area code and number”. For example, if the Authorized Phone Number is a cell phone number 0987654321 in Taiwan area, please input the Authorized Phone Number as “886987654321”.



v Click “Add new SMS command”, the SMS Command Setting page will appear.

vi Input a command string in the “Command” field as the nickname for the original corresponding command in the “Command String Editor” section. In the “Command String Editor” section, select the command type to be “GET” (retrieve real-time channel data) or “SET” (modify channel data) from the dropdown list. For “GET” command (shown as Figure 10-9); It provides an encoded string for you to add current I/O channel data, power data or Internal Register data into SMS command. To make it easy to add the encoded string, PMC provides “Real-time variable editor”. Please refer to “8.1 Data Logger Setting” for more detailed information of the “Real-time variable editor”. For “SET” command (shown as Figure 10-10), select “Source”, “Module” and “Channel” from the dropdown list, and then set the “Value” to be modified (you can also leave the “Value” field blank, and input the value later according to requirement in real-time when send back the SMS Command). Take Figure 10-10 as an example, you can leave the “Value “field blank and input the SMS Command AI/2.3 to modify the AI channel value to be 2.3.

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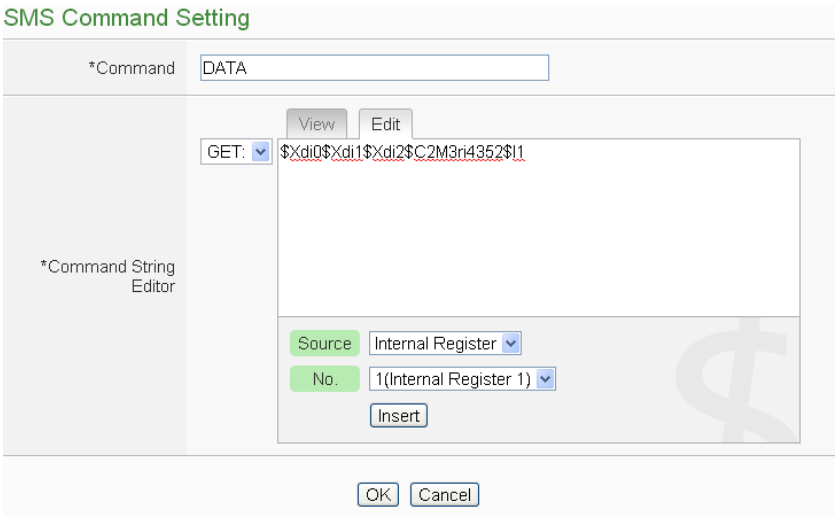


Figure10-9 : SMS Command Setting for GET Command

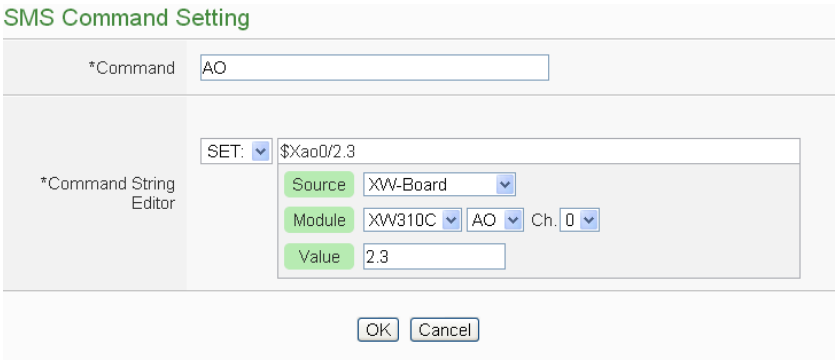


Figure10-10 : SMS Command Setting for SET Command

vii Click on "OK" to confirm the setting and leave the setting page.

viii Repeat steps v~vii to complete settings of all SMS Command setting. The SMS Command (and its original corresponding command) will be listed in the SMS Command List on the SMS Command setting page.

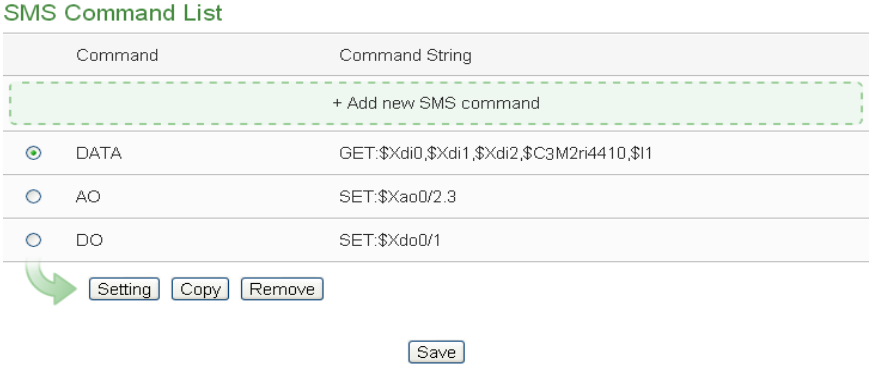


Figure10-11 : SMS Command list

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On Figure 10-11, taking the first SMS Command on the list as an example, when user send SMS message “DATA” to PMC-5231-3GWA, PMC-5231-3GWA will send back the data of DI0, DI1, & DI2 of the XV-Board, the Total/Average value of the kW from module PM-2133(2) on COM3, and value of Internal Register 1 to the command sender.

Taking the second SMS Command on the list as an example, when user send SMS message “AO” to PMC-5231-3GWA, PMC-5231-3GWA will set the value of AO0 on XV-Board to be 2.3 after receiving the message.

Taking the third SMS Command on the list as an example, when user send SMS message “DO” to PMC-5231-3GWA, PMC-5231-3GWA will set the value of DO0 on XV-Board to be ON after receiving the message.

ix To modify the settings of a pre-set SMS Command, please click on the radio button in front of the SMS Command, and then click on “Setting” to modify the settings.

x To copy the settings of a pre-set SMS Command to the new SMS Command, please click the radio button in front of the pre-set SMS Command and then click “Copy”, a new SMS Command will be added to the list and the settings of the old SMS Command will be copied to this newly added SMS Command.

xi To remove a pre-set SMS Command, please click the radio button in front of the pre-set SMS Command and then click “Remove”.

After you finish all the SMS Command selections and settings, click “Save” button to save the settings.

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10.3 SNMP Trap Setting

SNMP Trap function allows PMC/PMD to initiative sending of the system data, power meter data and IO channel data to the SNMP Manager in real time automatically when unusual events occur; so that the SNMP Manager can respond immediately with corresponding operations. The configuration page for SNMP Trap setting is shown as below:

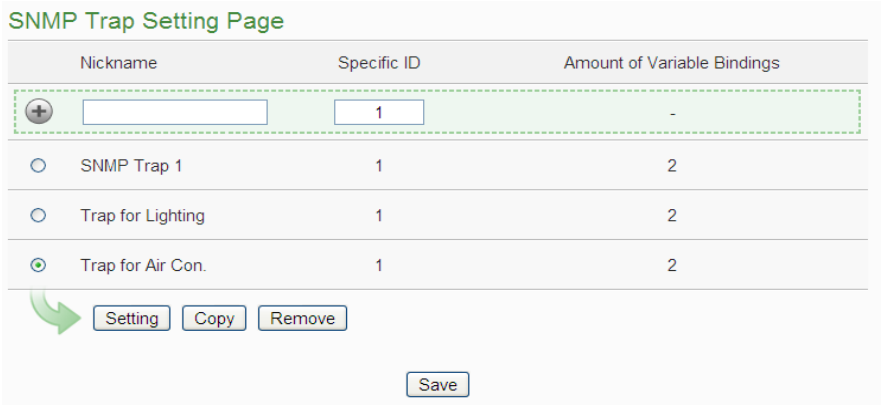


Figure10-12 : SNMP Trap Setting Page

The settings steps are as below:

i Input “Nickname” and “Specific ID” and then click button to create a new SNMP Trap.

ii To modify the settings of a pre-set SNMP Trap, please click on the radio button in front of the SNMP Trap, and then click on “Setting”, then the SNMP Trap Parameter Setting page will be shown as below. You can modify the settings of the SNMP Trap you selected if required.

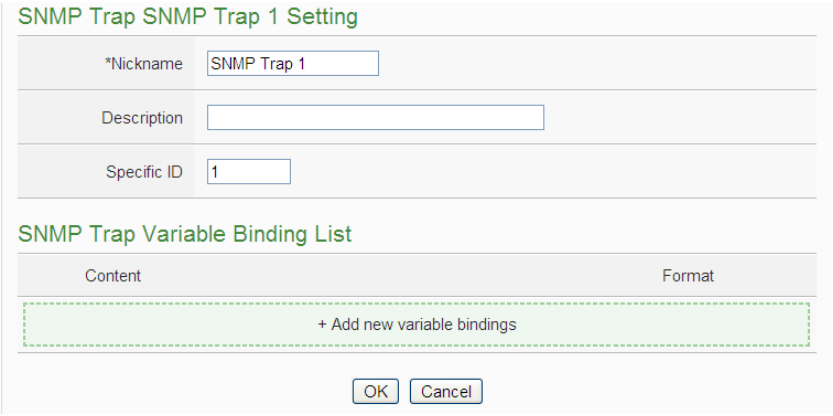


Figure10-13 : SNMP Trap Parameter Setting Page

iii In the SNMP Trap Parameter Setting page, you can input or modify the

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name of the SNMP Trap in the “Nickname” field and you could also input the description of this SNMP Trap in the “Description” field.

iv Input the Specific ID value of the SNMP Trap in the “Specific ID” field.

v Click on “Add new variable bindings” to add a new variable binding for the SNMP Trap.

vi After clicking the “Add new variable bindings”, the Variable Binding Setting Page will appear. Select the variable type first. PMC/PMD provides two variable types as “Channel Data” and “User-Defined Data” for selection. If you select the variable type as “Channel Data” type, The setting page interface will be shown as below:

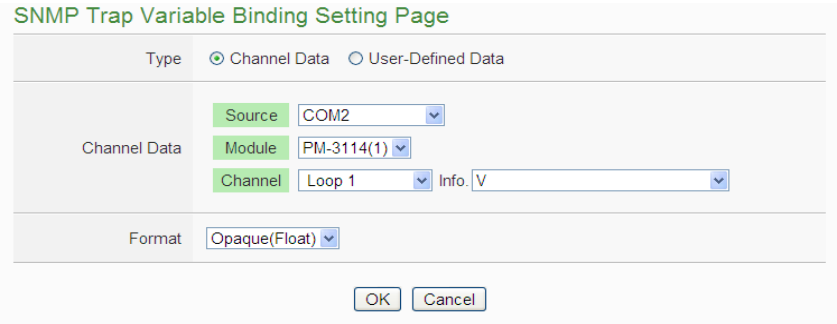


Figure10-14 : “Channel Data”Type Setting Page

Based on the “Channel Data” type interface, it provides the encoded string for user to easily add one real-time power data or I/O channel data as the variable binding in SNMP Trap each time. Select the “Source”, “Module”, “Channel” and “Format” from the dropdown list, and click the “OK” button to add the power data or I/O channel to the variable bindings list of the SNMP Trap.

The following figure shows two variable binding examples in “Channel Data” type are included in the SNMP Trap. The first variable binding is the voltage value of PM-3114 Loop 1 on the module 1 that is connected to COM2. The second variable binding is the kW value of PM-3114 Loop 1 on the module 1 that is connected to COM2.

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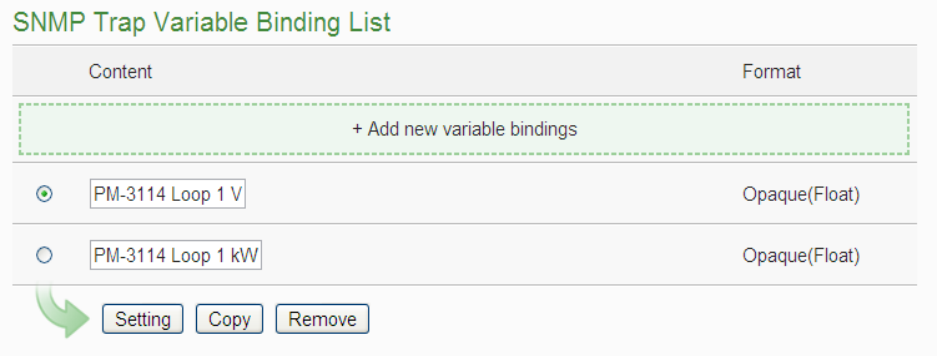


Figure10-15 : Example of "Channel Data" Type Variable Binding List

vii You can select the "User-Defined Data" as the variable type. The setting page interface will be shown as below:

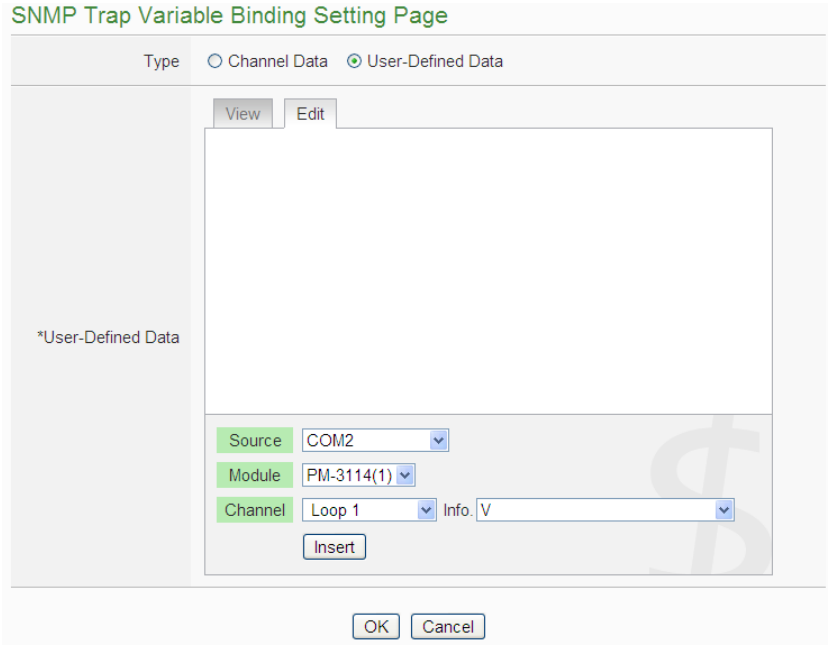


Figure10-16 : "User-Defined Data" Type Setting Page

Set up the content in the "User-Defined Data" field of the SNMP Trap Variable Binding Setting Page. The User-Defined Data provides encoded strings for user to add real-time power data or I/O channel data to the content easily. User can select the "Edit" tab or click on any blank area in the "User-Defined Data" field, and then the "Real-time variable editor" will be shown as below.

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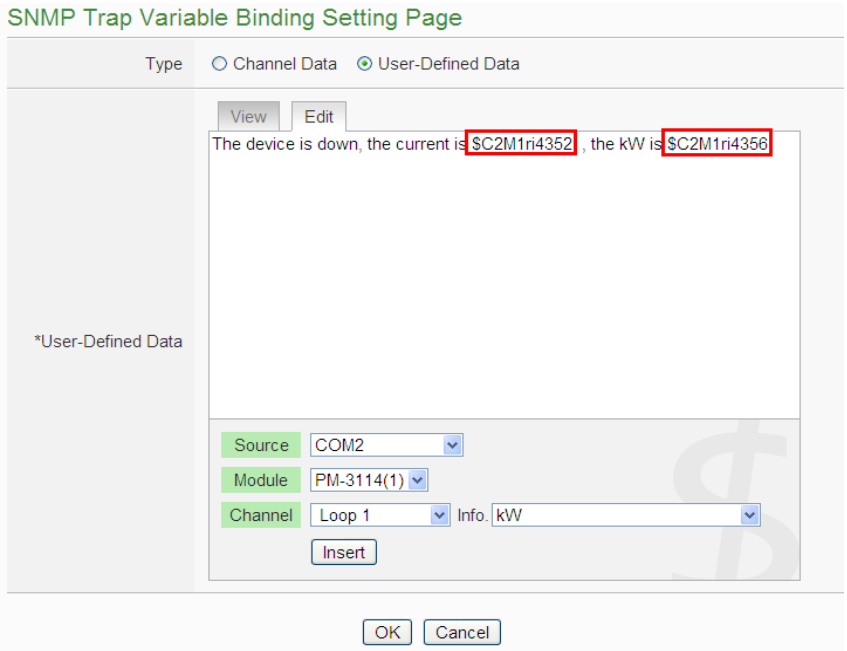


Figure10-17 : "User-Defined Data" Interface in Edit Mode

Input your message in the "User-Defined Data" field, and then select the "Source", "Module" and "Channel" from the dropdown list and click "Insert" to add channel value encoded string into the "User-Defined Data" content. The system will record the data the user pre-set in the User-Defined Data, and save the real data values in the SNMP Trap Variable Binding. When editing the content, the user can select the "View" tab, and then the channel encoded string will be displayed in the real index format of the channel for user to check the settings in an easy way.

The figure above shows an example of the encoded strings, the variable $C2M1ri4352 indicates the voltage value of PM-3114 Loop 1 on the module 1 that is connected to COM2, the variable $C2M1ri4356 indicates the kW value of PM-3114 Loop 1 on the module 1 that is connected to COM2. When users select the "View" tab, the channel value encoded string will be displayed as "PM-3114 Loop1 V" and "PM-3114 Loop1 kW" for user to check if the setting is appropriate (Figure 10-18).

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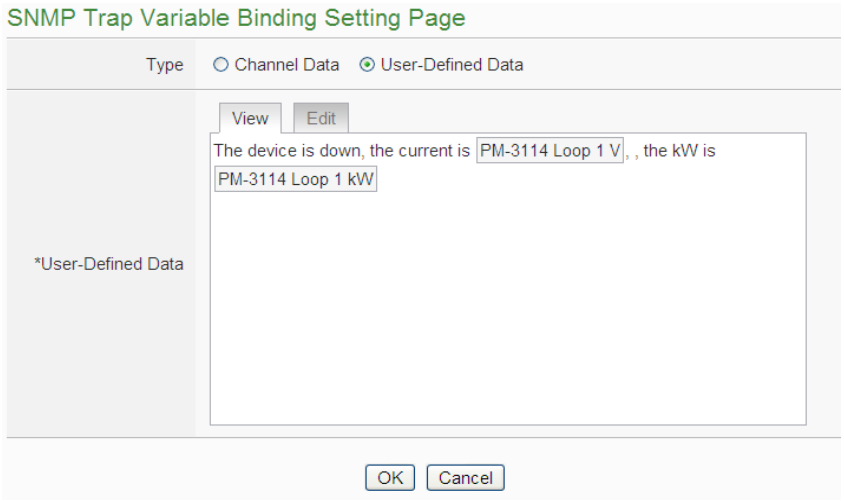


Figure10-18 : "User-Defined Data" Interface in View Mode

After completing the setting, click the "OK" button to save the parameters and variable bindings setting, and return to the SNMP Trap Setting Page

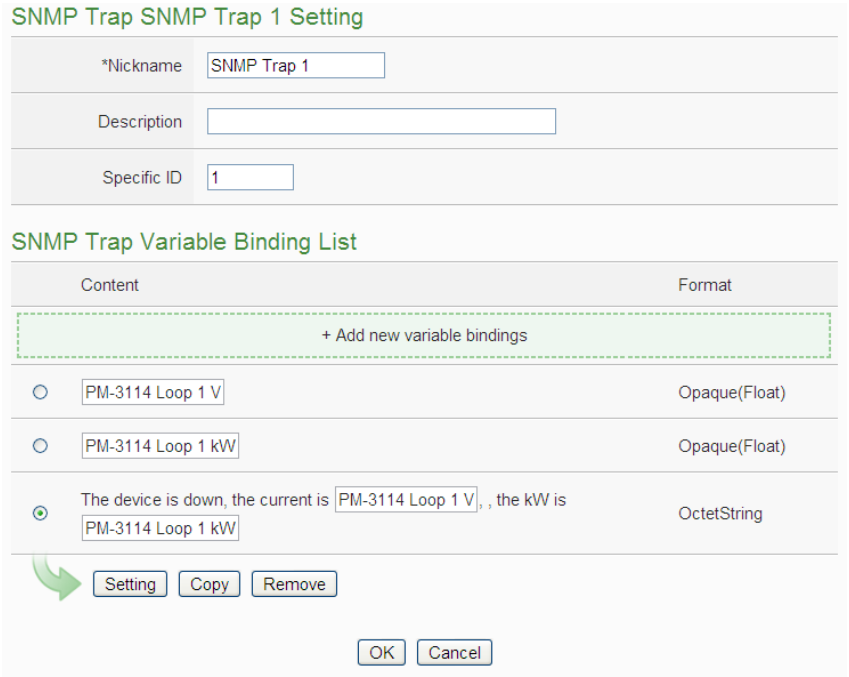


Figure10-19 : SNMP Trap setting with variable bindings list

viii To copy the settings of a pre-set SNMP Trap to the new SNMP Trap, please click the radio button in front of the pre-set SNMP Trap and then click "Copy", a new SNMP Trap (in sequence) will be added to the list and the settings of the old SNMP Trap will be copied to this newly

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added SNMP Trap.

ix To remove a pre-set SNMP Trap, please click the radio button in front of the pre-set SNMP Trap and then click “Remove”.

x After you finishing all the SNMP Traps creation and setting, click “Save” button to save the settings.

10.4 LINE Notify Setting (The service will end on March 31, 2025.)

PMC/PMD provides LINE Notify message sending function. With this function, PMC/PMD can send messages to LINE personal account or group chat rooms via LINE Notify official account. To send the LINE Notify message, users have to apply a LINE Notify service first and connect the service with the personal account or chat room to be sent. Please refer to the LINE Notify guide webpage on PMMS official webpage for the application and connection of LINE Notify service. The configuration page for LINE Notify message setting and chat room setting is shown as below.

10.4.1 Message Setting

In the Message setting page, users can edit the LINE messages with pre-input strings and realtime data. The configuration page is shown as below:

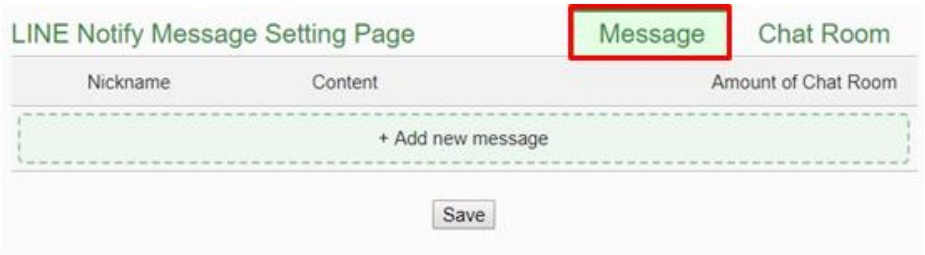


Figure10-20 : LINE Notify Message Setting page (1)

The settings steps are as below:

i. Make sure the “Message” Tab is selected.

ii. Click “Add new message”, the LINE Notify Message Setting page will appear as following:

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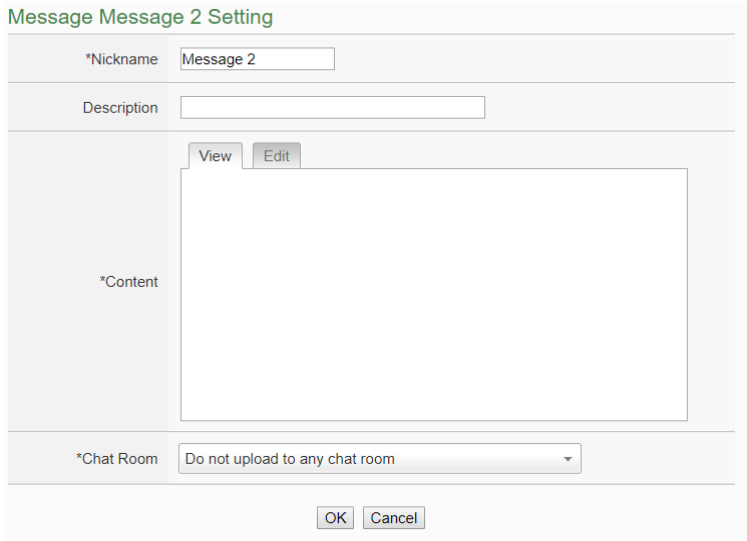


Figure10-21 : LINE Notify Message Setting page (2)

iii. Input name in the “Name” field and you could also input the description of this LINE message in the “Description” field.

iv. Enter the message content in the “Content” field. LINE message provides an encoded string for you to add current power data, I/O channel data or Internal Register data into LINE messages. To make it easy to add the encoded string, PMC provides “Real-time variable editor”. Please refer to “8.1 Data Logger Setting” for more detailed information of the “Real-time variable editor”.

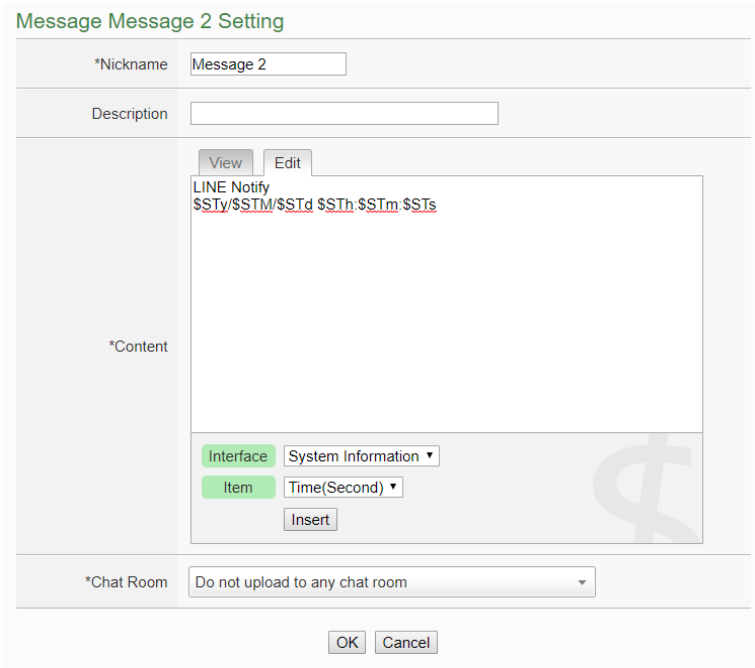


Figure10-22 : LINE Notify Message Setting page (3)

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v. In the “Chat Room” field, please specify the Chat rooms which will receive the message PMC/PMD send. PMC/PMD can send the messages to multi-chat rooms simultaneously. Users can directly click on the “Add new Chat Room” to connect with a new chat room, please refer to the section “10.4.2 Chat Room Setting”.

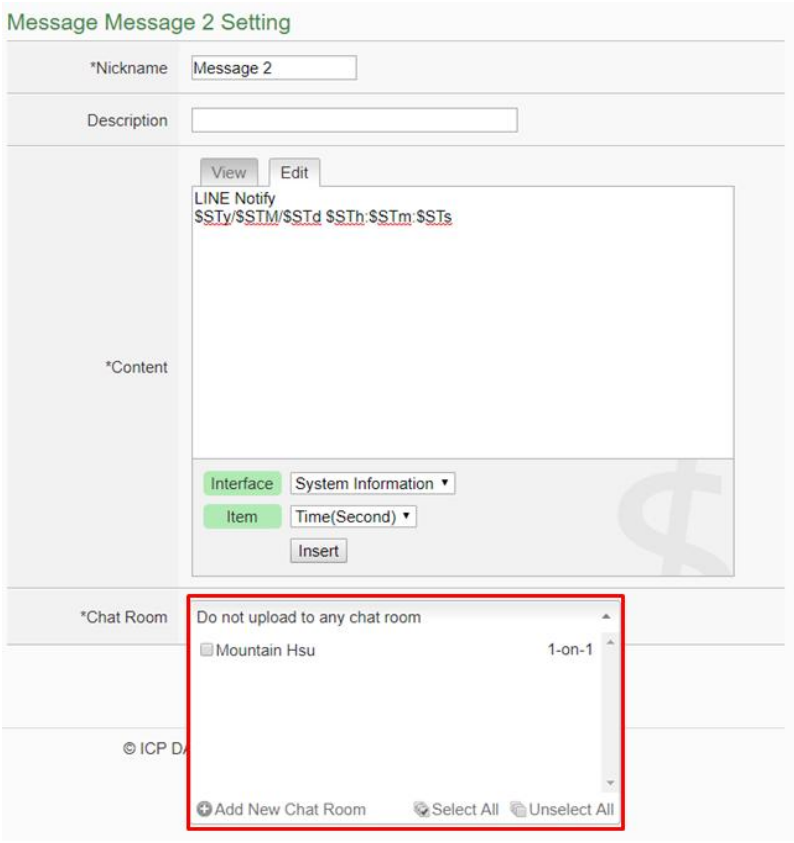


Figure10-23 : LINE Notify Message Setting page (4)

vi. After complete all settings, click the “OK” button to confirm the LINE Notify message setting, and return to the Message Setting page.

vii. Repeat steps ii~ vi to complete settings of all LINE Notify messages.

viii. After you finish all the LINE Notify Message settings, click “Save” button to save the settings.

10.4.2 Chat Room Setting

PMC/PMD send LINE messages to the chat room which is connected to the service. Users can add or manage chat rooms via the Chat Room setting page. The setting interface is as below:

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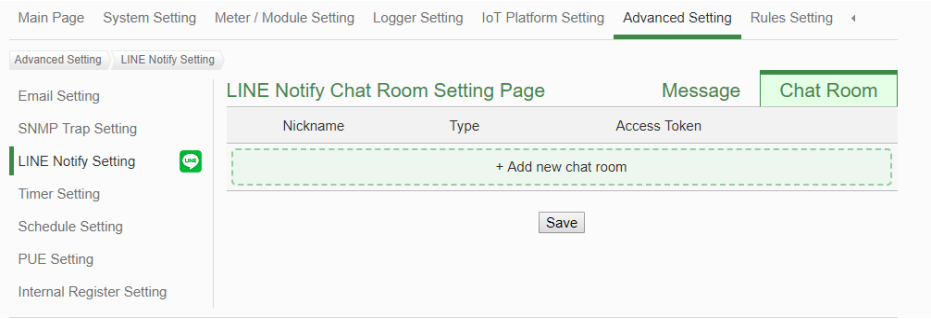


Figure10-24 : LINE Notify Chat Room Setting page (1)

The settings steps are as below:

i. Click “Add new chat room”, the LINE Notify Connection Setting page will appear as below. Input the Client ID and Client Secret of the applied service and click the “Send” button, the LINE login interface will appear if the client data was correct. If you do not apply the service before, click the link of “No Client ID and Client Secret?” at the lower area of the windows. It will lead you to the LINE Notify teaching website on the PMMS official webpage.



Figure10-25 : LINE Notify Chat Room Setting page (2)

ii. When the LINE login interface appears, login with the account which will receive the messages from PMC.

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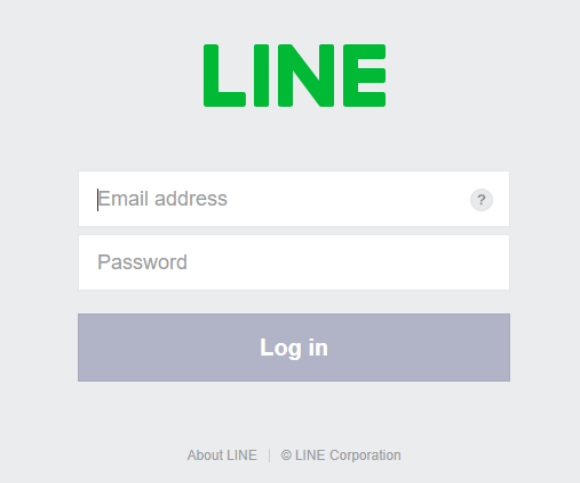


Figure10-26 : LINE Notify Chat Room Setting page (3)

iii. After login, select this account(one-to-one) or a group under this account which PMC/PMD will connect to.

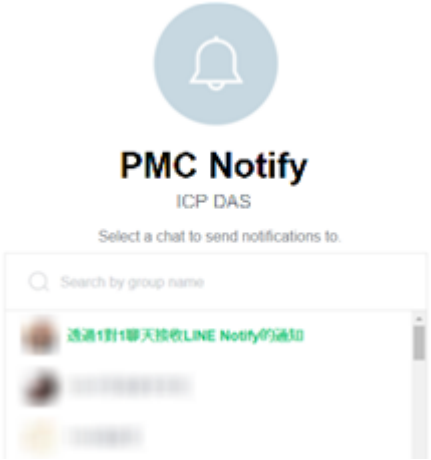


Figure10-27 : LINE Notify Chat Room Setting page (4)

iv. After the connection procedure is complete, the new chat room will appear in the list, and it can be selected in the message setting page.

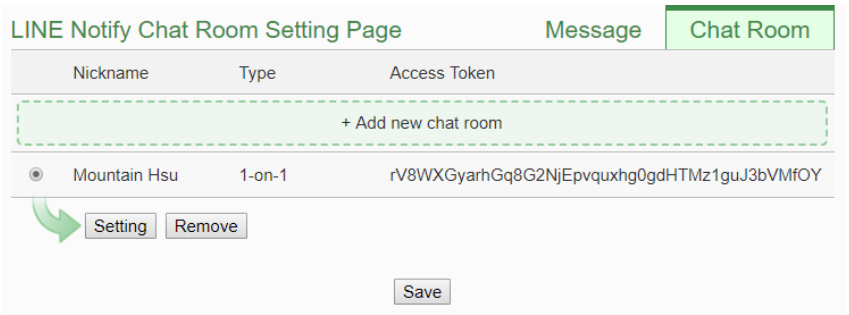


Figure10-28 : LINE Notify Chat Room Setting page (5)

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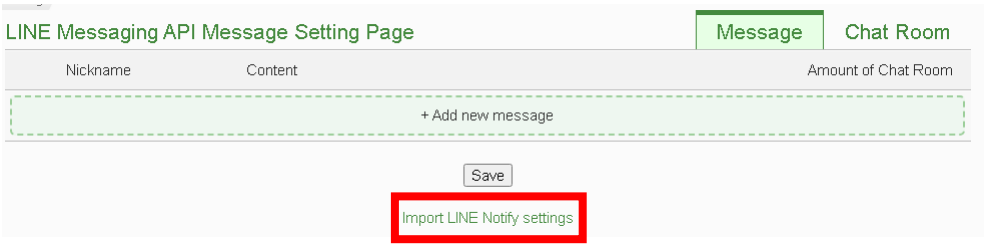
v. After you finish all the LINE Notify Chat Room settings, click "Save" button to save the settings.

Please Note:

- The limit of LINE Notify service to each chat room:
  - The number of text message: 1000 per hour.
  - PMC/PMD would not calculate the number of messages sent. The message sending operation would be fail if the number of message sent is over the limitation.
  - If you copy the PMC/PMD rule file from one PMC/PMD controller to another, they would share the quota of messages. You can re-connect the char room to avoid this problem
  - PMC/PMD can only send Text message.
- To send LINE messages to multi-LINE accounts with PMC/PMD, We suggest you can create a group with LINE APP first, and connect this group with the LINE Notify service, then you can invite the other LINE accounts to join the group to receive the messages from PMC/PMD.
- To perform the chat room setting, please confirm that the PMC/PMD is connected with internet. The setting could only be done by connecting with LINE Notify server.
- LINE Notify sending function sends messages to the port 443 of LINE Notify server. If the PMC/PMD is located behind a firewall, please confirm the sending would not be blocked.

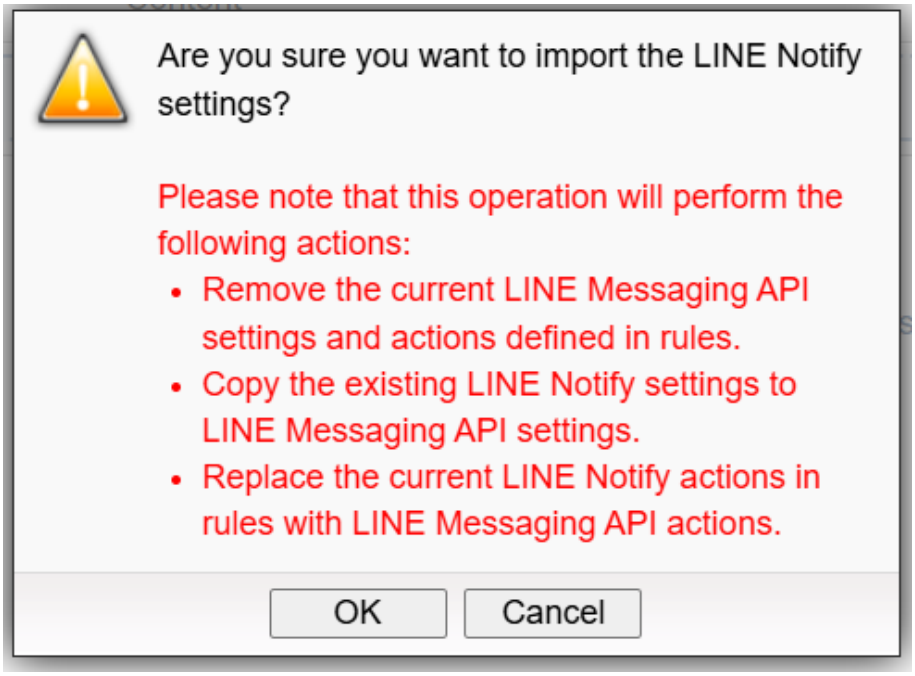
10.5 LINE Messaging API Settings

PMC/PMD provides the function to push text messages via the LINE Messaging API to one-on-one or group chat rooms. Users must first register a LINE Business ID and create a LINE official account to use this function. Below are the message setting interface, chat room setting interface, and steps to create a LINE official account.



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At the bottom of the LINE Messaging API message setting page, there is an option to “Import LINE Notify settings”. Clicking this will copy the LINE Notify messages and related settings to the LINE Messaging API settings, and logical rules will convert the action of sending LINE Notify messages into sending LINE Messaging API messages. However, due to the structural differences between LINE Messaging API chat rooms and LINE Notify chat rooms, users still need to manually replace the LINE Notify chat rooms with LINE Messaging API chat rooms.



Note:

- After completing the import action, you still need to click "Save" to take effect.
- Do not click import repeatedly, as this may delete logical actions that have already been converted to LINE Messaging API.
- This import action can only be executed in either LINE Messaging API settings or Telegram settings, but not both.

10.5.1 Message Setting

In the message settings page, you can edit the LINE Messaging API messages to be sent. In addition to entering the message content, you can also edit the LINE messages with pre-input strings and realtime data. Below is the message settings page:

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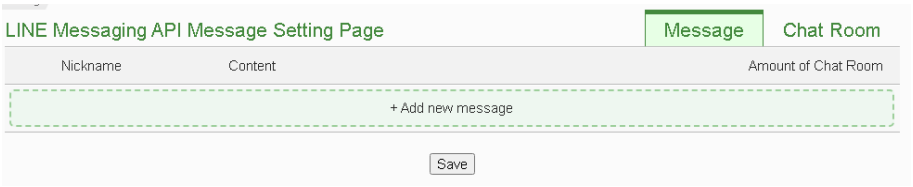


Figure10-29 : LINE Messaging API Message Setting page (1)

The settings steps are as below:

i. Click the “Message” tab at the top right of the “LINE Messaging API Message Settings Page”.

ii. Click “Add new message” to open the LINE Messaging API message settings page.

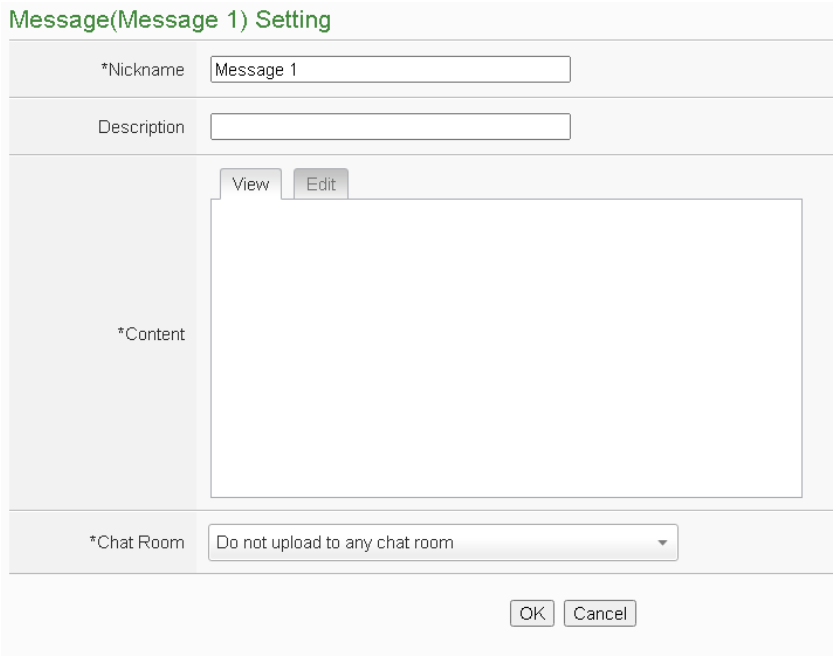


Figure10-30 : LINE Messaging API Message Setting page (2)

iii. Input name in the “Name” field and you could also input the description of this LINE message in the “Description” field.

iv. Enter the message content in the “Content” field. LINE Messaging API message provides an encoded string for you to add current power data, I/O channel data or Internal Register data into the messages. To make it easy to add the encoded string, PMC/PMD provides “Real-time variable editor”. Please refer to “8.1 Data Logger Setting” for more detailed information of the “Real-time variable editor”.

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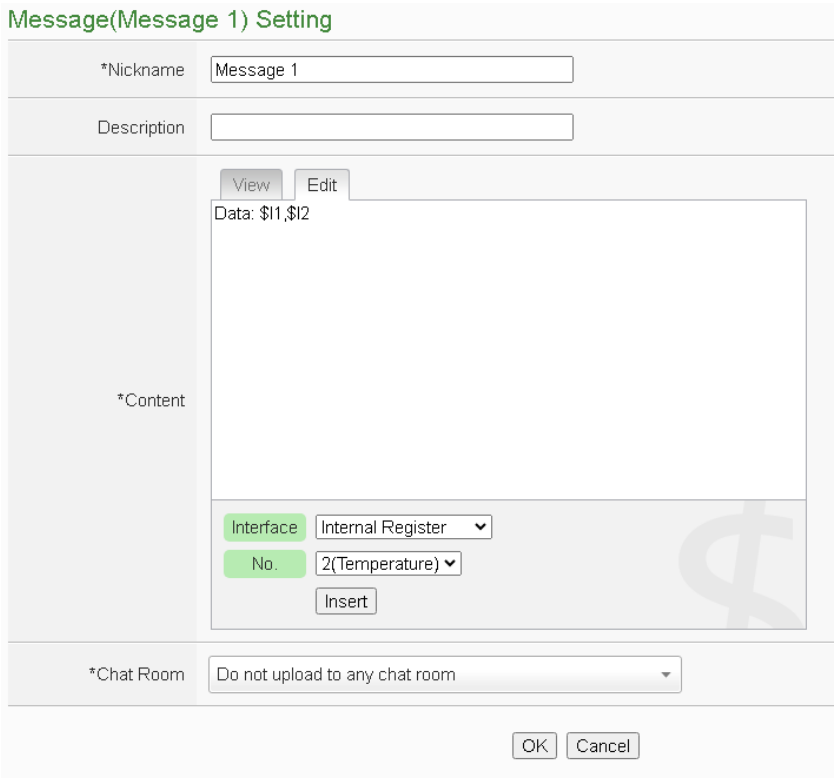


Figure10-31 : LINE Messaging API Message Setting page (3)

v. In the “Chat Room” field, please specify the Chat rooms which will receive the message PMC/PMD send. PMC/PMD can send the messages to multi-chat rooms simultaneously. Users can directly click on the “Add new Chat Room” to connect with a new chat room, please refer to the section “10.5.2 Chat Room Setting”.

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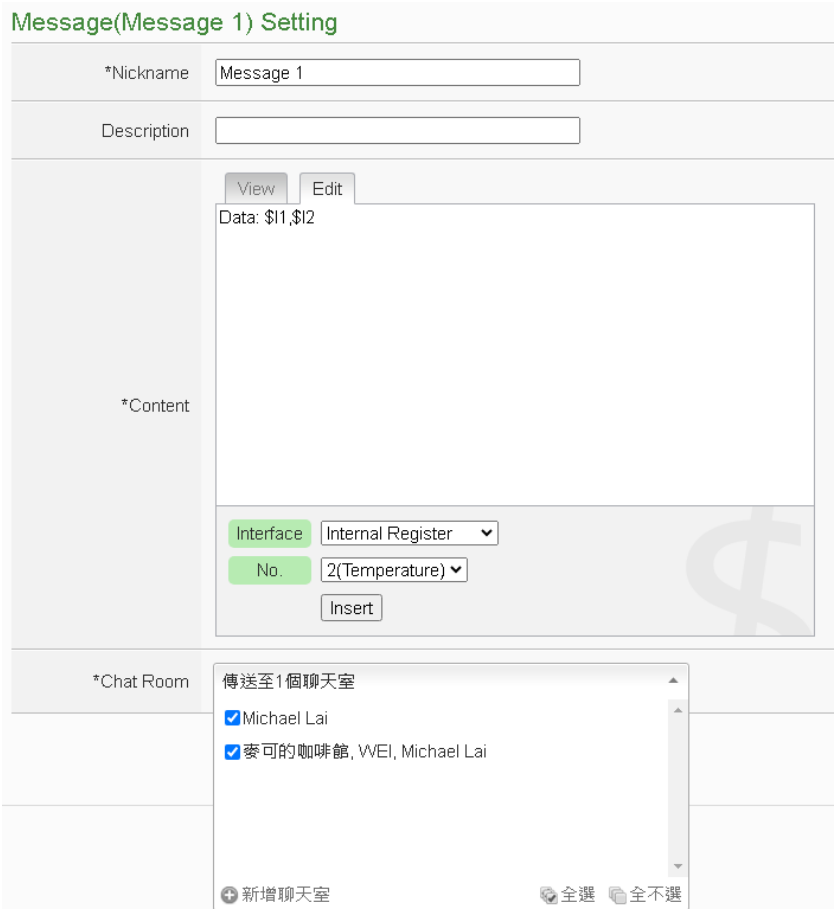


Figure10-32 : LINE Messaging API Message Setting page (4)

vi. After complete all settings, click the "OK" button to confirm the LINE Messaging API message setting, and return to the Message Setting page.

vii. Repeat steps ii~vi to complete settings of all LINE Messaging API messages.

viii. After you finish all the LINE Messaging API Message settings, click "Save" button to save the settings.

10.5.2 Chat Room Setting

Chat rooms are the push targets for LINE Messaging API messages. You can add or manage chat rooms through the settings page. The chat room settings page is as follows:

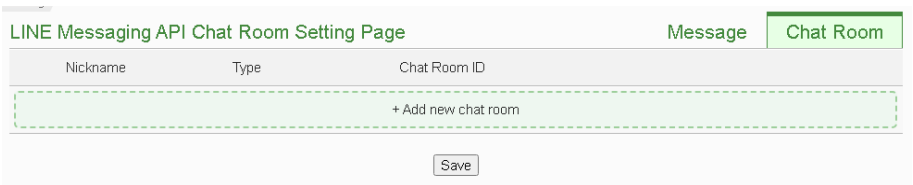


Figure10-33 : LINE Messaging API Chat Room Setting page (1)

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The settings steps are as below:

i. After clicking the “Add new chat room” button, PMC/PMD will open a chat room ID recording window as below. Enter the Channel Secret of the official account to be used in the “Channel Secret” field and enter the Channel Access Token of the official account to be used in the “Channel Access Token” field. Click the “Start getting LINE chatroom information” button.



Figure10-34 : LINE Messaging API Chat Room Setting page (2)

ii. Use your phone to chat in the chat room with the official account, and PMC/PMD will record the chat room IDs that have been engaged. After recording all chat room IDs, click the “Finished getting LINE chatroom information” button to stop recording chat room IDs.

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Figure10-35： LINE Messaging API Chat Room Setting page (3)

iii. After adding, the newly added chat room will appear in the list and can be used as a message sending target.

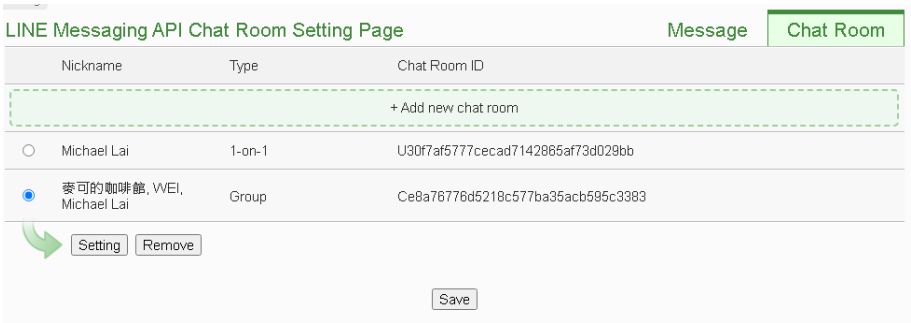


Figure10-36： LINE Messaging API Chat Room Setting page (4)

iv. You can select a chat room and click the “Setting” button to enter the chat room settings page. In addition to setting the chat room's description, you can also click the “Send” button, and PMC/PMD will send a test message to the chat room.

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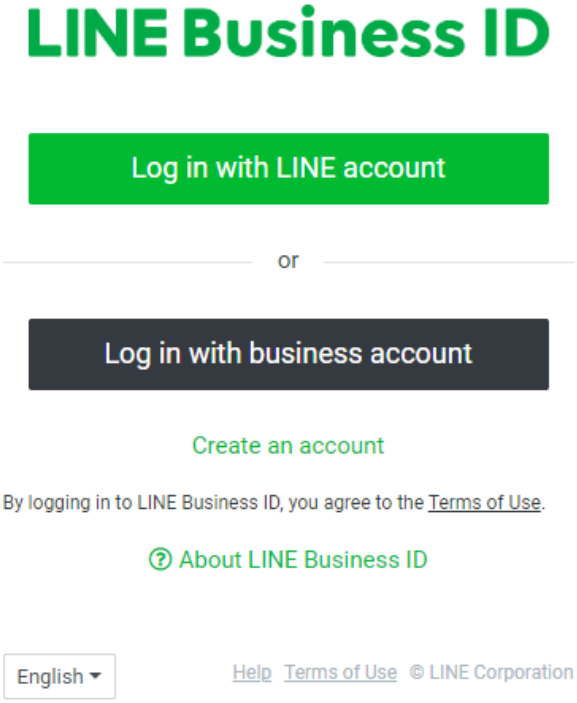
Figure10-37 : LINE Messaging API Chat Room Test Function

v. After you finish all the LINE Messaging API Chat Room settings, click “Save” button to save the settings.

10.5.3 Line Official Account Application and Settings

Users must first register a LINE Business ID and create a LINE official account to use the LINE Messaging API message push function. The setup steps are as follows:

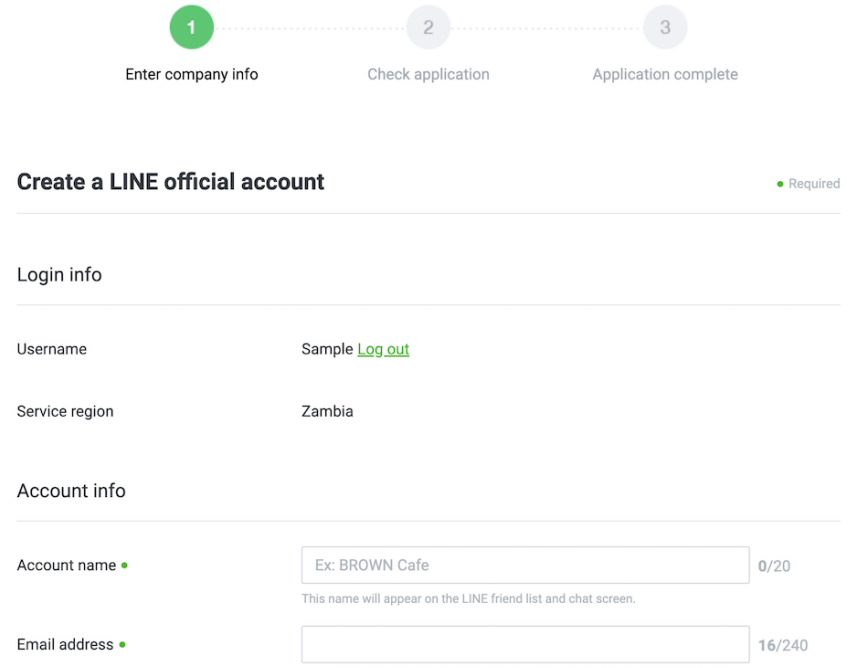
i. Before creating a LINE Official Account, you need to log in to LINE Business ID using your LINE account or business account.



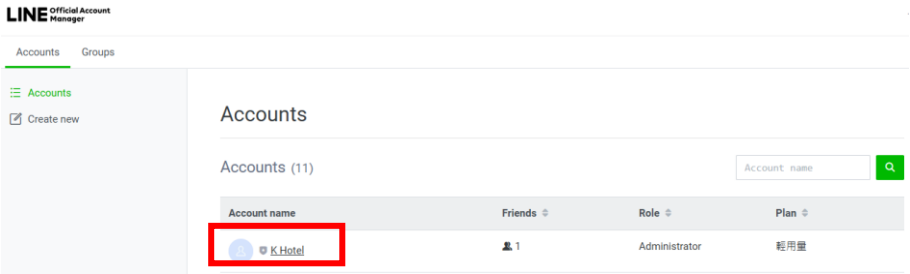
ii. After logging into LINE Business ID, you will be directed to the create a LINE official account page. On the page's form, fill in the

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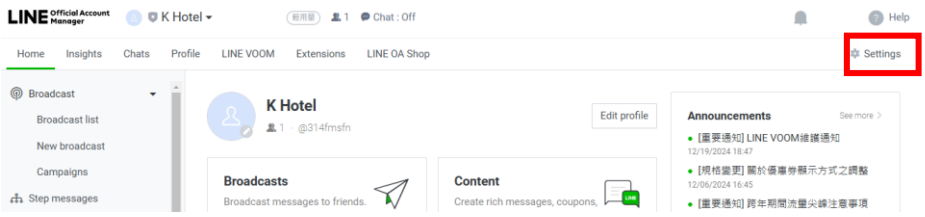
relevant information for the account you want to create and submit it to complete the creation of the LINE Official Account.



iii. After the official account is created, go to [the LINE Official Account Manager website] to configure it. In the account list, select the account you just created.

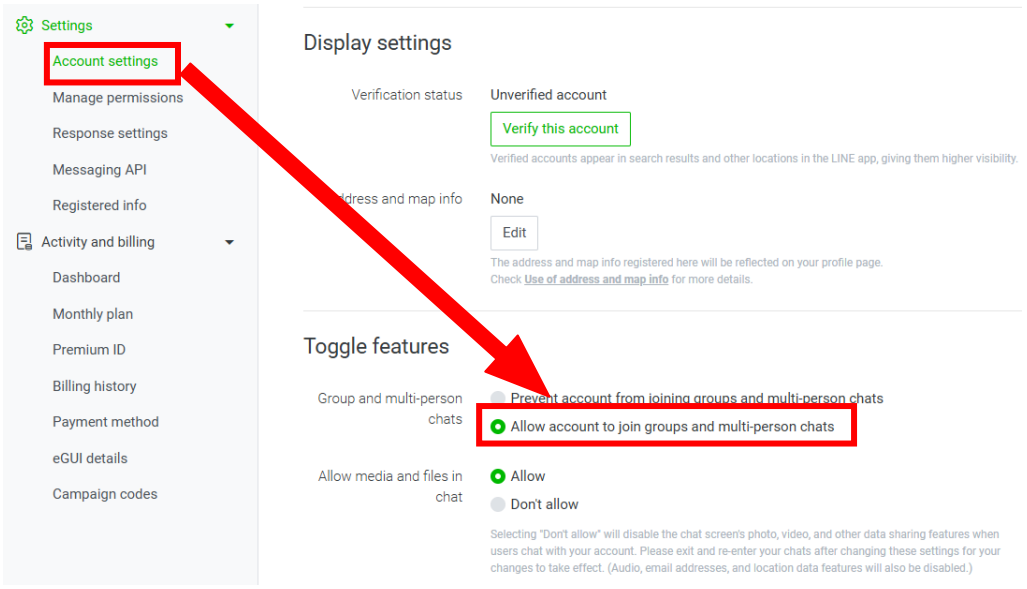


iv. Once on the settings page, click the “Settings” button located at the top right corner.

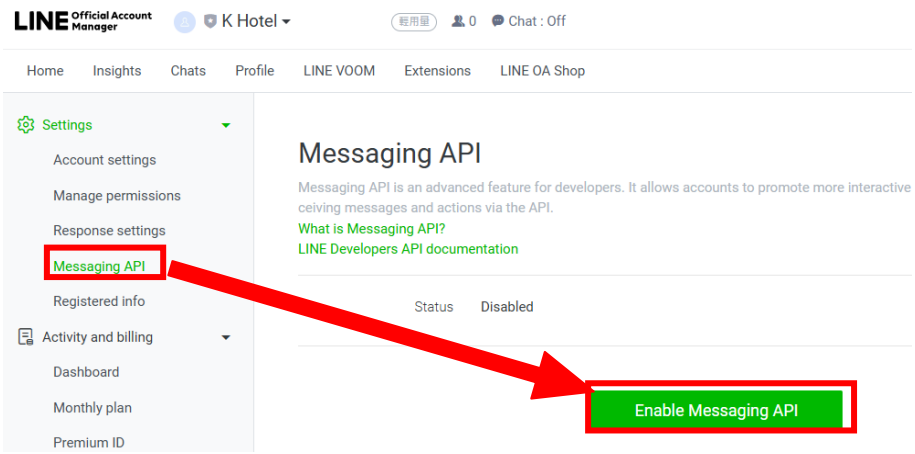


v. Click on “Account Settings” on the left, then toggle the function to “Allow account to join groups and multi-perion chats”.

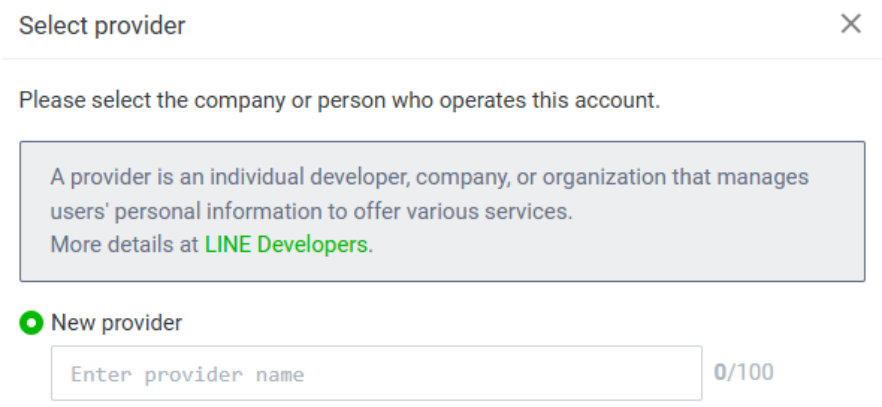
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vi. Click on “Messaging API” on the left, and then click “Enable Messaging API”.

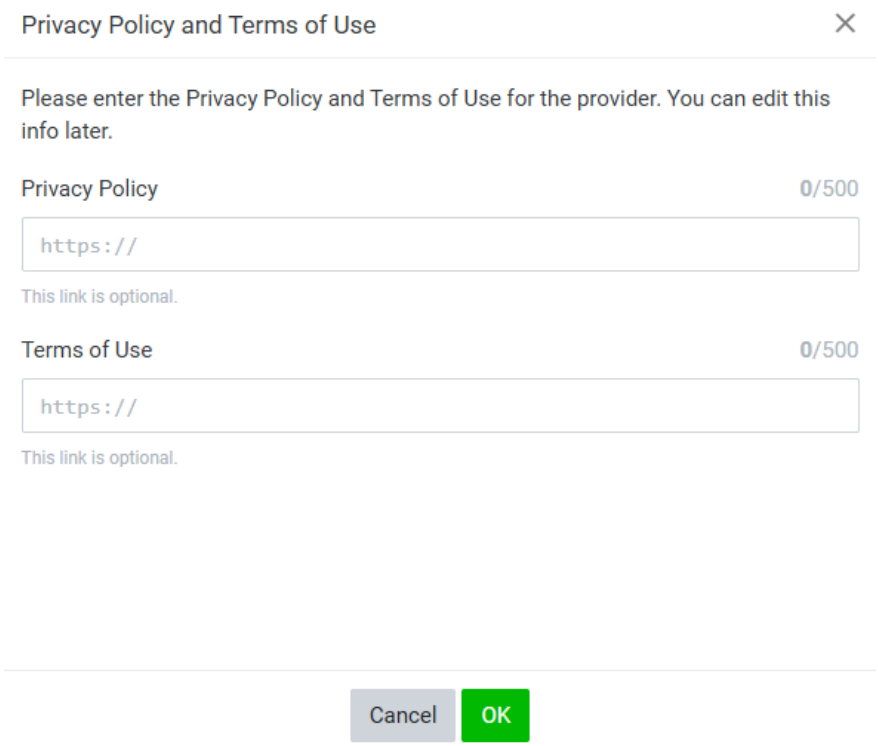


vii. Enter the name of the service provider (enter any name you prefer), then click “Agree”.

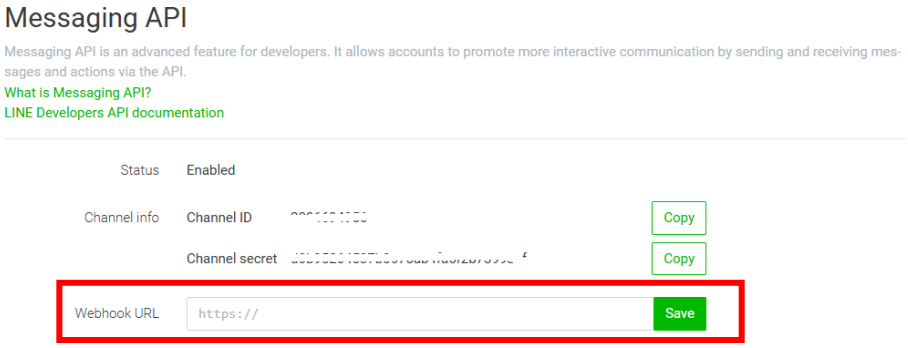


viii. You can skip the Privacy Policy and Terms of Service by clicking “OK”.

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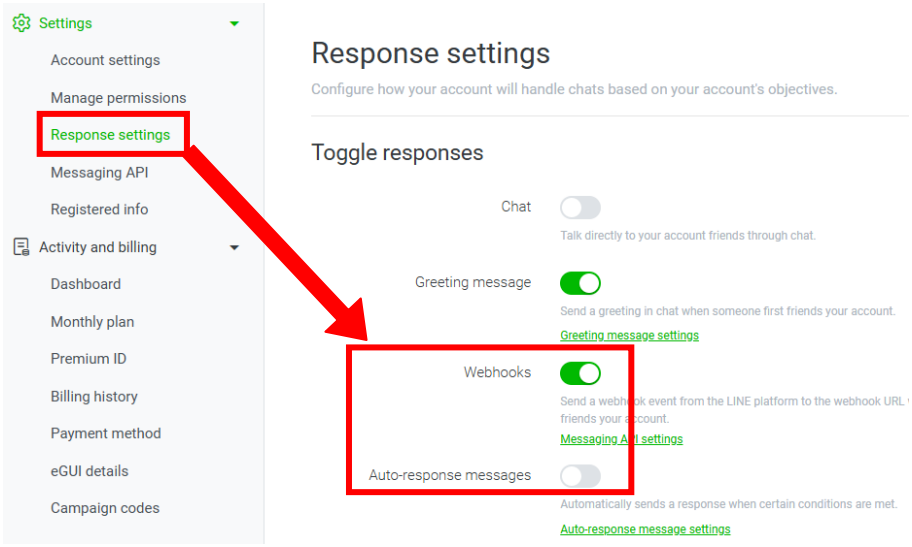


ix. Once the official account is set up, return to the "Messaging API" page, input the following URL in the "Webhook URL" field, and click the "Save" button:
https://pmms.icpdas.com/line/messaging_webhook.php

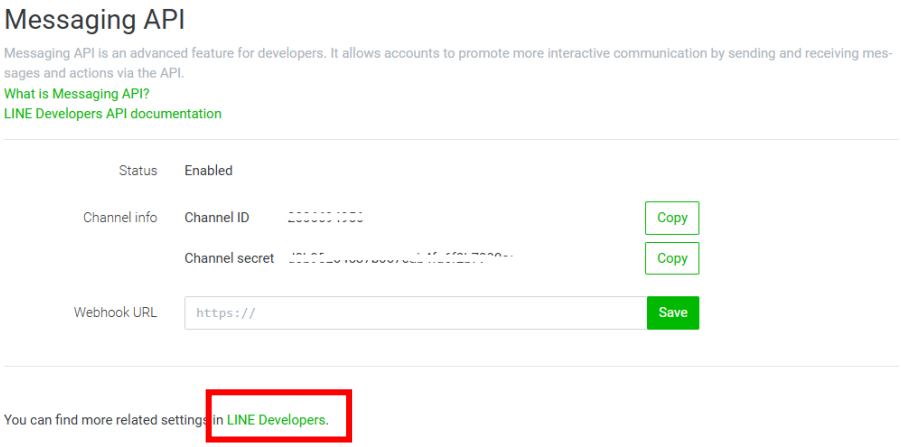


x. Click on "Response settings" on the left, activate the "Webhook" function and disable the "Auto-response messages" function.

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xi. Return to the “Messaging API” page, then click “LINE Developers” at the bottom to navigate to the LINE Developers page.

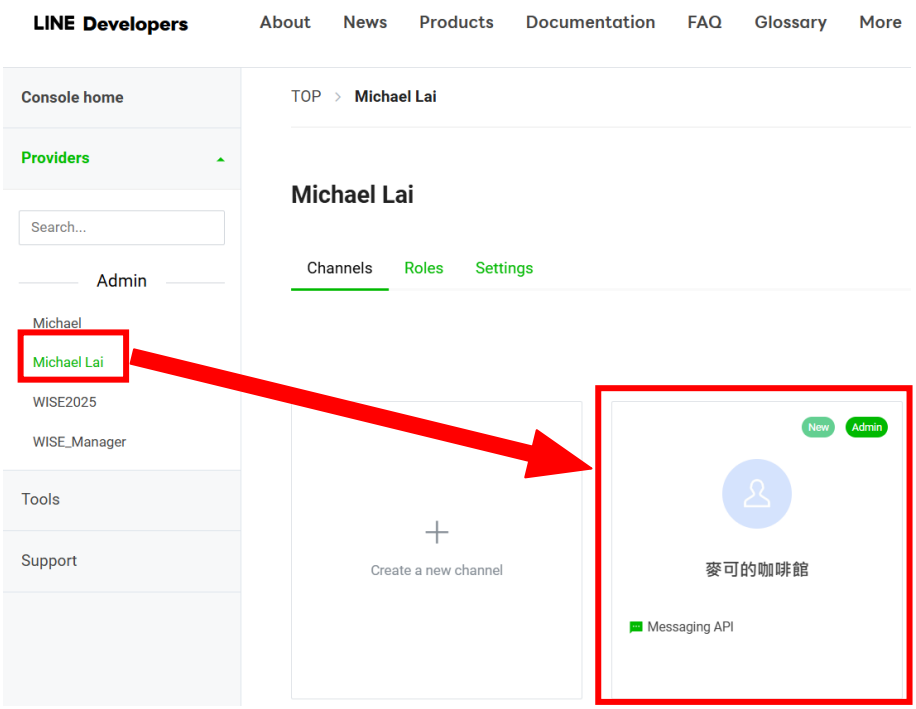


xii. Click “Console” to enter the configuration page.

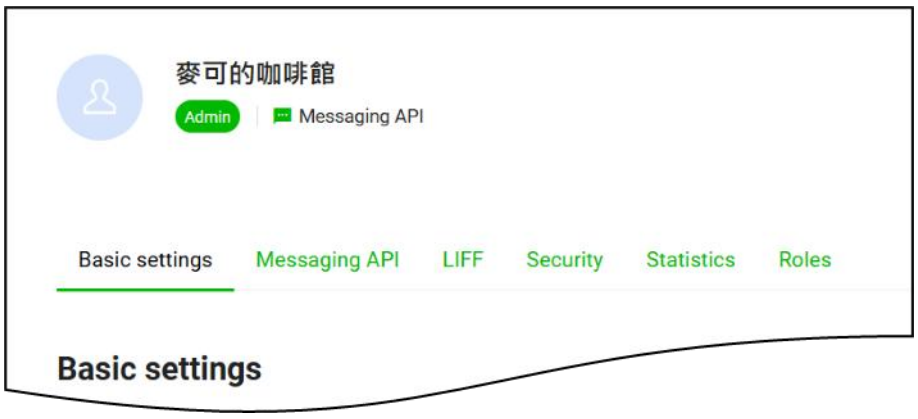


xiii. Select the service provider name you previously entered, find the official account you created, and click to access its settings page.

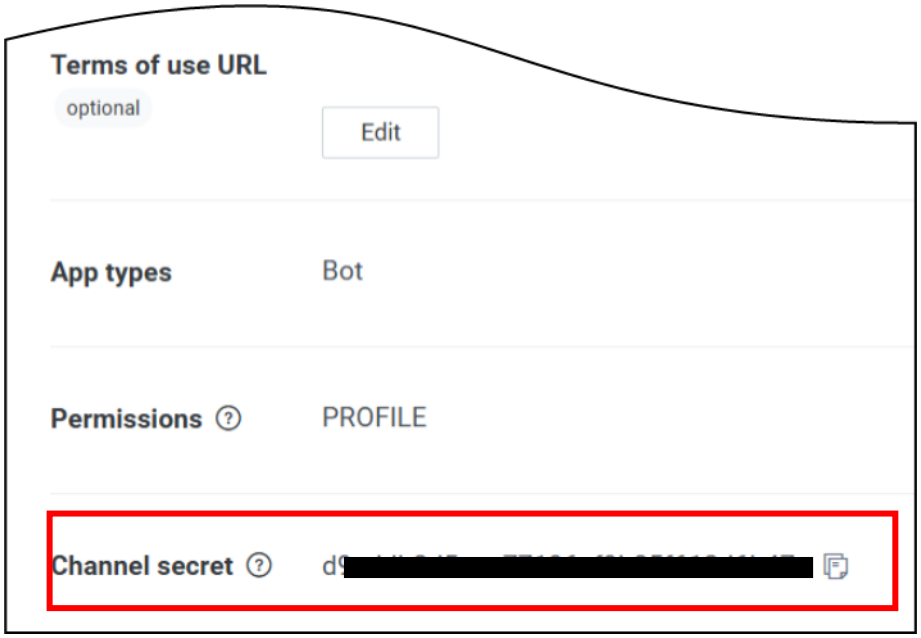
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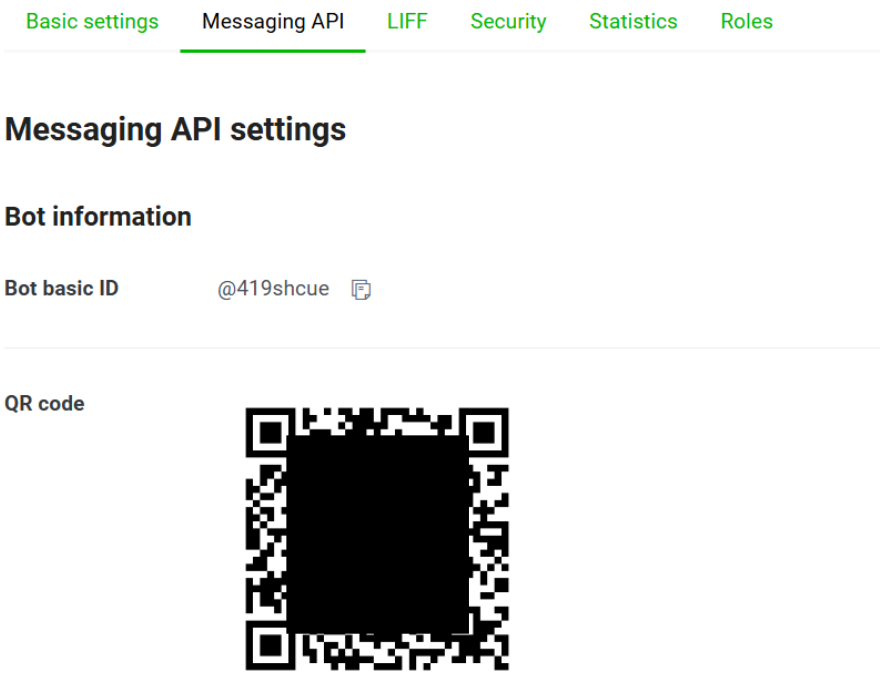
xiv. Go to the “Basic settings” page, find the “Channel secret” information below, this is a necessary parameter for PMC configuration.



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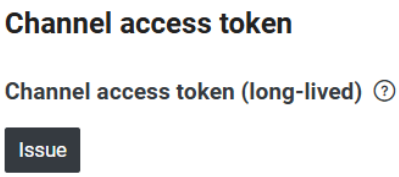


xv. Navigate to the “Messaging API” page, use the QR code on this page to add this official account as a friend and create a chat room.



xvi. At the bottom of the “Messaging API” page, find the “Channel access token” section, click the “Issue” button to generate a token and record it. This information is a required parameter for PMC configuration.

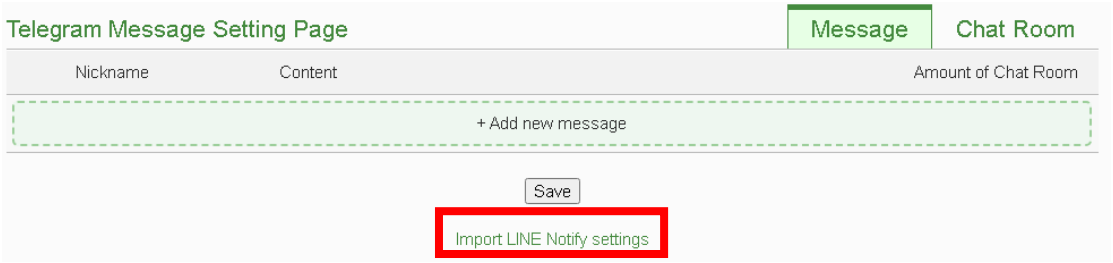
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xvii. After obtaining the “Channel secret” and “Channel access token”, you can complete the chat room settings on PMC. This concludes the setup for the LINE Official Account.

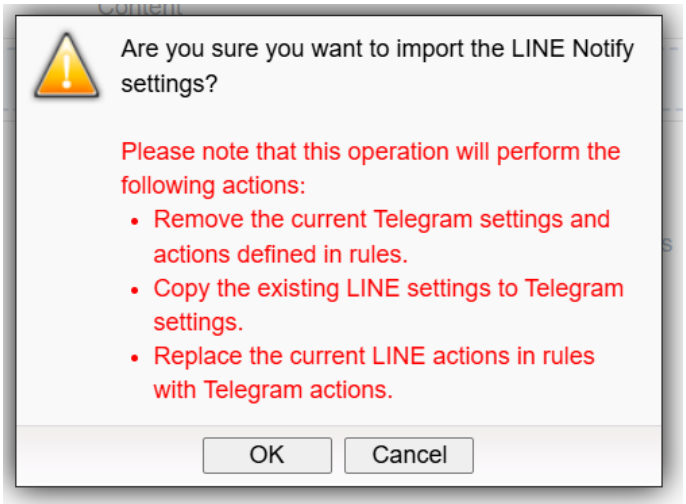
10.6 Telegram Setting

PMC/PMD provides Telegram message sending function. With this function, PMC/PMD can send the text messages to Telegram 1-on-1 or group chat rooms via Telegram Bot account. To send the Telegram message, users have to apply a Telegram Bot account first and add the bot account into a group chat room to be sent. The configuration page for Telegram message setting, chat room setting, and the application procedure of Telegram Bot account is shown as below.



At the bottom of the Telegram settings page, there is an option labeled “Import LINE Notify settings”. Clicking this option will copy LINE Notify messages and related settings into the Telegram configuration. The logical rules will also convert the action of sending LINE Notify messages into the action of sending Telegram messages. However, due to structural differences between Telegram chatrooms and LINE Notify chatrooms, users must manually replace the Telegram chatrooms.

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Note:

- After completing the import action, you still need to click "Save" to take effect.
- Do not click import repeatedly, as this may delete logical actions that have already been converted to LINE Messaging API.
- This import action can only be executed in either LINE Messaging API settings or Telegram settings, but not both.

10.6.1 Message Setting

In the Message setting page, users can edit the Telegram messages with pre-input strings and realtime data. The configuration page is shown as below:

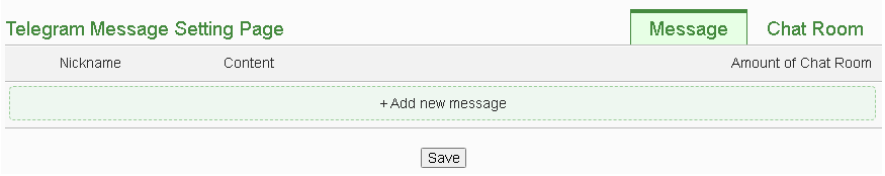


Figure10-38 : Telegram Message Setting page (1)

The settings steps are as below:

i. Make sure the “Message” Tab is selected.
ii. Click “Add new message”, the Telegram Message Setting page will appear as following:

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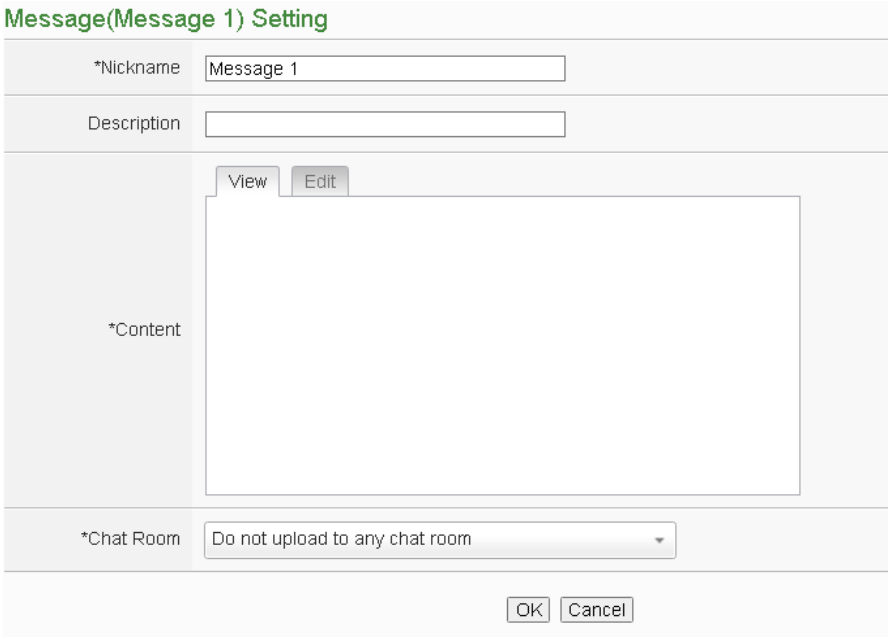
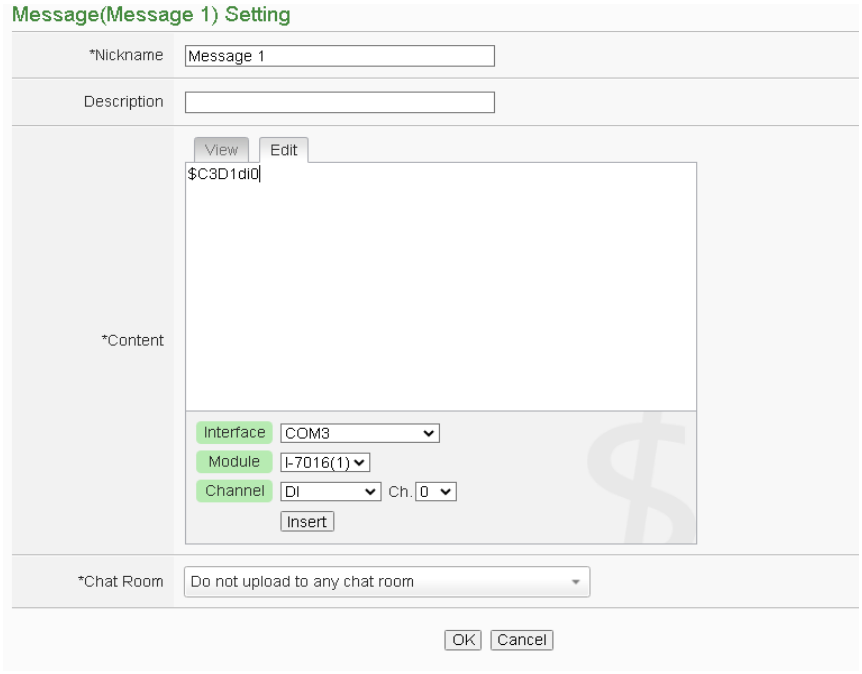


Figure10-39 : Telegram Message Setting page (2)

iii. Input name in the “Name” field and you could also input the description of this message in the “Description” field.

iv. Enter the message content in the “Content” field. Telegram message provides an encoded string for you to add power data, I/O channel data or Internal Register data into Telegram messages. To make it easy to add the encoded string, PMC/PMD provides “Real-time variable editor”. Please refer to “8.1 Data Logger Setting” for more detailed information of the “Real-time variable editor”.



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Figure10-40 : Telegram Message Setting page (3)

v. In the “Chat Room” field, please specify the Chat rooms which will receive the message PMC/PMD send. PMC/PMD can send the messages to multi-chat rooms simultaneously. Users have to entry a Bot Token and add new chat rooms before selecting the chat rooms to be sent. To apply a Telegram Bot account, please refer to the section “ Create Telegram Bot Account and Get the Token”. Users can directly click on the “Add new Chat Room” to connect with a new chat room, please refer to the section “10.6.2 Chat Room Setting”.

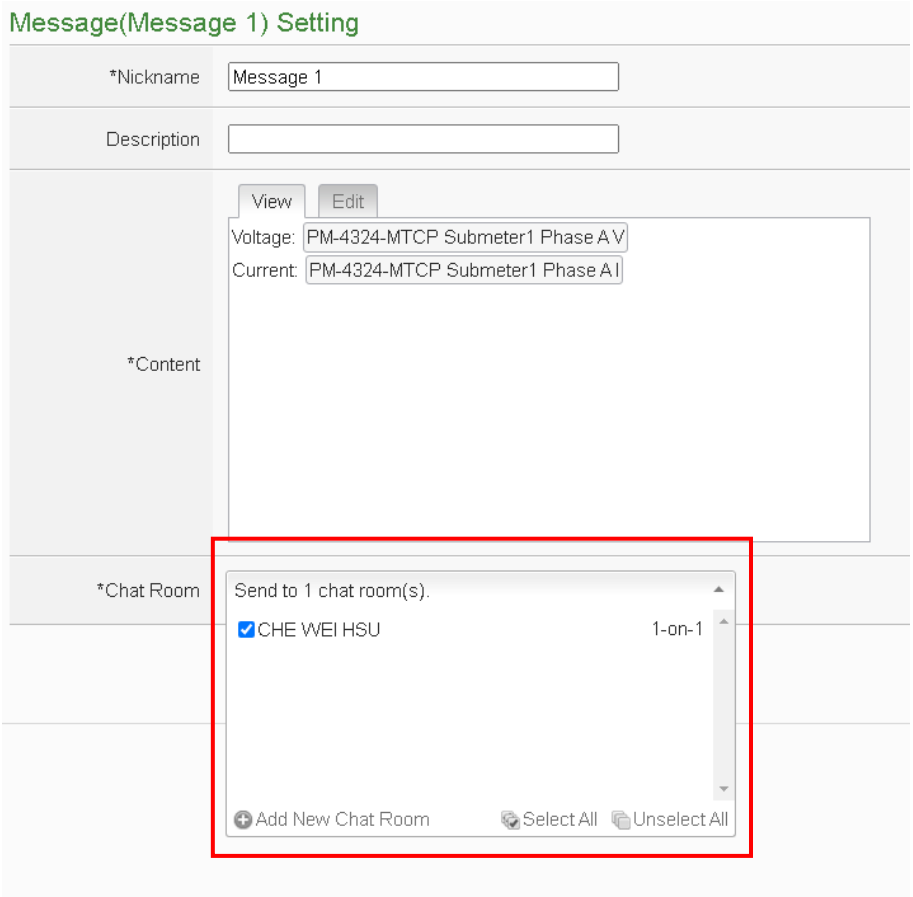


Figure10-41 : Telegram Message Setting page (4)

vi. After complete all settings, click the “OK” button to confirm the Telegram message setting, and return to the Message Setting page.

vii. Repeat steps ii~vi to complete settings of all Telegram messages.

viii. After you finish all the Telegram Message settings, click “Save” button to save the settings.

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10.6.2 Chat Room Setting

PMC/PMD send messages to the Telegram chat rooms. Users can add or manage chat rooms via the Chat Room setting page. The setting interface is as below:

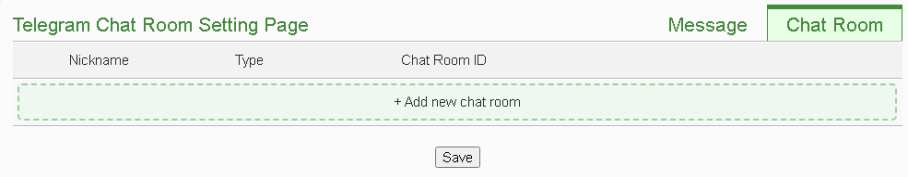


Figure10-42 : Telegram Chat Room Setting page (1)

The settings steps are as below:

i. Click “Add new chat room”, in the “Bot Token” field, key in the token of the Telegram Bot account. Please refer to the section “Create Telegram Bot Account and Get the Token” to get the token.

ii. Before add the Telgram chat rooms to PMC/PMD, You have to interact with the chat rooms by Telegram app. To interact with 1-on-1 chat room, you have to send messages to the Bot account. To interact with a Group chat room, you have to add the Bot account into the group chat room. Users must complete the interactions with Telegram app via cell phone or PC, and add the chat rooms on PMC/PMD within 24 hours. Otherwise, you need to interact with the chat rooms again for adding then into PMC/PMD.

iii. Click the “Next” button, the chat rooms that have been interacted within 24 hours would be shown on the list. To add the chat rooms, click on the checkbox in fornt of the chat rooms and press “OK” button.

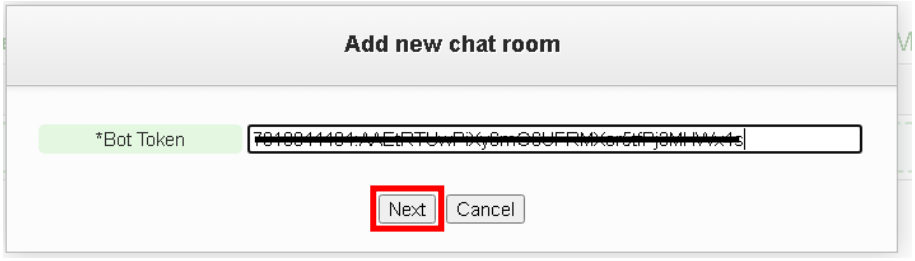


Figure10-43 : Telegram Chat Room Setting page (2)

iv. After the adding procedure is complete, the new chat room will appear in the list, and it can be selected in the message setting page..

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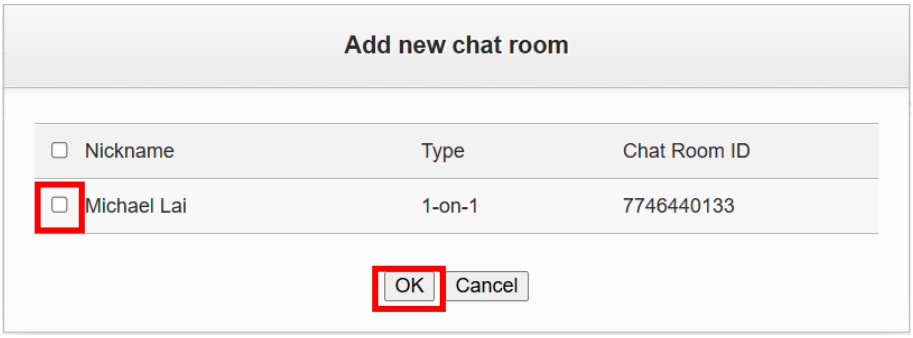


Figure10-44 : Telegram Chat Room Setting page (3)

v. After the adding procedure is complete, the new chat room will appear in the list, and it can be selected in the message setting page.

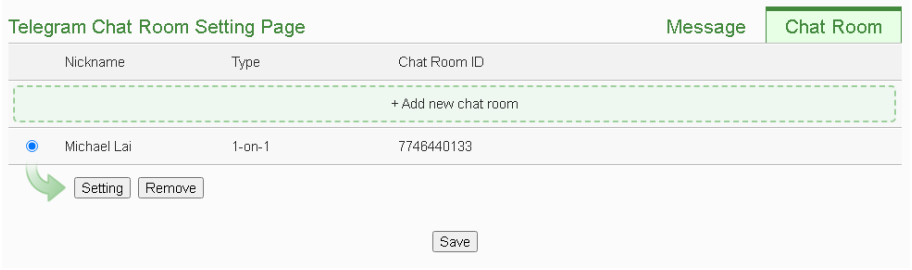


Figure10-45 : Telegram Chat Room Setting page (4)

vi. Select a chat room and click the “Setting” button to enter the setting page of the chat room. Users can make a brief description of this chat room, and click “Testing” button to send a testing message to this chat room.

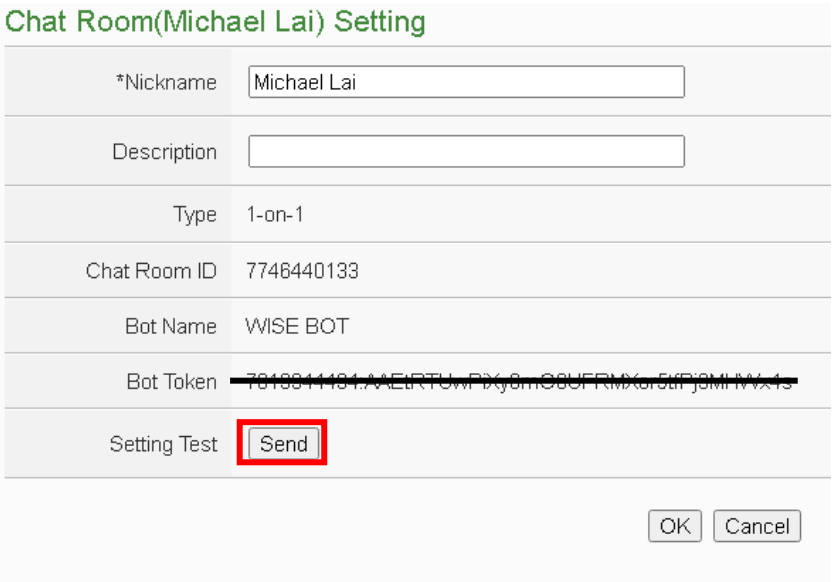


Figure10-46 : Telegram Chat Room Test Function

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vii. After you finish all the Telegram Chat Room settings, click “Save” button to save the settings.

- Create Telegram Bot Account and Get the Token
  - Connect to Telegram Web Version and login via Browser. And open Telegram BotFather official webpage, click on “OPEN IN WEB” button to enter the dialog window with BotFather account.



Figure10-47 : Create Telegram Bot Account(1)

  - In the message field, key in the message “/newbot” to create a Bot account, and then input the “Name” and “Username” for the Bot account. The “Username” must be end with the “bot” string. After the Bot is created, click the Bot account link in the following message to enter the dialog window of the Bot account. Click on the Token to copy it, and then paste it on the PMC/PMD Chat Room Setting Page.

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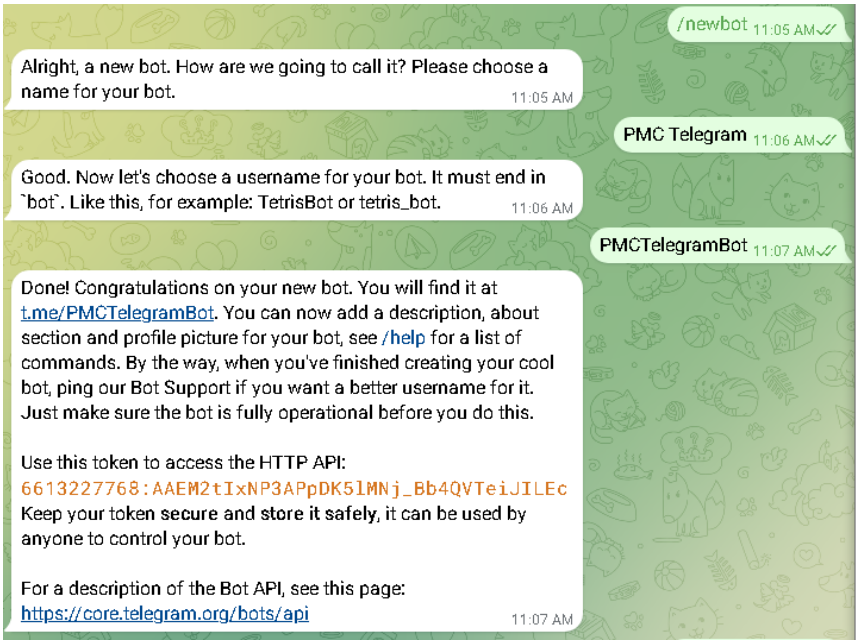
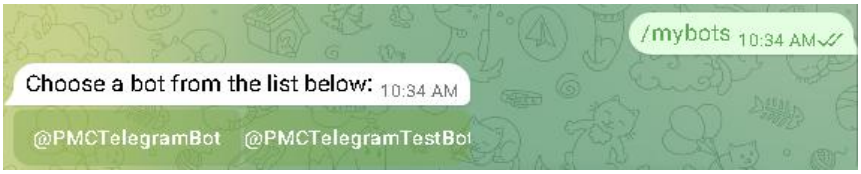
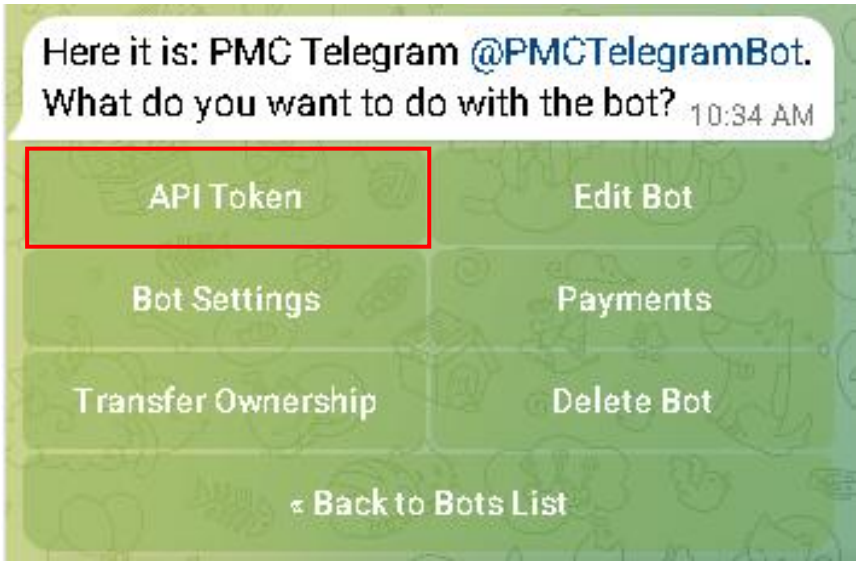


Figure10-48 : Create Telegram Bot Account(2)

- If you had created a bot, key in "/mybots" in the message field, and select the Username of the Bot account, and then click the "API Token" button. Click the Bot account link in the following message to enter the dialog window of the Bot account. Click on the Token to copy it, and then paste it on the PMC/PMD Chat Room Setting Page.





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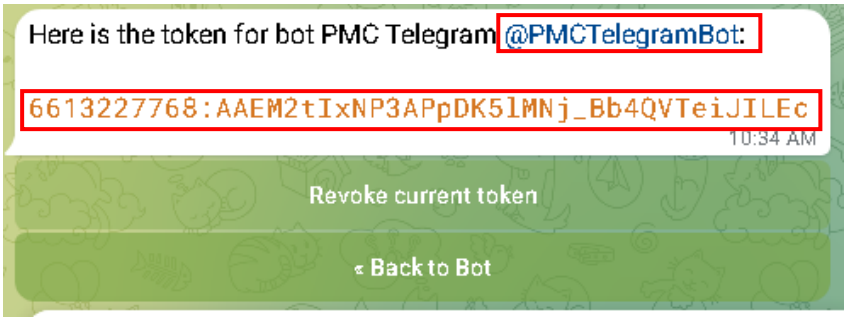


Figure10-49 : Get the Token of Telegram Bot Account

Please Note:

- Telegram Bot account can send message numbers in every chat room: 20 per minute.
- PMC/PMD would not calculate the number of messages sent. The message sending operation would be fail if the number of message sent is over the limitation.
- If you copy the PMC/PMD rule file from one PMC/PMD to another, they would share the quota of messages. You can create new Telegram Bot accounts to avoid this problem.
- PMC/PMD can only send Text message.
- To perform the chat room setting, please confirm that the PMC/PMD is connected with internet. The setting could only be done by connecting with Telegram server.

10.7 Timer Setting

PMC/PMD provides “Timer” for timing functions. The Timer status can be “Not Timeout” or “Timeout”. They can be included in the IF Condition statements. The Timer Action can be “Start” or “Reset”. The Start Action will start to run the Timer and if the Start Action is triggered one more time when the Timer is running, the Timer will restart again. The Reset action will reset the Timer and stop running the Timer. The Timer will be in “Timeout” status only when the Timer is running and reached the setting time, otherwise, the status of Timer will remain in “Not Timeout”.

Follow the following steps：

i Input the nickname of the timer in the “Nickname” field.

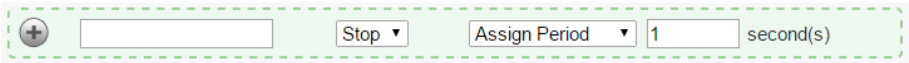
ii Specify the initial status of the timer from the dropdown list of the “Initial Status” field. The “Initial Status” could be “Stop” or “Start”

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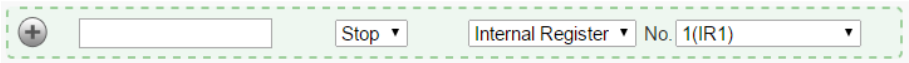
status.

iii Specify the period interval in units of seconds. There are two modes to setup the period interval:

- Assign Period : Input the period interval in units of seconds manually。



- Internal Register：Assign the period interval as the value of selected internal register.



Please note: The user must setup internal register before using internal register as timer period. Please refer to ch 10.8 Internal Register Setting to setup internal register.

iv Click  button to create a new Timer.

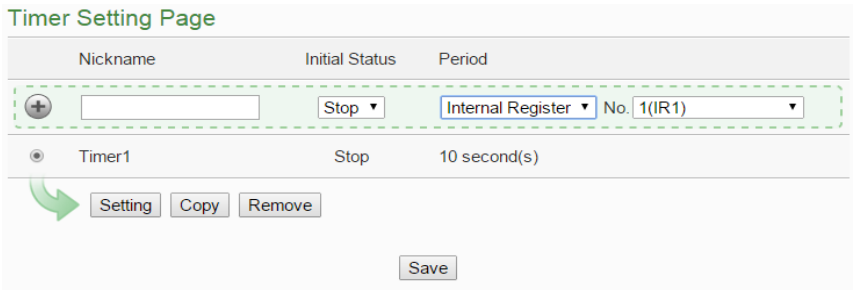


Figure10-50 : Timer creating Page

v Repeat steps i~iv to complete settings of all Timer.

vi To modify the settings of a pre-set timer, please click on the radio button in front of the timer, and then click on “Setting” to modify the settings. The setting user interface is as following:

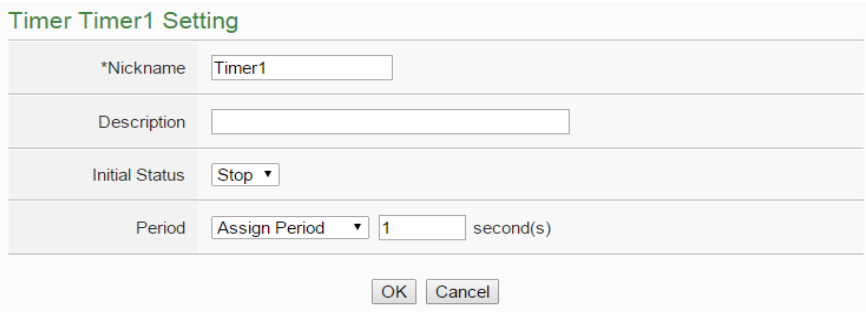


Figure10-51 : Timer setting Page(Assign Period)

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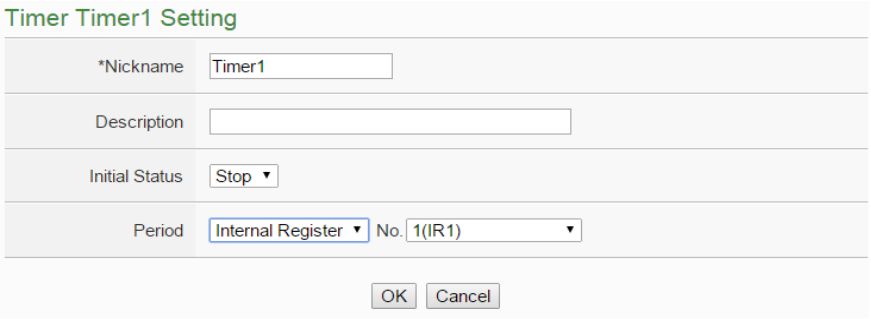


Figure10-52 : Timer setting page(Internal Register)

vii To copy the settings of a pre-set Timer to the new Timer, please click the radio button in front of the pre-set Timer and then click “Copy”, a new Timer (in sequence) will be added to the list and the settings of the old Timer will be copied to this newly added Timer.

viii To remove a pre-set Timer, please click the radio button in front of the pre-set Timer and then click “Remove”.

ix After all timer settings are completed, click “Save” button to save the changes.

10.8 Schedule Setting

PMC/PMD provides Schedules to setup prescheduled routine tasks. The setting of Schedule can be used to check if the system time of the PMC is in the range of date/time setting of the schedule or not. The checking status can be included in the IF Condition statements. Schedule setting page is shown as below:

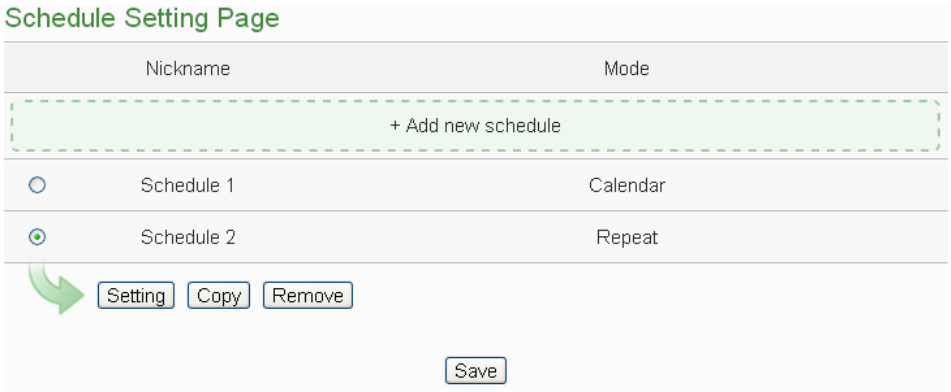


Figure10-53 : Schedule setting page

The settings steps are as below:

i Click on “Add new schedule” to add a new schedule.

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ii After clicking the “Add new schedule”, a setting page will appear, input name in the “Name” field and you could also input the description of this schedule in the “Description” field.

iii Select Mode to be “Calendar” or “Repeat”.

- Calendar：

(a.) In the “Date” field, select the “Starting Month” and “Duration” from the dropdown list. The maximum duration can be set is 120 months. After you specify the Year and Month in the Date section, the calendars corresponding to the Year and Month you specified will appear as shown below:

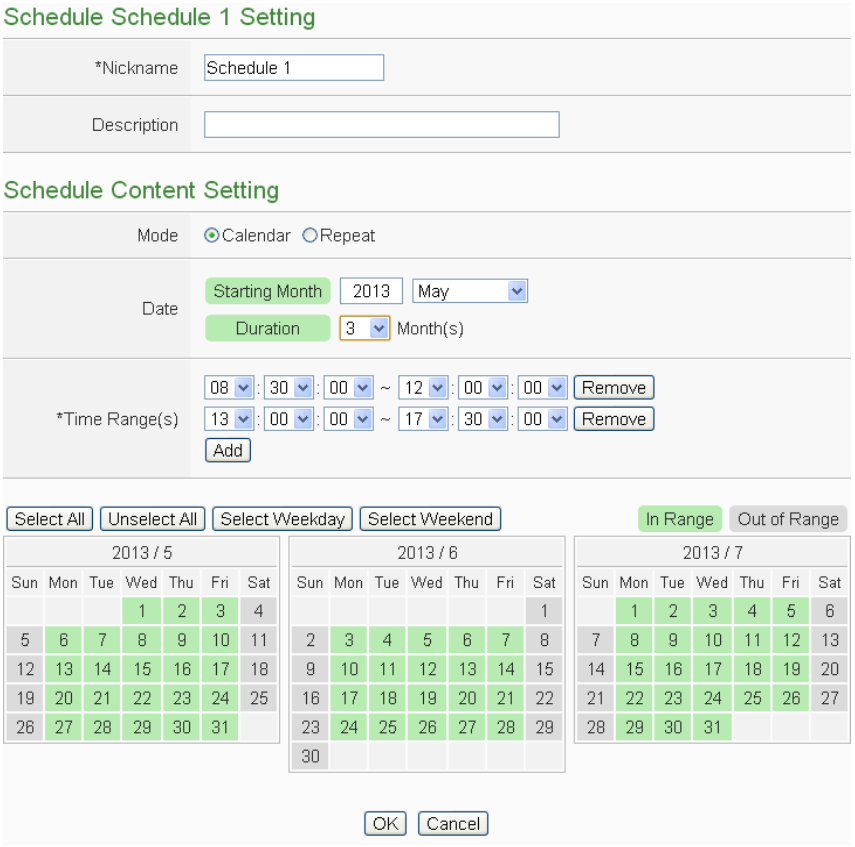


Figure10-54 : Calendar mode of Schedule setting

(b.) In the “Time Range(s)” section, click “Add” to add new Time Range to execute this schedule. Select the start time and the end time from the dropdown list. Each Schedule is required to set at least one Time Range; click on “Add” to add more Time Range. Please note: the time zones you specified can’t be overlapped. If you specify an end time that is earlier than the start time, such as 20:00:00 ~ 06:00:00, it indicates the end time will be set one day after the start date. Click “Remove” to remove a pre-set

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Time Range.

(c.) On the calendars, click to toggle highlight on the dates you'd like to execute or not execute the operations for this Schedule. If the date shows a light green background, it indicates the date is "In Range" of the schedule, that is, that date falls into the range that will execute the operations. On the contrary, if the date shows a light grey background, it indicates that date is "Out of Range" of the schedule, that is, that date falls out of the range and will not execute the operations. By default, all dates will be "In Range", that is, during the date range you select, the operation will be executed every day. "Select All" button is used to set all dates to be "In Range"; whereas "Unselect All" button is for marking all dates to be "Out of Range". The Weekday button is for you to select all Mondays to Fridays to be "In Range", and Saturdays and Sundays to be "Out of Range", that is, the operations will be executed during weekdays only. On the contrary, the Weekend button is for you to set all Saturdays and Sundays to be "In Range", and all Mondays to Fridays to be "Out of Range", that is, the operations will be executed during weekends only.

- Repeat：

(a.) In the "Day(s) of week" section, click on the day(s) in a week that is going to execute the schedule; shown as below:

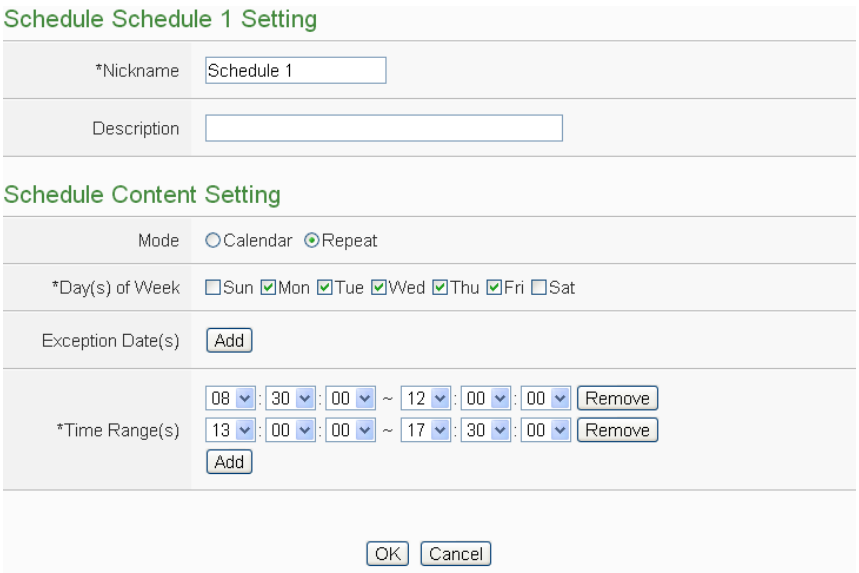


Figure10-55 : Repeat mode of Schedule setting

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(b.) In the “Exception Date(s)” selection, click on “Add” to add the date(s) that is/are not going to execute the schedule. Click “Remove” to remove a pre-set Exception Date.

(c.) In the “Time Range(s)” section, click “Add” to add new Time Range to execute this schedule. Select the start time and the end time from the dropdown list. Each Schedule is required to set at least one Time Range; click on “Add” to add more Time Range. Please note: the time zones you specified can’t be overlapped. If you specify an end time that is earlier than the start time, such as 20:00:00 ~ 06:00:00, it indicates the end time will be set one day after the start date. Click “Remove” to remove a pre-set Time Range.

iv Click on “OK” to confirm the setting and leave the setting page.

v Repeat steps i~iv to complete settings of all Schedule.

vi To modify the settings of a pre-set Schedule, please click on the radio button in front of the Schedule, and then click on “Setting” to modify the settings.

vii To copy the settings of a pre-set Schedule to the new Schedule, please click the radio button in front of the pre-set Schedule and then click “Copy”, a new Schedule (in sequence) will be added to the list and the settings of the old Schedule will be copied to this newly added Schedule.

viii To remove a pre-set Schedule, please click the radio button in front of the pre-set Schedule and then click “Remove”.

ix After all schedule settings are completed, click “Save” button to save the changes.

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10.9 PUE Setting

PMC/PMD provides 10 PUEs; The configuration is shown as below:

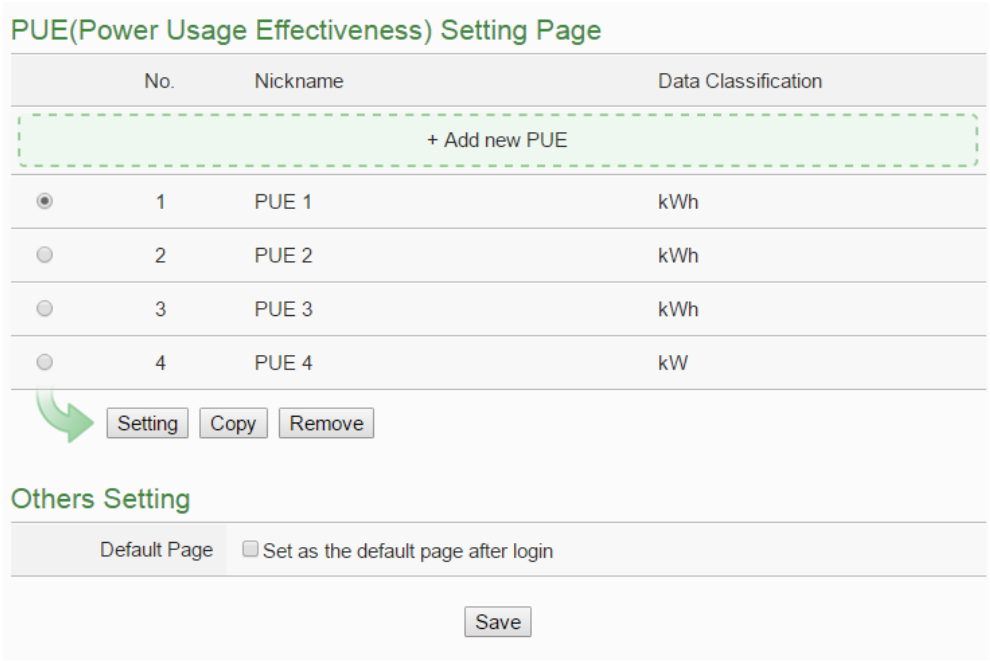


Figure10-56 : PUE Setting Page(1)

The settings steps are as below:

i Click on "Add new PUE" to add a new PUE option.

ii After clicking the “Add new PUE”, a setting page will appear, select the number of the PUE from the dropdown list, input name in the “Name” field and you could also input the description of this PUE in the “Description” field.

iii Setup the calculation expressions of the "Total Facility Energy", and users can click "add" button to modify the expressions.

iv Setup the calculation expressions of the "IT Equipment Energy", and users can click "add" button to modify the expressions

v Select the "Data Classification" of the PUE.

vi Setup the minimum and maximum display value of the chart on the main page.

vii Setup the marker display name and value of the chart on the main page. (This will affect color of the chart. If you do not enable, it to calculate the color change of the chart based on the minimum and maximum values.)

viii Setup the PUE value format on the main page.

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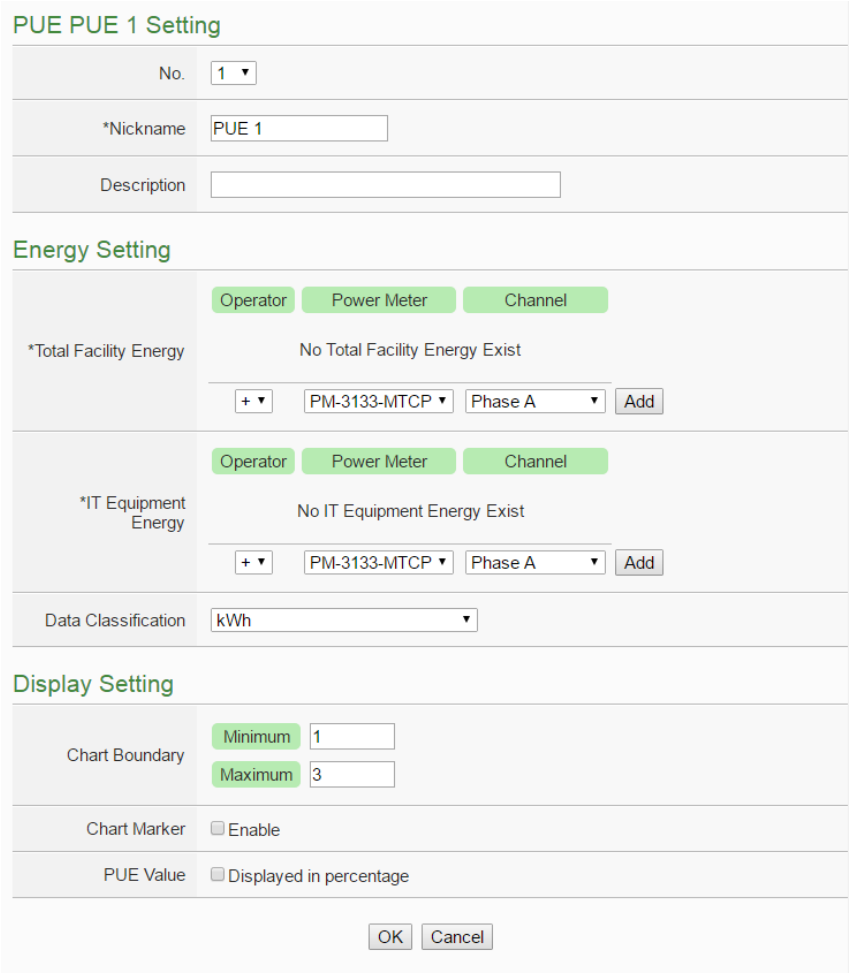


Figure10-57 : PUE Setting Page(2)

ix Click on “OK” to confirm the setting and leave the setting page.

x Repeat steps i~ix to complete settings of all PUE setting.

xi To modify the settings of a pre-set PUE, please click on the radio button in front of the PUE, and then click on “Setting” to modify the settings.

xii To copy the settings of a pre-set PUE to the new PUE, please click the radio button in front of the pre-set PUE and then click “Copy”, a new PUE (in sequence) will be added to the list and the settings of the old PUE will be copied to this newly added PUE.

xiii To remove a pre-set PUE, please click the radio button in front of the pre-set PUE and then click “Remove”.

xiv After all PUE settings are completed, click “Save” button to save the changes.

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10.10 Internal Register Setting

PMC/PMD provides 70 Internal Registers; the Internal Registers of No.51 to No.70 provide the "Retain Variable" mechanism. It means that the data inside these Internal Registers will be retained even the PMC/PMD is in Power Off status.

The Internal Register can be used to hold temporary variables and the data can be read/written on the Registers via Modbus command. The data on the registers can also be read and evaluated in IF Condition and be written after performing a THEN/ELSE Action.

In additional, PMC/PMD supports math formula editing function with the firmware v3.3.0 (or later version) for the Internal Registers. Users can edit different formula in each Internal Register by assing the power data or I/O channels data as the variables, and using the operators as plus"+", minus"-", times"*", divide"/", superscript"^", left parenthesis"(" and right parenthesis")". PMC/PMD will calculate the results of all formulas repeatedly, and save the results into the corresponding Internal Registers for logic rule operation or data logging

The configuration page of Internal Register is shown as follow.

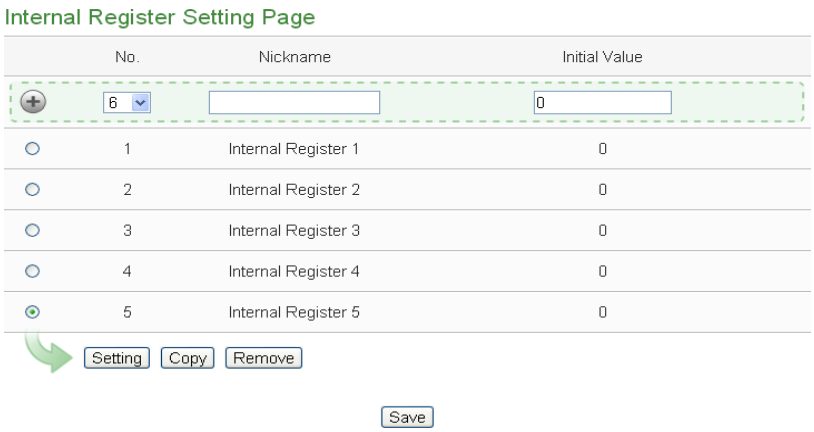


Figure10-58 : Internal Register setting page(1)

The settings steps are as below:

i Select the number of the Internal Register from the dropdown list, input "Name" and "Initial Value" and then click to add new Internal

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Register.

Please Note: there are up to 70 Internal Register can be enabled, if the name of the register is not inputted, the name will be automatically set as “Internal Register#”(#is the number of the register), the default initial value will be set as 0.

ii To modify the settings of a pre-set internal register, please click on the radio button in front of the register, and then click on “Setting” to modify the settings. If user want to edit the formula for Internal Register, please check “Enable” in the “Function Status” field of the "Formula Setting" section.

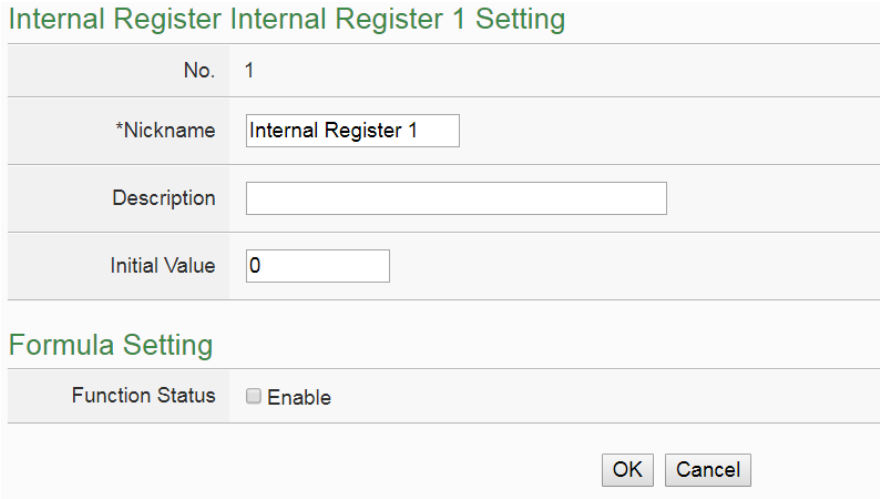


Figure10-59 : Internal Register setting page(2)

iii Edit math formula in the “Formula” field. Users can select the “Interface”, “Module” and “Channel” from the dropdown list and click “Insert” to add a channel value encoded string into the formula, and use the operators as “+”, “-”, “*”, “/”, “^”, “(” and “)” to edit the formula. For example, if user edit a formula as below:
$C3M1m10 + $C3M2m10 +$C3M4m138

In the “View” tab, it would be displayed in the real index format of the power data and I/O channel as below. User can click the “Test” button to check the result of the formula.

PM-3112 CT1 Daily Accumulated Electricity +
PM-3114 CT1 Daily Accumulated Electricity +
PM-4324 Submeter3 CT7 Daily Accumulated Electricity

Please note:

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1. Do not modify the channel value encoded string when you are editing the formula. It may cause failures when PMC/PMD reads the power data or I/O channel value.
2. Before you click the “Test” button, please confirm that the power meter and I/O module setting is saved to PMC/PMD if you use the power data or I/O channels in the formula. Otherwise, the test result would be error because the power meter or I/O module is not found.

iv Click on “OK” to confirm the setting and leave the setting page.

v Repeat steps i~iv to complete settings of all Internal Register setting.

vi To modify the settings of a pre-set Internal Register, please click on the radio button in front of the Internal Register, and then click on “Setting” to modify the settings.

vii To copy the settings of a pre-set internal register to the new internal register, please click the radio button in front of the pre-set internal register and then click “Copy”, a new internal register(in sequence) will be added to the list and the settings of the old internal register will be copied to this newly added internal register.

viii To remove a pre-set internal register, please click the radio button in front of the pre-set internal register and then click “Remove”.

ix After you finish all the Internal Registers selections and settings, click “Save” button to save the settings.

10.11 Ping Setting

PMC/PMD provides the Ping function to detect the connection status between the PMC/PMD controller and specified Ethernet devices. The results of Ping function can be used as IF conditions. The settings steps are as below:

i Click on “Add new Ping” to add a new Ping target.

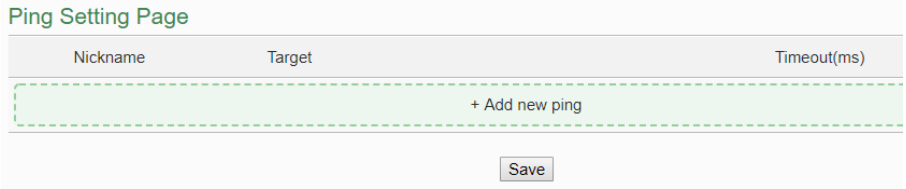


Figure10-60 : Ping List Page

ii After clicking the “Add new Ping”, a setting page will appear, input a

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name in the “Nickname” field and you could also input the description of this Ping in the “Description” field; shown as below:

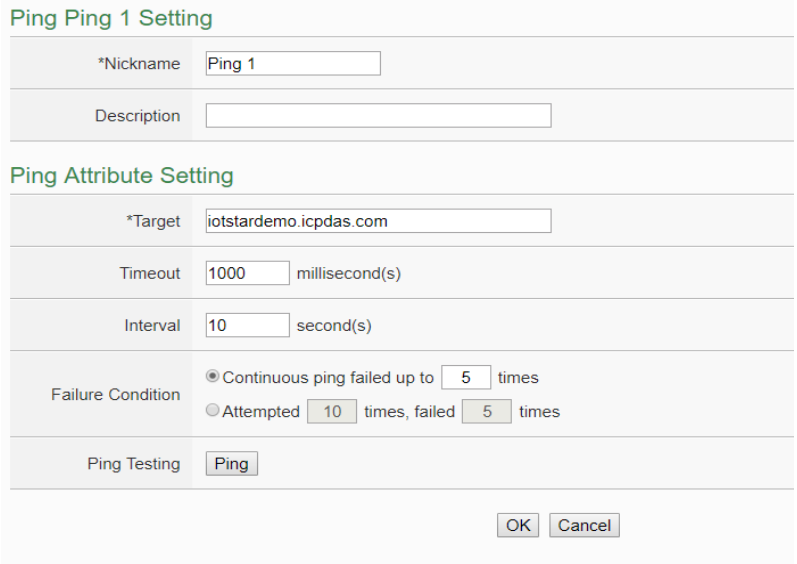


Figure10-61 : Ping List Page

iii In the “Target” field, enter the IP or the domain name of the target to be pinged.

iv In the “Timeout” field, enter the timeout value of the Ping function for waiting the response. The unit will be millisecond (ms).

v In the “Interval” field, set the time interval to specify how often the PMC/PMD will automatically ping the target. The unit will be second (sec).

vi In the “Failure Condition” field, select the judgment method to check the Ping IF condition. If you select “Continuous ping failed up to X times”, you can set the continuous failed times with a number between 1 to 60. The Ping status would become failure when the ping action failed continuously and the failed number exceeds the number you set. If you select “Attempted X times, failed Y times”, PMC/PMD would check the latest X ping results, if the failed number exceeds the number Y, the Ping status would become failure.

vii User can click the “Ping” button in the “Ping Testing” field to test the Ping status between the PMC/PMD controller and the target.

viii Click on “OK” to confirm the setting and return to the Ping list page

ix Repeat steps ii~ vi to complete settings of all Pings.

x After you finish all the Ping settings, click “Save” button to save the settings.

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11 Rules Setting

After finishing all Advanced Setting configurations, you can start to edit IF-THEN-ELSE rules. Click the “Rules Setting” button, a list of rules will be displayed on the left side of the page, and at the right side of the page will show detailed content of each rule that was previously defined. The rule setting page is shown as below:

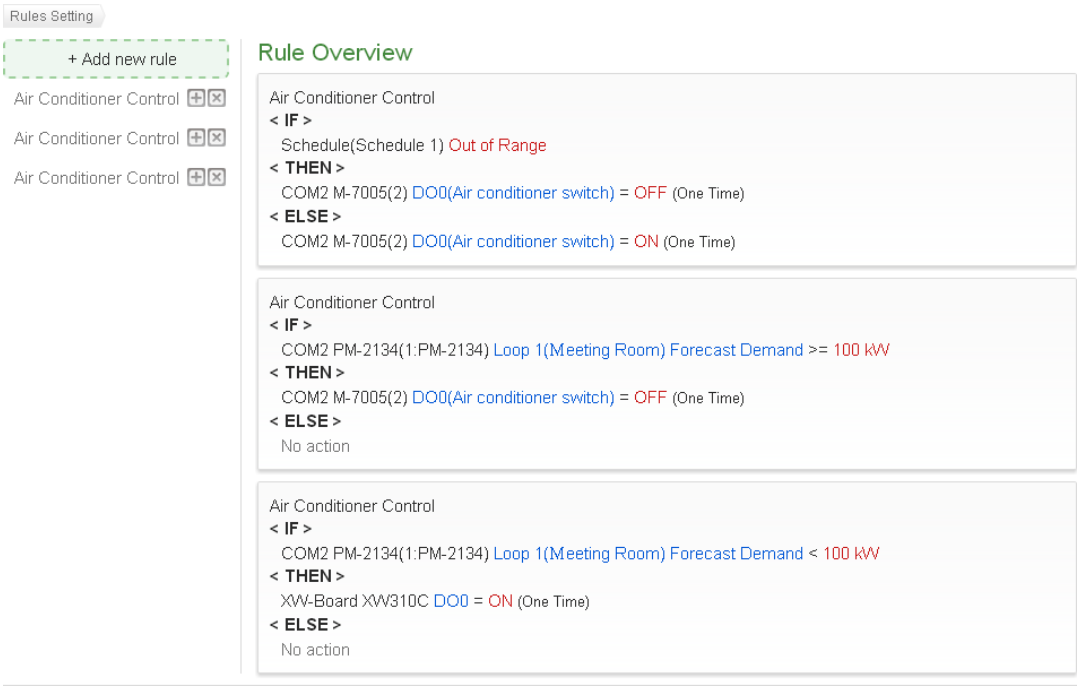


Figure11-1 : Rules overview page

In addition to the list of the rules, Rule Management interface will also be shown on the left side of the page. Detailed description is as below:

- **Add new rule**：To add a new rule, please click “Add new rule”.
- **Copy**：To copy the settings of an old rule to the new rule, please click on the button on the right side of the old rule, a new rule will be added to the list and the settings of the old rule will be copied to this newly added rule.
- **Remove**：To remove a pre-set rule, please click on the button on the right side of the pre-set rule.
- **Arrange the order**：Right click on the pre-set rule and drag them up or down to arrange the rules into the proper order.

Click “Add new rule” to get into the “Rule Information Setting” page for logic rule edition (shown as below).

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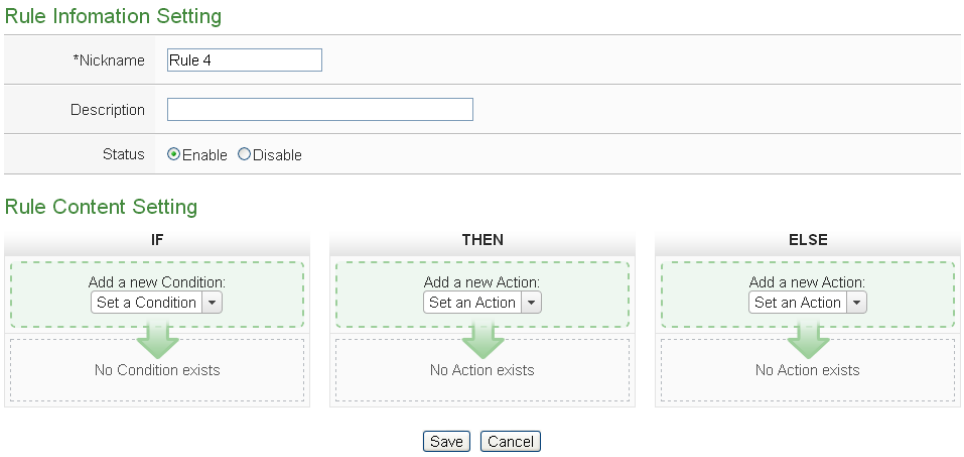


Figure11-2 : Rules setting page

- **Nickname**: Input name in the "Nickname" field and you could also input the description of this Rule in the "**Description**" field.
- **Status**: Select "Enable" or "Disable". If you select "Enable", the rule will be executed after being downloaded. If you select "Disable" the rule will only be stored temporarily and will not be executed after being downloaded.
- **IF Condition Setting**: More detailed information, please refer to 11.1 IF Condition.
- **THEN/ELSE Action Setting**: More detailed information, please refer to 11.2 THEN/ELSE Action.
- **Save**: After finish all IF Condition and THEN/ELSE Action setting, click on "Save" to save the settings.
  Please note: if you make modification in Power meter setting, IO module setting or in Advanced Setting after finish defining the rules, it might cause unexpected error due to the changes, some variables may no longer exist. Therefore, in case you make any modification, please double check your settings and Rules definition to make sure no errors are present.

When user finish settings of an IF Condition or THEN/ELSE Action, after going back to the Rule Information Setting page, a function component will be displayed under the IF Condition or THEN/ELSE Action section(shown as below), the function component will display the settings information of the IF-THEN-ELSE logic rule.



The function component (IF Condition, THEN Action or ELSE Action) provides various functions such as:

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- **Setting**: to edit a pre-set function component, click on  to get in to the setting page of the function component.
- **Copy**: to copy a pre-set function component, click on  to generate a new component with the same pre-set component settings. The new function component will be listed under the pre-set component.
- **Remove**: to remove a pre-set function component, click on  to remove the component.
- **Arrange order**: the order of the function component might result in different outcomes of IF-THEN- ELSE rule execution, therefore, user could click on and drag the component to arrange the components into appropriate order.

The following section will give more detailed information of IF Condition and THEN/ELSE Action settings.

11.1 IF Condition Setting

To add an IF Condition, please select and set the Condition from the dropdown list in the “Add a new Condition” field under the IF Condition setting section.

IF Condition provides the following Condition setting options:

- ICP DAS Module
- Modbus Module
- Power Meter
- Microsoft Azure
- IBM Bluemix
- MQTT
- Connection Status
- Timer
- Schedule
- Mobile Network Signal Strength
- FTP Upload Status
- SD Card Status
- Rule Status
- Internal Register
- PUE
- Ping

If the PMC/PMD is connected to ICP DAS XV-Board/M-7000/DL/IR

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modules, ICP DAS power meters or Modbus TCP/RTU modules, the setting options for I/O channel information (AI, DI, Discrete Input, Coil Output, Input Register and Holding Register) or power data on these modules will be automatically displayed on the dropdown list.

To include subjects other than modules mentioned above in the IF Condition statement; they have to be pre-defined in Advanced Setting first. The setting options of the subjects that already being defined in Advanced Setting will appear on the dropdown list of IF Condition. Select the Condition option from the dropdown list in the "Add a new Condition" field under the IF Condition setting section, a window will pop up for you to edit detailed information. The setting options of IF Condition are as follow:

11.1.1 ICP DAS Module

Click on ICP DAS Module (XV-Board/M-7000/DL), 3 options will appear as the following: DI, DI Counter, and AI.

11.1.1.1 DI

DI channel value from XV-Board/M-7000 module can be used as evaluation criteria for IF condition statement; the setting page for DI Condition Setting is shown as below :

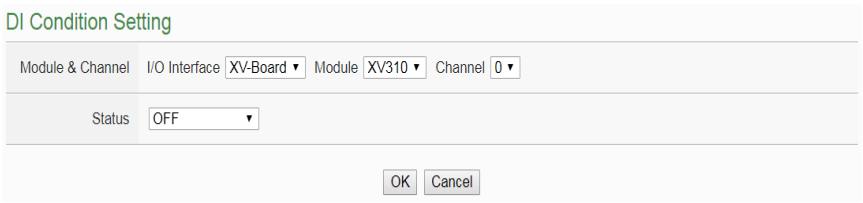


Figure11-3 : DI condition setting page

Follow the steps below:

i Specify the module and channel from the dropdown list of the "Module & Channel" section that you are going to include its value in the IF condition statements.

ii Define the evaluation criteria of the status in IF statement to be "OFF", "ON", "ON to OFF", "OFF to ON" or "Change". Once the DI channel value matches the evaluation criteria, the result of this condition evaluation will be "true". Please note: If the statement involves state transitions: "ON to OFF", "OFF to ON" and "Change", the action will be executed only once and

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only at the moment when the state transition occurs.

iii Click “OK” button to confirm the settings and return to the Rule settings page.

11.1.1.2 DI Counter

DI counter value from XV-Board/M-7000 module can be used as evaluation criteria for IF condition statement; the editing page for DI Counter Condition Setting is shown as follow:

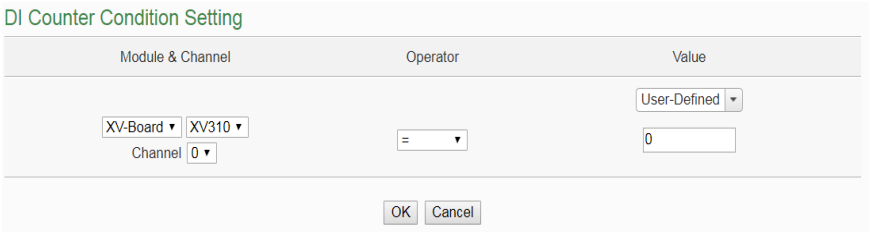


Figure11-4 : DI Counter condition setting page

Follow the steps below:

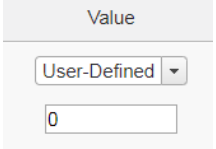
i Specify the module and channel from the dropdown list of the “Module & Channel” section that you are going to include its value in the IF condition statements.

ii Set up the expression statement for this counter value. Select an operator from “=”,”>”,”<”,”>=”,“<=” or “Change”.

iii And then specify the evaluation value. If this DI Counter value match the evaluation criteria, the result of this condition evaluation will be “true”. If the operator is “Change”, there is no need to set the comparison value; the condition will be “true” when there is a change to the counter value. The action will be executed only once and only at the moment when DI Counter experience a change.

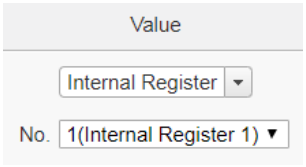
iv PMC/PMD provides the following 12 values options; you can compare them with the DI Counter value for condition evaluation:

- User-Defined: The “User-Defined” value could be used as evaluation criteria; input the “User-Defined” value under the “Value” field.

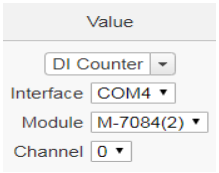


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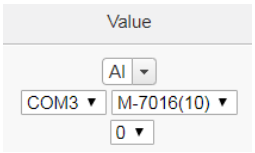
- Internal Register: The “Internal Register” value could be used as evaluation criteria; select the number of the Internal Register from the dropdown list.



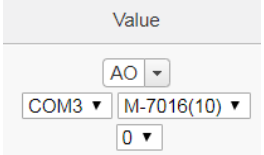
- DI Counter: The DI channel counter value from other ICP DAS modules(such as: XV-Board/M-7000) could be used as evaluation criteria; select the module and the channel from the dropdown list to specify which channel value will be used.



- AI channel: The AI channel value from other ICP DAS modules(such as: XV-Board/M-7000/DL) could be used as evaluation criteria; select the module and channel from the dropdown list to specify which channel value will be used.

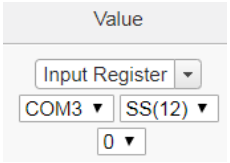


- AO channel: The AO channel value from other ICP DAS modules(such as: XV-Board/M-7000) could be used as evaluation criteria; select the module and channel from the dropdown list to specify which channel value will be used.

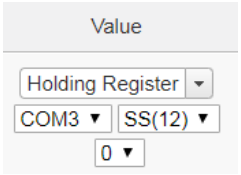


- Input Register: The Input Register value from other Modbus RTU/TCP Slave modules could be used as evaluation criteria; select the module and channel from the dropdown list to specify which channel value will be used.

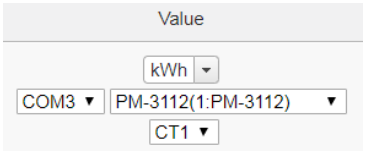
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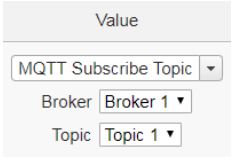
- Holding Register: The Holding Register value from other Modbus RTU/TCP Slave modules could be used as evaluation criteria; select the module and channel from the dropdown list to specify which channel value will be used.



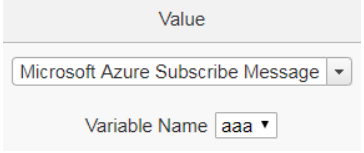
- Power Meter: The power data of the Power Meter could be used as evaluation criteria; select the type of power data from the dropdown list first (It provide as "Basic Values", "Statistical Values" and "Others Information" for selection). And then select module and channel from the dropdown list to specify which power meter and loop(or phase) value will be used.



- MQTT: The value of the MQTT subscribe topic could be used as evaluation criteria; select the broker and the subscribe topic from the dropdown list to specify which topic will be used.

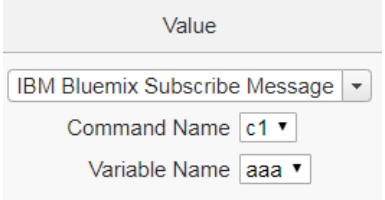


- Azure: The value of the Azure received paremeter could be used as evaluation criteria; select the variable name from the dropdown list to specify which variable will be used.



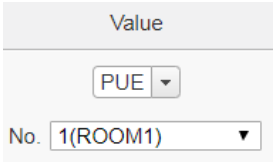
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- Bluemix: The value of the Bluemix received paremeter could be used as evaluation criteria; select the command and the variable name from the dropdown list to specify which variable will be used.



Please Note: The content of received MQTT subscribe topic or Azure / Bluemix parameter must be a number, otherwise 0 will be assigned

- PUE: The PUE value could be used as evaluation criteria; select the PUE from the dropdown list to specify which PUE value will be used.



v Click “OK” button to confirm the settings and return to the Rule settings page.

11.1.1.3 AI

AI channel value from XV-Board/M-7000/DL module can be included in the IF condition statements; the editing page for AI Condition Setting is shown as below :

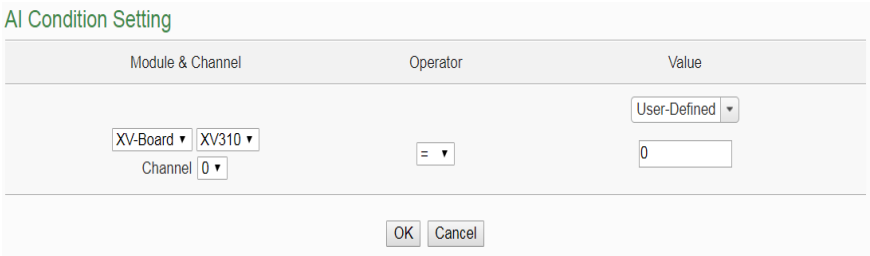


Figure11-5 : AI condition setting page

Follow the steps below:

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i Specify the module and channel from the dropdown list of the "Module & Channel" section that you are going to include its value in the IF condition statements.

ii Set up the expression statement for this channel value. Select an operator from "=",">","<",">=" or "<=".

iii And then specify the evaluation value. If this AI channel value match the evaluation criteria, the result of this condition evaluation will be "true".

iv PMC/PMD provides the following 12 values options; you can compare them with the AI channel value for condition evaluation. Please refer to "11.1.1.2 DI Counter" section for more detailed information.

v Click "OK" button to confirm the settings and return to the Rule settings page.

11.1.2 Modbus Module

Click on "Modbus Module", 4 options will appear as the following: Discrete Input, Coil Output, Input Register and Holding Register.

11.1.2.1 Discrete Input

Discrete Input channel value from Modbus TCP/RTU Slave module can be included in the IF condition statements; the editing page for Discrete Input Condition Setting is shown as below:



Figure11-6 : Discrete Input condition setting page

Follow the steps below:

i Specify the module and address of the Modbus TCP/RTU Slave module from the dropdown list of the "Module & Address" section that you are going to include its value in the IF condition statements.

ii Define the evaluation criteria of the status in IF statement to be "OFF" or "ON".

iii Click "OK" button to confirm the settings and return to the

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Rule settings page.

11.1.2.2 Coil Output

Coil Output channel value from Modbus TCP/RTU Slave module can be included in the IF condition statements; the editing page for Coil Output Condition Setting is shown as below:



Figure11-7 : Coil Output condition setting page

Follow the steps below:

i Specify the module and address of the Modbus TCP/RTU Slave module from the dropdown list of the "Module & Address" section that you are going to include its value in the IF condition statements.

ii Define the evaluation criteria of the status in IF statement to be "OFF" or "ON".

iii Click "OK" button to confirm the settings and return to the Rule settings page.

11.1.2.3 Input Register

Input Register channel value from Modbus TCP/RTU Slave module can be included in the IF condition statements; the editing page for Input Register Condition Setting is shown as below:

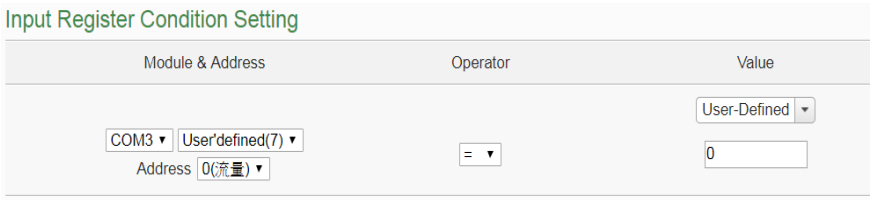


Figure11-8 : Input Register condition setting page

Follow the steps below:

i Specify the module and address of the Modbus TCP/RTU Slave module from the dropdown list of the "Module & Address" section that you are going to include its value in the

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IF condition statements.

ii Set up the expression statement for this Input Register address value. Select an operator from “=”,”>”,”<”,”>=” or “<=”.

iii And then specify the evaluation value. If this Input Register value match the evaluation criteria, the result of this condition evaluation will be “true”.

iv PMC/PMD provides 12 value options; you can compare them with the Input Register value for condition evaluation. Please refer to “11.1.1.2 DI Counter” section for more detailed information.

v Click “OK” button to confirm the settings and return to the Rule settings page.

11.1.2.4 Holding Register

Holding Register channel value from Modbus TCP/RTU Slave module can be included in the IF condition statements; the editing page for Holding Register Condition Setting is shown as below:

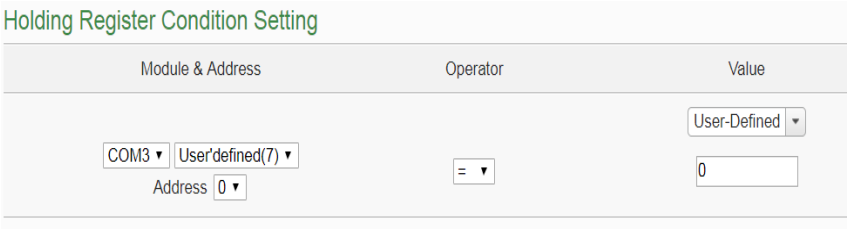


Figure11-9 : Holding Register condition setting page

Follow the steps below:

i Specify the module and address of the Modbus TCP/RTU Slave module from the dropdown list of the “Module & Address” section that you are going to include its value in the IF condition statements.

ii Set up the expression statement for this Holding Register address value. Select an operator from “=”,”>”,”<”,”>=” or “<=”.

iii And then specify the evaluation value. If this Holding Register value match the evaluation criteria, the result of this condition evaluation will be “true”.

iv PMC/PMD provides 12 value options; you can compare them with the Holding Register value for condition evaluation. Please refer to “11.1.1.2 DI Counter” section for more detailed

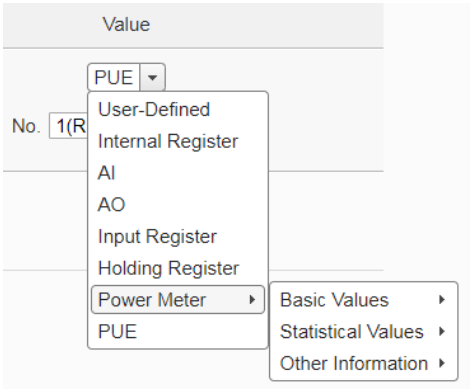
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information.

v Click “OK” button to confirm the settings and return to the Rule settings page.

11.1.3 Power Meter

The power data of the Power Meter could be used as evaluation criteria; the power data options are as follow: Basic Value, Statistical Value and Others Informations. The setting page for Power Meter Condition Setting is shown as below:



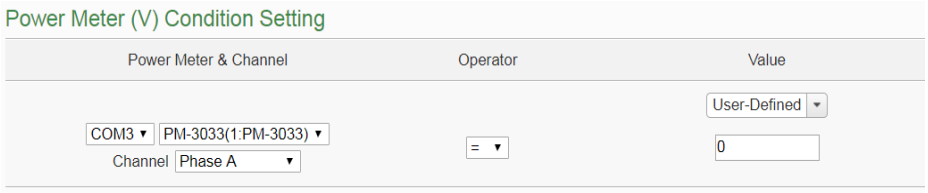


Figure11-10 : Power Meter condition setting page

Select which type of power data of the Power Meter is going to be used and then continue the following steps (taking option V as an example):

i Specify the power meter and loop/phase from the dropdown list of the “Module & Address” section that you are going to include its value in the IF condition statements.

ii Set up the expression statement for this power data value of the Power Meter. Select an operator from “=”,”>”,”<”,”>=” or “<=”.

iii And then specify the evaluation value. If this power data value of the Power Meter match the evaluation criteria, the result of this condition evaluation will be “true”.

iv PMC/PMD provides 12 value options; you can compare them with the power data value of the Power Meter for condition evaluation. Please refer to “11.1.1.2 DI Counter” section for more detailed

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information.

v Click “OK” button to confirm the settings and return to the Rule settings page.

11.1.4 Microsoft Azure

Click on Microsoft Azure, 2 options will appear as the following: " Connection Status" and " Subscribe Message".

11.1.4.1 Connection Status

The Connection Status between PMC/PMD and Microsoft Azure can be used as evaluation criteria for IF condition statement. The editing page for Microsoft Azure Connection Status Condition Setting is shown as below:

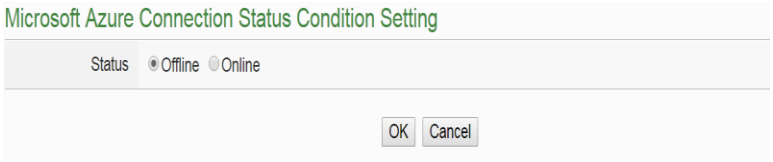


Figure11-11 : Microsoft Azure Connection Status condition setting

Follow the steps below:

i Specify the connection status to be “Offline” or “Online”. If the connection status of Microsoft Azure match the evaluation criteria, the result of this condition evaluation will be “true”.

ii Click “OK” button to confirm the settings and return to the Rule settings page.

11.1.4.2 Subscribe Message

The Variable in the Subscribe Message from Microsoft Azure can be used in the IF condition statements; the editing page for Microsoft Azure Subscribe Message condition setting is shown as below:

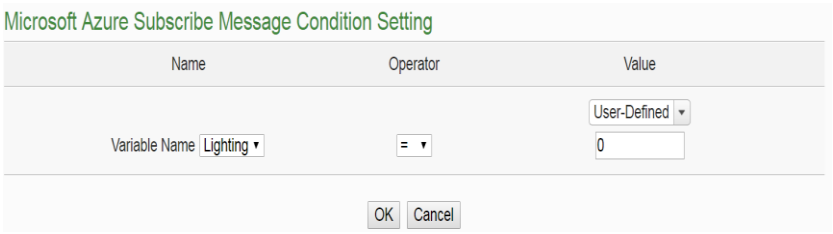


Figure11-12 : Microsoft Azure Subscribe Message condition setting

Follow the steps below:

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i Specify the variable from the dropdown list of “Variable Name” field that you are going to include it in the IF condition statements.

ii Set up the expression statement for the content of this Subscribe Topic. Select an operator from “=”, “>”, “=” or “<=”.

iii Specify the user-defined evaluation value. If the content of this variable match the evaluation criteria, the result of this condition evaluation will be “true”. PMC/PMD provides 12 values options; you can compare them with the content of this Subscribe Topic for condition evaluation. Please refer to “11.1.1.2 DI Counter” section for more detailed information.

iv Click “OK” button to confirm the settings and return to the Rule settings page.

11.1.5 IBM Bluemix

Click on IBM Bluemix, 2 options will appear as the following: " Connection Status" and " Subscribe Message".

11.1.5.1 Connection Status

The Connection Status between PMC/PMD and IBM Bluemix can be used as evaluation criteria for IF condition statement. The editing page for IBM Bluemix Connection Status Condition Setting is shown as below:

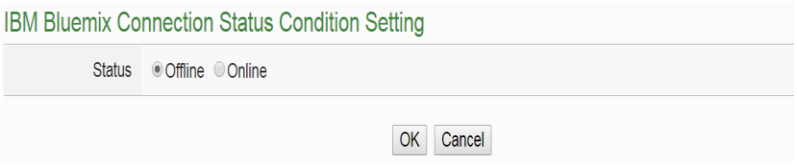


Figure11-13 : IBM Bluemix Connection Status condition setting

Follow the steps below:

i Specify the connection status to be “Offline” or “Online”. If the connection status of IBM Bluemix match the evaluation criteria, the result of this condition evaluation will be “true”.

ii Click “OK” button to confirm the settings and return to the Rule settings page.

11.1.5.2 Subscribe Message

The Command and Variable in the Subscribe Message from IBM

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Bluemix can be used in the IF condition statements; the editing page for IBM Bluemix Subscribe Message condition setting is shown as below:

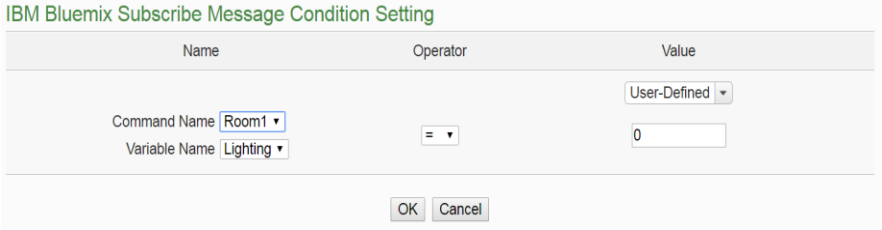


Figure11-14 : IBM Bluemix Subscribe Message condition setting

Follow the steps below:

i Specify the Command and Variable from the dropdown list of "Command Name" and "Variable Name" fields that you are going to include them in the IF condition statements. Only when the Subscribe Message is bound with the setting of the"Command Name", then the IF condition statements will be processed. User can select "*" to ignore the criteria.

ii Set up the expression statement for the content of this Subscribe Topic. Select an operator from "=", ">", "=" or "<="

iii Specify the user-defined evaluation value. If the content of this Subscribe Topic match the evaluation criteria, the result of this condition evaluation will be "true". PMC/PMD provides 12 values options; you can compare them with the content of this Subscribe Topic for condition evaluation. Please refer to "11.1.1.2 DI Counter" section for more detailed information.

iv Click "OK" button to confirm the settings and return to the Rule settings page.

11.1.6 MQTT

The parameters of MQTT Broker connection status and Subscribe Topic can be included in the IF condition statements; the editing pages for MQTT Broker connection status and Subscribe Topic condition setting are shown as below:

11.1.6.1 Broker Connection Status

The Broker connection status can be included in the IF condition statements; the editing page is shown as below:

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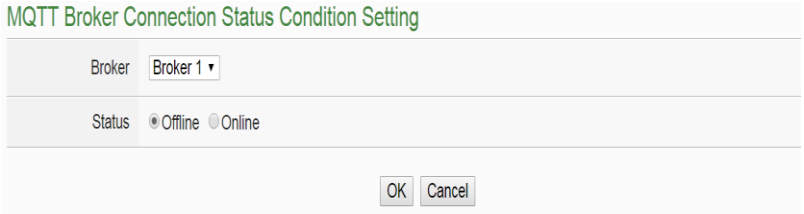


Figure11-15 : Broker Connection Status condition setting

Follow the steps below:

i Specify the Broker from the dropdown list of "Broker" field that you are going to include its connection status in the IF condition statements.

ii And then specify the connection status to be "Offline" or "Online". If the connection status of the Broker match the evaluation criteria, the result of this condition evaluation will be "true".

iii Click "OK" button to confirm the settings and return to the Rule settings page.

11.1.6.2 Subscribe Topic

The content of the Subscribe Topic can be included in the IF condition statements; the editing page is shown as below:

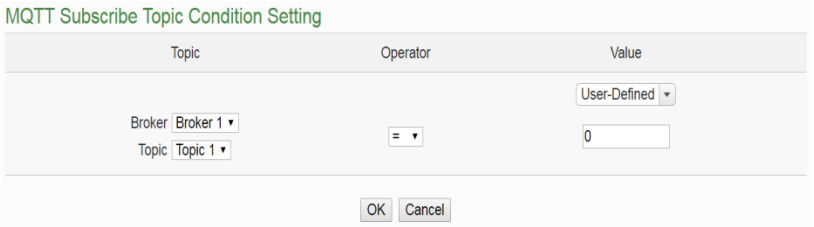


Figure11-16 : Subscribe Topic condition setting

Follow the steps below:

i Specify the Broker and Subscribe Topic from the dropdown list of "Broker" field and "Topic" field that you are going to include them in the IF condition statements.

ii Set up the expression statement for the content of this Subscribe Topic. Select an operator from "=", ">", "=" or "<=".

iii Specify the user-defined evaluation value. If the content of this Subscribe Topic match the evaluation criteria, the result of this condition evaluation will be "true". PMC/PMD provides 12 values options; you can compare them with the content of this

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Subscribe Topic for condition evaluation. Please refer to "11.1.1.2 DI Counter" section for more detailed information.

iv Click "OK" button to confirm the settings and return to the Rule settings page.

11.1.7 Connection Status

Connection Status can be included in the IF condition statements; the editing page for Connection Status Condition Setting is shown as below:

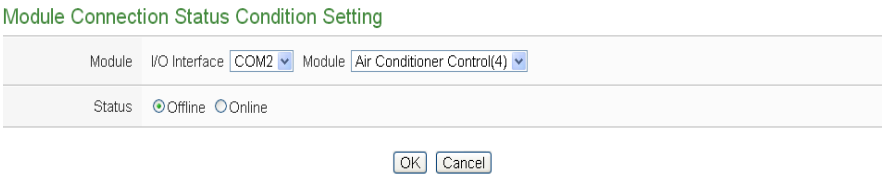


Figure11-17 : Connection Status condition setting page

Follow the steps below:

i Specify the module from the dropdown list of the "Module" section that you are going to include its Connection Status in the IF condition statements.

ii And then specify the Connection Status to be "Offline" or "Online". If the Connection Status of the module match the evaluation criteria, the result of this condition evaluation will be "true".

iii Click "OK" button to confirm the settings and return to the Rule settings page.

11.1.8 Timer

Timer condition can be used as evaluation criteria for IF condition statement; the editing page for timer condition setting is shown as follow:

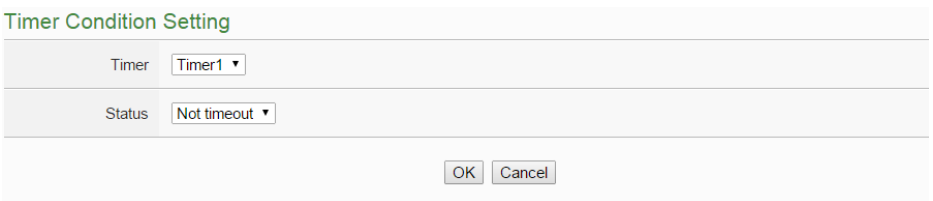


Figure11-18 : Timer condition setting page

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Follow the following steps:

i Select the timer that you are going to use its status as evaluation criteria for IF condition statement. Specify the timer from the dropdown list of the “Timer” field.

ii Define the evaluation criteria of the timer status in IF statement to be “Not timeout” or “Timeout”. If the timer status match the evaluation criteria, the result of this condition evaluation will be “true”.

iii Click “OK” button to save the settings. The popup window will be closed and return to the Rule settings page.

11.1.9 Schedule

The Schedule can be used as evaluation criteria for IF condition statement; the editing page for Schedule Condition Setting is shown as follow:

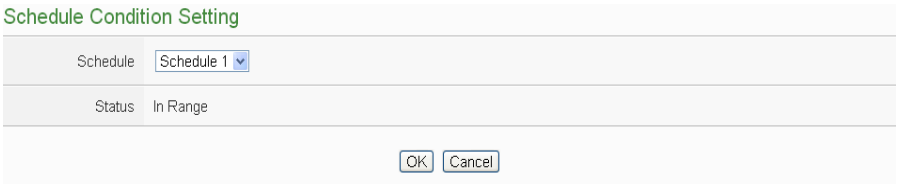


Figure11-19 : Schedule condition setting page

Follow the steps below:

i Select the Schedule that you are going to use for IF condition statement from the dropdown list of “Schedule” field.

ii The “Status” field must be “In Range”. If the system time of the PMC is in the range of date/time setting of the schedule, the result of this condition evaluation will be “true”.

iii Click “OK” button to confirm the settings and return to the Rule settings page.

11.1.10 Mobile Network Signal Strength

The Mobile Network Signal Strength can be used as evaluation criteria for IF condition statement; the editing page for Mobile Network Signal Strength Condition Setting is shown as follow:

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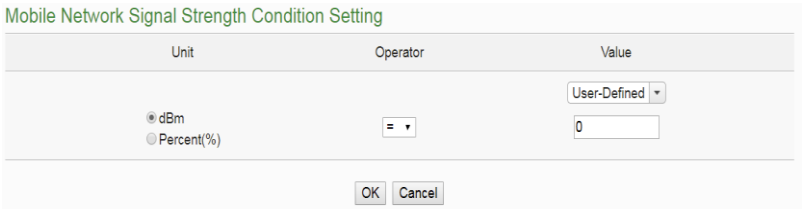


Figure11-20 : Mobile Network Signal Strength condition setting page

Follow the steps below:

i Select the unit that you are going to use for IF condition statement. The interface provides dBm and Percent(%) for selection.

ii Set up the expression statement for the Mobile Network Signal Strength value. Select an operator from "=", ">", "=" or "<=".

iii Specify the evaluation value. If the Mobile Network Signal Strength value match the evaluation criteria, the result of this condition evaluation will be "true".

iv Click "OK" button to confirm the settings and return to the Rule settings page.

11.1.11 FTP Upload Status

The status of FTP Upload Status can be used as evaluation criteria for IF condition statement; the editing page for FTP Upload Status Condition Setting is shown as follow:

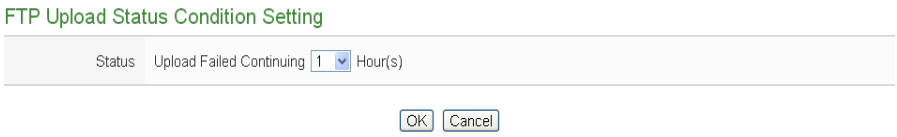


Figure11-21 : FTP Upload Status condition setting page

Follow the steps below:

i In the "Status" field, set up the maximum allowable idle time period when fails to upload files via FTP; once the time period reaches the maximum allowable idle time period, the result of this condition evaluation will be "true".

ii Click "OK" button to confirm the settings and return to the Rule settings page.

11.1.12 SD Card Status

The status of SD Card can be used as evaluation criteria for IF

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condition statement; the editing page for SD Card Status Condition Setting is shown as follow:

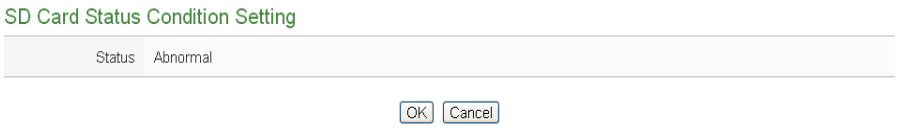


Figure11-22 : SD Card Status condition setting page

Follow the steps below:

i When the status of micro SD Card appears irregular (micro SD Card is not detected or the space is less than 100MB), the result of this condition evaluation will be “true” Click “OK” button to confirm the settings and return to the Rule settings page.

11.1.13 Rule Status

The Rule Status (if the Rule is disabled or enabled) can be used as evaluation criteria for IF condition statement. Please note: there must be at least one edited rule on PMC/PMD controller for setting up Rule Status in the IF Condition Setting page. The editing page for Rule Status Condition Setting is shown as below:



Figure11-23 : Rule Status condition setting page

Follow the steps below:

i Specify the Rule that is going to be used in the IF Condition statement from the dropdown list of the “Rule” field.

ii Specify the Rule status to be “Disable” or “Enable” from the dropdown list of the “Status” field. When the Rule status matches the specified status, the evaluation result will be “true”.

iii Click “OK” button to confirm the settings and return to the Rule settings page.

11.1.14 Internal Register

Internal Register value can be used as evaluation criteria for IF condition

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statement; the editing page for Internal Register Condition Setting is shown as follow:

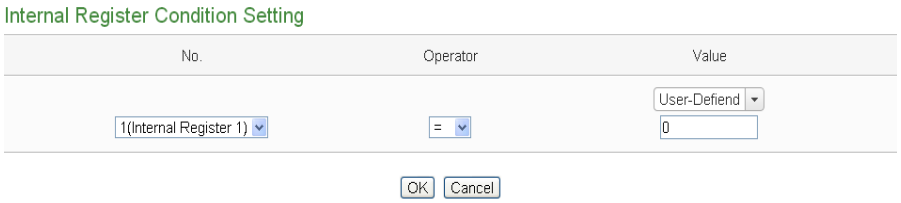


Figure11-24 : Internal register condition setting page

Follow the steps below:

i Select the Internal Register that you are going to use the value as evaluation criteria for IF condition statement. Specify the Internal Register Index from the dropdown list of "No." field.

ii Set up the expression statement for this Internal Register value. Select an operator from "=",">","<",">=" or "<=".

iii And then specify the evaluation value. If this Internal Register value match the evaluation criteria, the result of this condition evaluation will be "true".

iv PMC/PMD provides 12 value options; you can compare them with the Input Register value for condition evaluation. Please refer to "11.1.1.2 DI Counter" section for more detailed information.

v Click "OK" button to confirm the settings and return to the Rule settings page.

11.1.15 PUE

PUE value can be used as evaluation criteria for IF condition statement; the editing page for PUE Condition Setting is shown as follow:

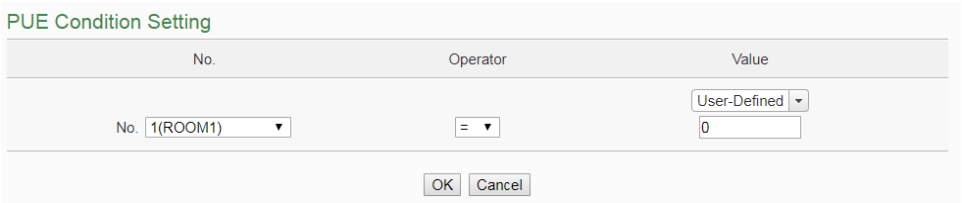


Figure11-25 : PUE condition setting page

Follow the steps below:

ii Select the PUE that you are going to use the value as evaluation criteria for IF condition statement. Specify the PUE Index from the

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dropdown list of “No.” field.

ii Set up the expression statement for this PUE value. Select an operator from “=”,”>”,”<”,”>=” or “<=”.

iii And then specify the evaluation value. If this PUE value match the evaluation criteria, the result of this condition evaluation will be “true”.

iv PMC/PMD provides 12 value options; you can compare them with the PUE value for condition evaluation. Please refer to “11.1.1.2 DI Counter” section for more detailed information.

v Click “OK” button to confirm the settings and return to the Rule settings page.

11.1.16 Ping

The Ping Status can be used as evaluation criteria for IF condition statement. The editing page for Ping Condition Setting is shown as below:



Figure11-26 : Ping condition setting page

Follow the steps below:

i Specify the Ping that is going to be used in the IF Condition statement from the dropdown list of the “Ping” field. When the Ping status was failure, the evaluation result will be “true”.

ii Click “OK” button to confirm the settings and return to the Rule settings page.

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11.2 THEN/ELSE Action Setting

To add a THEN/ELSE Action, please select and set the Action from the dropdown list in the “Add a new Action” field under the THEN/ELSE Action setting section.

- ICP DAS Module
- Modbus Module
- Power Meter
- Microsoft Azure
- IBM Bluemix
- MQTT
- Timer
- Email
- SMS Alarm
- SNMP Trap
- LINE Notify (The service will end on March 31, 2025.)
- LINE Messaging API
- IoTstar Bot Service
- IoTstar Alarm
- Telegram
- Re-boot System
- Reset modem
- Data Logger
- Rule Status
- Internal Register
- Delay

If the PMC/PMD is connected to ICP DAS XV-Board/M-7000/ DL I/O modules, ICP DAS power meters or Modbus TCP/RTU modules, the setting options for I/O channel information (AO、DO、Coil Output 和 Holding Register) will be automatically displayed on the dropdown list.

To include subjects other than modules mentioned above in the THEN/ELSE Action statement; they have to be pre-defined in Advanced Setting first. The setting options of the subjects that already being defined in Advanced Setting will appear on the dropdown list of THEN/ELSE Action. Select the Action option from the dropdown list in the “Add a new Action” field under the THEN/ELSE Action setting section, a window will pop up for you to edit detailed information. The THEN Action statement will be

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executed only when the result of IF condition statement is found “true”; otherwise the ELSE Action statement will be executed. In order to meet application requirement, for some Actions, PMC/PMD offers options to execute the Action one-time or repeatedly. The setting options of THEN/ELSE Action are as follow:

- One-Time: when the IF Condition is TRUE, this Action will be executed once and only once. This Action will not be executed again until the IF Condition turns to be TRUE again.
- Repeat: when the IF Condition is TRUE, this Action will be executed repeatedly until the IF Condition turns to be FALSE.

The setting options of THEN/ELSE Action are as follow:

11.2.1 ICP DAS Module

Click on ICP DAS Module(XV-Board/M-7000/DL), 3 options will appear as the following: DI Counter, DO, and AO.

11.2.1.1 DI Counter

You can reset DI counter of the XV-Board/M-7000 modules in the THEN/ELSE Action statement; the editing page for DI counter Action is shown as follow:

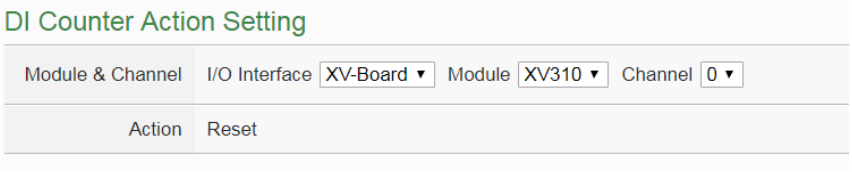


Figure11-27 : DI Counter action setting page

Follow the steps below:

i Select the DI channel to reset DI counter from the dropdown list of channel field in the “Module & Channel” section.

ii Click “OK” button to confirm the settings and return to the Rule settings page.

11.2.1.2 DO

You can execute an action in DO channel of XV-Board/M-7000/DL module in the THEN/ELSE Action statement; the editing page for DO Action is shown as follow:

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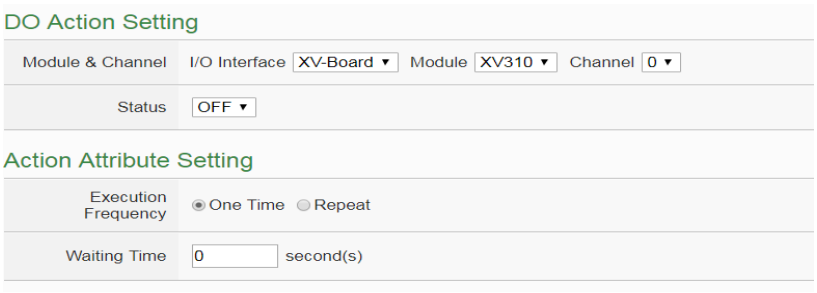


Figure11-28 : DO action setting page

Follow the steps below:

i Specify the module and channel from the dropdown list of the "Module & Channel" section.

ii Specify the output value of DO Channel from the dropdown list of the "Status" field. The output value can be "OFF", "ON" or "Pulse Output" (Pulse Output applies to XV-Board only). For M-7088 belongs to PWM (Pulse width modulation) modules, the DO channel Action will be "Start PWM" or "Stop PWM".

iii Specify the "Frequency" to be "One-Time" or "Repeat".

iv Specify the value in the "Waiting Time" field, it means after the action be executed, how long the system will delay to execute the next Action. The unit will be second(s).

v Click "OK" button to confirm the settings and return to the Rule settings page.

11.2.1.3 AO

You can execute an action in AO channel of XV-Board/M-7000 module in THEN/ELSE Action statement; the editing page for AO Action is shown as follow:



Figure11-29 : AO action setting page

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Follow the steps below:

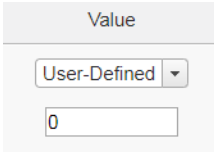
i From the dropdown list of the “Module & Channel” field, select the AO channel to execute actions.

ii Specify the Operator to be “=”, “+=”, or “-=” from the dropdown list in the “Operator” field. The 3 operators are as follow：

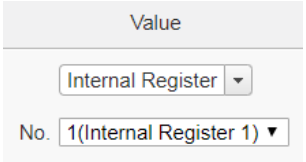
- “=”：Indicate assign the new AO channel value as the value in “Value” field
- “+=”：Indicate assign the new AO channel value as the original AO channel value plus the value in “Value” field.
- “-=”：Indicate assign the new AO channel value as the original AO channel value minus the value in “Value” field.

iii Set up the value in the “Value” field, PMC/PMD provides the following 12 value options to be used in the “Value” field:

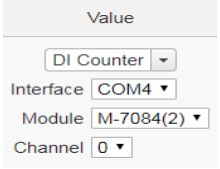
- User-Defined: Input a User-Defined value under the “Value” field.



- Internal Register: Select the number of the Internal Register from the dropdown list.

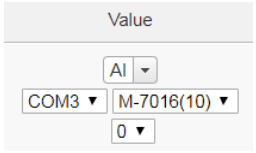


- DI Counter: Using DI channel counter values from ICP DAS I/O Module, select the module and channel from the dropdown list to specify which channel value will be used.

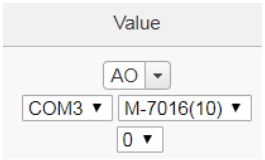


- AI: Using AI channel values from XV-Board/M-7000/DL, select the module and channel from the dropdown list to specify which channel value will be used.

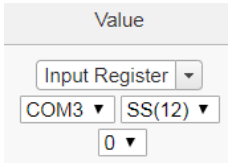
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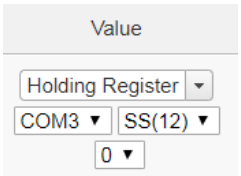
- AO: using AO channel values from XV-Board /M-7000, select the module and channel from the dropdown list to specify which channel value will be used.



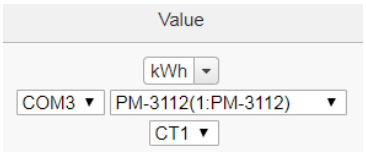
- Input Register: using value of Input Register from Modbus RTU/TCP Slave modules, select the module and address from the dropdown list to specify which channel value will be used.



- Holding Register: using value of Holding Register from Modbus RTU/TCP Slave modules, select the module and address from the dropdown list to specify which channel value will be used.



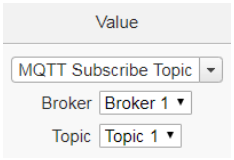
- Power Meter: using the power data of the Power Meter; select the type of power data from the dropdown list first (It provide as "Basic Values", "Statistical Values" and "Others Information" for selection). And then select the power meter and loop(or phase) from the dropdown list to specify which power meter and loop(or phase) value will be used.



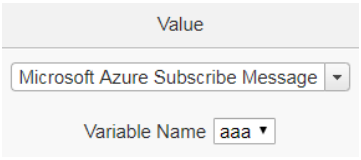
- MQTT: using the value of MQTT subscribe topic, select

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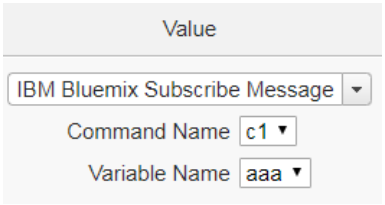
the broker and the subscribe topic from the dropdown list to specify which value will be used.



- Azure: using the value of Azure received paremeter, select the parameter from the dropdown list to specify which value will be used.

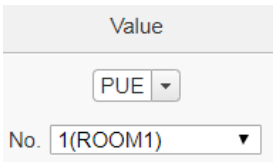


- Bluemix: using the value of Bluemix received paremeter, select the command and the parameter from the dropdown list to specify which value will be used.



Please Note: The content of received MQTT subscribe topic or Azure / Bluemix parameter must be a number, otherwise 0 will be assigned.

- PUE: using value of PUE, select the No of PUE from the dropdown list to specify which PUE value will be used.



iv Specify the “Frequency” to be “One-Time” or “Repeat”.

v Specify the value in the “Waiting Time” field, it means after the action be executed, how long the system will delay to execute the next Action. The unit will be second(s).

vi Click “OK” button to confirm the settings and return to the

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Rule settings page.

11.2.2 Modbus Module

Click on “Modbus Module”, 2 options will appear as the following: Coil Output and Holding Register.

11.2.2.1 Coil Output

You can execute an action to change the status of Coil Output of Modbus TCP/RTU module in the THEN/ELSE Action statement; the editing page for Coil Output Action is shown as follow:

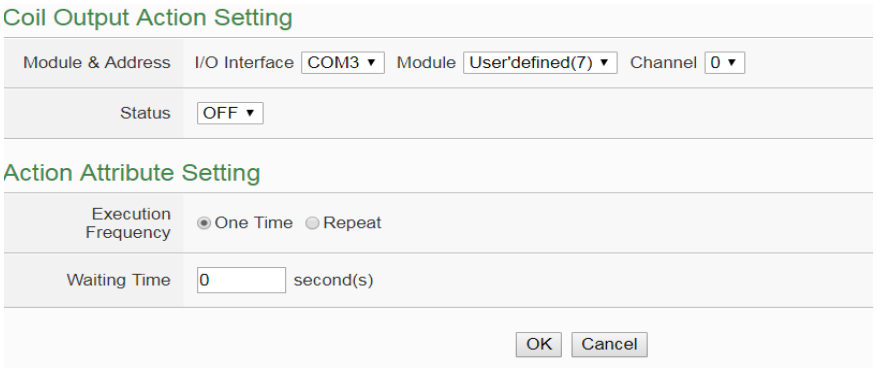


Figure11-30 : Coil Output action setting page

Follow the steps below:

i Select the module and address of the Coil Output from the dropdown list of the “Module & Address” section.

ii Specify the output value of Coil Output from the dropdown list of the “Status” field. The output value can be “OFF” or, “ON”.

iii Specify the “Frequency” to be “One-Time” or “Repeat”.

iv Specify the value in the “Waiting Time” field, it means after the action be executed, how long the system will delay to execute the next Action. The unit will be second(s).

v Click “OK” button to confirm the settings and return to the Rule settings page.

11.2.2.2 Holding Register

You can execute an action to change the value of Holding Register in the THEN/ELSE Action statement; the editing page for Holding Register Action is shown as follow:

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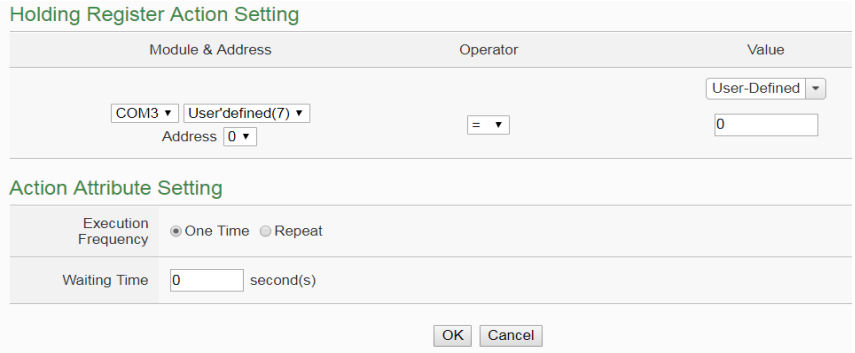


Figure11-31： Holding Register action setting page

Follow the steps below:

i Select the module and address of the Holding Register from the dropdown list of the “Module & Address” section.

ii Specify the Operator in the “Operator” field. The 3 operators are as follow：

- “=”：Indicate assign the new Holding Register value as the value in “Value” field.
- “+=”：Indicate assign the new Holding Register value as the original Holding Register value plus the value in “Value” field.
- “-=”：Indicate assign the new Holding Register value as the original Holding Register value minus the value in “Value” field.

iii Set up the value in the “Value” field, PMC/PMD provides 12 value options. Please refer to “11.2.1.3 AO” section for more detailed information for value settings of these 7 options.

iv Specify the “Frequency” to be “One-Time” or “Repeat”.

v Specify the value in the “Waiting Time” field, it means after the action be executed, how long the system will delay to execute the next Action. The unit will be second(s).

vi Click “OK” button to confirm the settings and return to the Rule settings page.

11.2.3 Power Meter

Click on “Power Meter”, 1 option “Power Relay” will appear. You can execute an action to change the Power Relay status of the Power Meter in the THEN/ELSE Action statement; the editing page for Power Relay Action of Power Meter is shown as follow:

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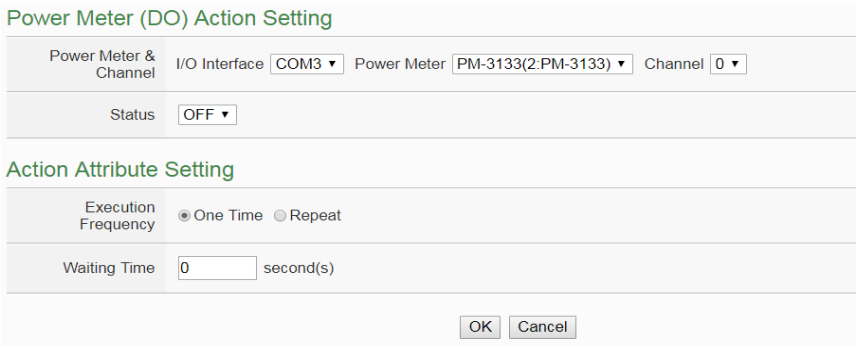


Figure11-32 : Power Meter Relay Action setting page

Follow the steps below:

i From the dropdown list of the “Power Meter & Channel” field, select the Power Meter module and Channel.

ii Specify the output value of Power Relay from the dropdown list of the “Status” field. The output value can be “OFF” or, “ON”.

iii Specify the “Frequency” to be “One-Time” or “Repeat”.

iv Specify the value in the “Waiting Time” field, it means after the action be executed, how long the system will delay to execute the next Action. The unit will be second(s)

v Click “OK” button to confirm the settings and return to the Rule settings page.

11.2.4 Microsoft Azure

Click on “Microsoft Azure”, 3 options will appear as the following: “Function Status”, “Publish Message” and “Reset Variable”.

11.2.4.1 Function Status

User can execute an action to change the connection operation between Microsoft Azure and PMC/PMD in the THEN/ELSE Action statement; the editing page is shown as follow:

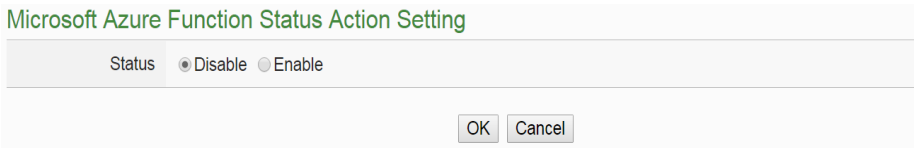


Figure11-33 : Microsoft Azure Function Status action setting

Follow the steps below:

i Specify the connection operation between Microsoft Azure and

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PMC/PMD to be “Disable” or “Enable” from the dropdown list of the “Status” field.

ii Click “OK” button to confirm the settings and return to the Rule settings page.

11.2.4.2 Publish Message

You can publish messages to Microsoft Azure when executing a THEN/ELSE Action statement; the editing page is shown as below:

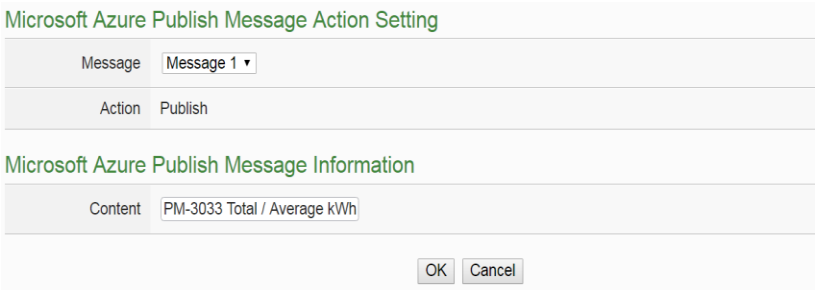


Figure11-34 : Microsoft Azure Publish Message action setting

Follow the steps below:

i Select a pre-set Publish message from the dropdown list of the “Message” field. The Publish message will be displayed for you to verify if this is the message you are going to send to.

ii Click “OK” button to confirm the settings and return to the Rule settings page.

11.2.4.3 Reset Variable

You can reset the saved content of the subscribe variable from Microsoft Azure when executing a THEN/ELSE Action statement; the editing page is shown as below:

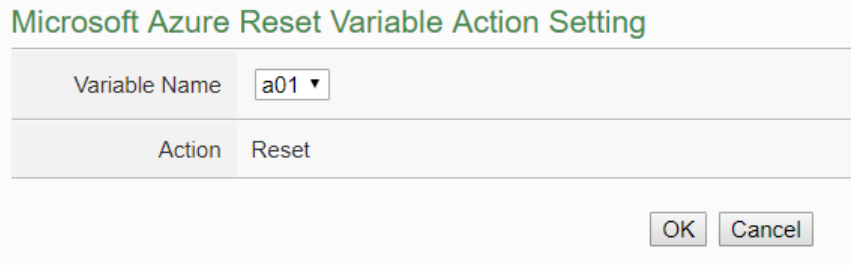


Figure11-35 : Microsoft Azure Reset Variable action setting page

Follow the steps below:

i Select a pre-set Subscribe variable from the dropdown list of the

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"Variable Name" field. When this action is executed, PMC/PMD would reset the content of the variable, and the evaluation result of the IF statement which is associated with the variable will be verified again.

ii Click "OK" button to confirm the settings and return to the Rule settings page.

11.2.5 IBM Bluemix

Click on "IBM Bluemix", 3 options will appear as the following: "Function Status", "Publish Message" and "Reset Variable" .

11.2.5.1 Function Status

User can execute an action to change the connection operation between IBM Bluemix and PMC/PMD in the THEN/ELSE Action statement; the editing page is shown as follow:

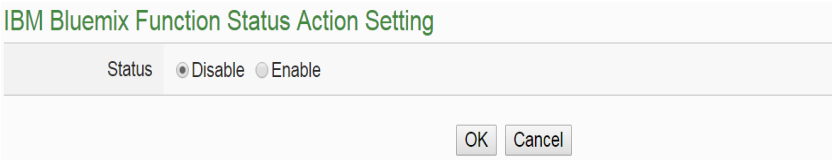


Figure11-36 : IBM Bluemix Function Status action setting

Follow the steps below:

i Specify the connection operation between IBM Bluemix and PMC/PMD to be "Disable" or "Enable" from the dropdown list of the "Status" field.

ii Click "OK" button to confirm the settings and return to the Rule settings page.

11.2.5.2 Publish Message

You can publish messages to IBM Bluemix when executing a THEN/ELSE Action statement; the editing page is shown as below:

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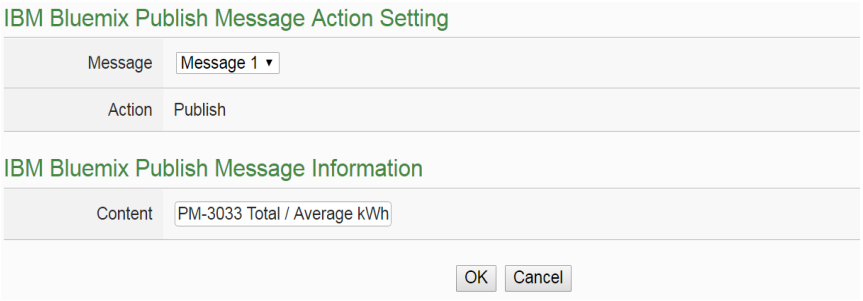


Figure11-37 : IBM Bluemix Publish Message action setting

Follow the steps below:

i Select a pre-set Publish message from the dropdown list of the "Message" field. The Publish message will be displayed for you to verify if this is the message you are going to send to.

ii Click "OK" button to confirm the settings and return to the Rule settings page.

11.2.5.3 Reset Variable

You can reset the saved content of the subscribe variable from IBM Bluemix when executing a THEN/ELSE Action statement; the editing page is shown as below:

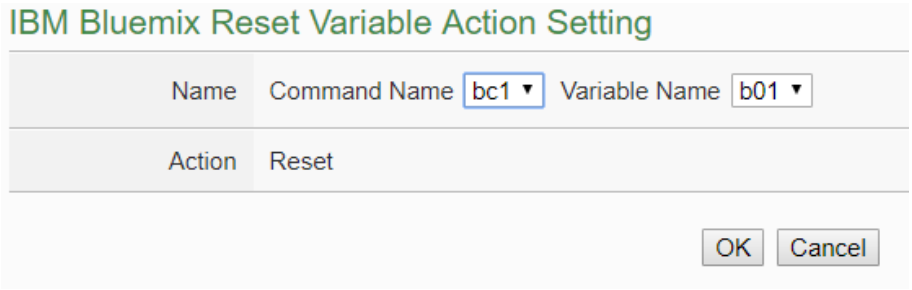


Figure11-38 : IBM Bluemix Reset Variable action setting page

Follow the steps below:

i Select a Command and a Variable from the dropdown list of the "Name" field. When this action is executed, PMC/PMD would reset the content of the variable, and the evaluation result of the IF statement which is associated with the variable will be verified again.

ii Click "OK" button to confirm the settings and return to the Rule settings page.

11.2.6 MQTT

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Click on “MQTT”, 3 options will appear as the following: “Broker Function”, “Publish Message” and “Reset Topic”.

11.2.6.1 Broker Function

User can execute an action to change the function status of MQTT Broker in the THEN/ELSE Action statement; the editing page is shown as follow:

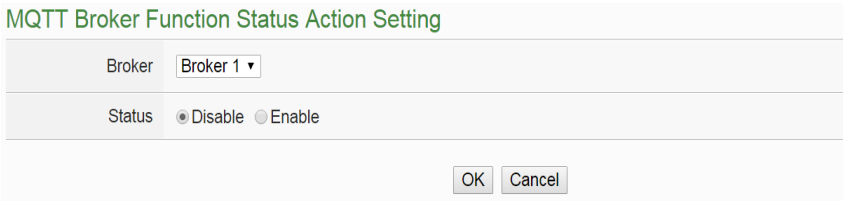


Figure11-39 : Broker Function action setting page

Follow the steps below:

i Select the specific Broker from the dropdown list of the “Broker” field.

ii Specify the Broker Function status to be “Disable” or “Enable” from the dropdown list of the “Status” field. When the Action being executed, the Broker Function status will be changed to specified status.

iii Click “OK” button to confirm the settings and return to the Rule settings page.

11.2.6.2 Publish Message

You can publish a MQTT Topic to the Broker when executing a THEN/ELSE Action statement; the editing page is shown as below:

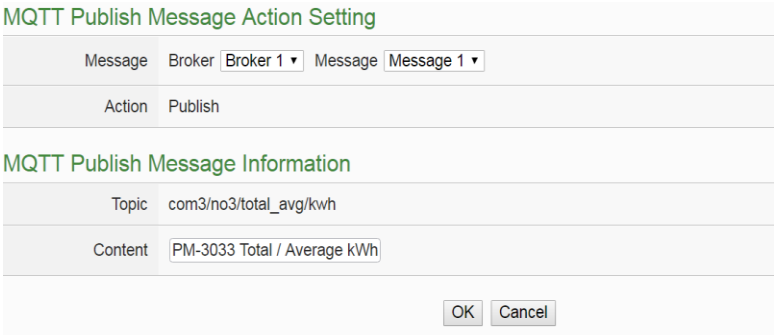


Figure11-40 : Publish Message action setting page

Follow the steps below:

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i Select a pre-set MQTT Publish Topic message from the dropdown list of the “Broker” and “Message” fields. The MQTT Publish Topic message will be displayed for you to verify if this is the MQTT Publish Topic message you are going to send to.

ii Click “OK” button to confirm the settings and return to the Rule settings page.

11.2.6.3 Reset Topic

You can reset the saved content of the subscribe topic when executing a THEN/ELSE Action statement; the editing page is shown as below:

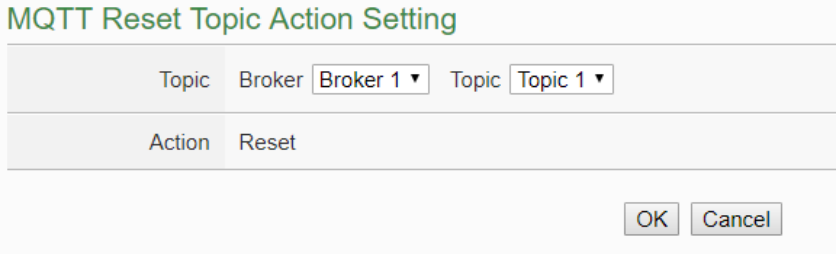


Figure11-41 : MQTT Reset Topic action setting page

Follow the steps below:

i Select a pre-set MQTT Subscribe Topic from the dropdown list of the “Broker” and “Topic” fields. When this action is executed, PMC/PMD would reset the message of the topic, and the evaluation result of the IF statement which is associated with the topic will be verified again.

ii Click “OK” button to confirm the settings and return to the Rule settings page.

11.2.7 Timer

You can change the Timer status (to Start or to Reset the Timer) in the THEN/ELSE Action statement; the editing page for Timer Action Setting is shown as below:

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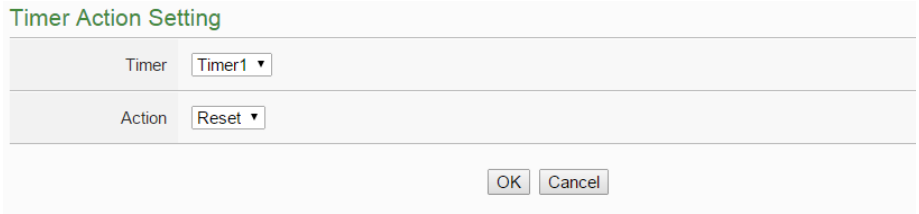


Figure11-42 : Timer action setting page

Follow the following steps:

i Select the pre-defined Timer from the dropdown list of the "Timer" field. Please note: the Timer you select has to be created in Advanced Setting.

ii Specify you want to "Reset" or "Start" this Timer when this THEN/ELSE Action statement is executed. The Start Action will start to run the Timer and if the Start Action is triggered one more time when the Timer is running, the Timer will restart again. The Reset action will reset the Timer and stop running the Timer.

iii Click "OK" button to save the settings. The popup window will be closed and return to the Rule settings page.

11.2.8 Email

You can send a Email message to an Email group when executing a THEN/ELSE Action statement; the editing page is as below:



Figure11-43 : Email action setting page

Follow the steps below:

i Select a pre-set Email group from the dropdown list of the "Index" field. Please note: the Email you select has to be enabled in Advanced Setting. The Email group information will be displayed for you to verify if this is the Email group you are going to send the message to.

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ii Click “OK” button to confirm the settings and return to the Rule settings page.

11.2.9 SMS Alarm

You can send a specific SMS Alarm message when executing a THEN/ELSE Action statement. The setting page is show as below:

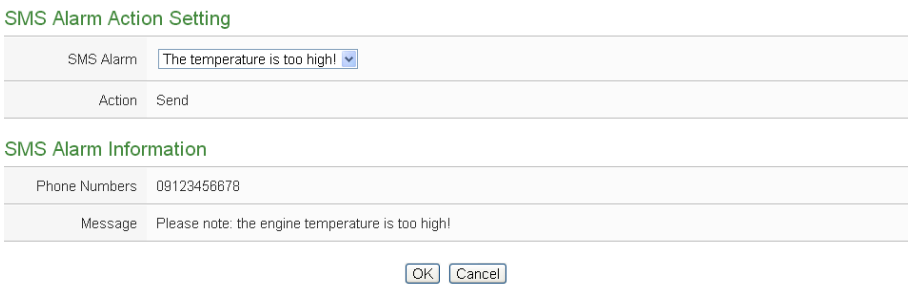


Figure11-44 : SMS Alarm action setting page

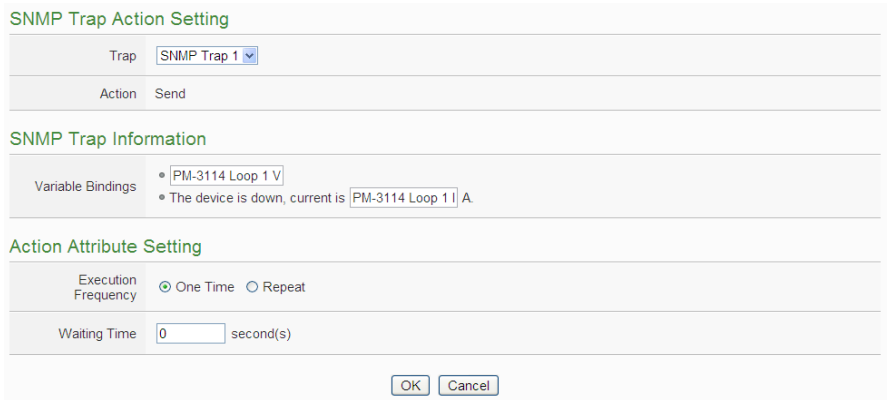
Follow the steps below:

i In the “SMS Alarm” field, specify the SMS Alarm you want to execute in Action from the dropdown list. Please note: the SMS Alarm you select has to be enabled in Advanced Setting. The selected SMS Alarm message such as phone numbers and message content will be displayed for you to verify if this is the SMS Alarm you want to send.

ii Click “OK” button to confirm the settings and return to the Rule settings page.

11.2.10 SNMP Trap

You can send a specific SNMP Trap when executing a THEN/ELSE Action statement. The setting page is show as below:



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Figure11-45 : SNMP Trap Action Setting Page

Follow the steps below:

i In the “Trap” field, specify the SNMP Trap you want to execute in Action from the dropdown list. Please note, the SNMP Trap you select has to be the pre-set SNMP Trap in the "SNMP Trap Setting of Advanced Setting" section. The selected SNMP Trap message such as “Variable Bindings” and message content will be displayed for you to verify if this is the SNMP Trap you want to send.

ii Select the Action Execution Frequency, there are two options as “One Time” and “Repeat” for selection. Please refer to “11.2 THEN/ELSE Action Setting” section for the description of “One Time” and “Repeat” operation.

iii Input the value in the “Waiting Time” field, it means after the action be executed, how long the system will delay to execute the next Action. The unit will be second(s).

iv Click “OK” button to confirm the settings and return to the Rule settings page.

11.2.11 LINE Notify (The service will end on March 31, 2025.)

You can send a specific LINE Notify message to LINE personal account or group chat rooms when executing a THEN/ELSE Action statement. The setting page is show as below:

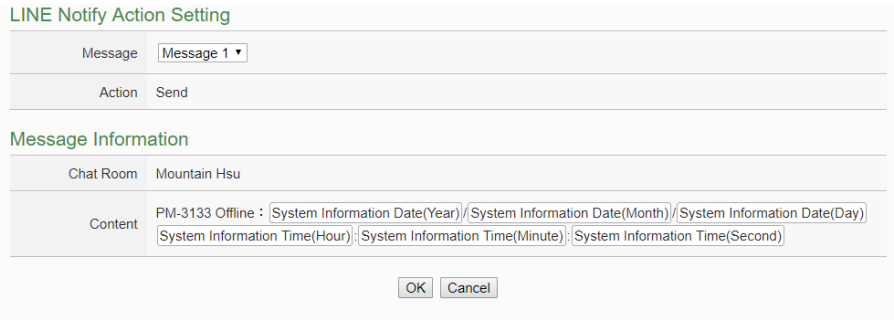


Figure11-46 : LINE Notify action setting page

Follow the steps below:

ii In the “Message” field, specify the LINE message you want to send in Action from the dropdown list. The selected LINE Notify message such as “Chat Room” and message content will be displayed for you to verify if this is the LINE message you want to send.

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iii Click “OK” button to confirm the settings and return to the Rule settings page.

11.2.12 LINE Messaging API

You can configure the THEN/ELSE actions to send LINE Messaging API messages to a LINE personal account or group chat room when certain conditions are met. The configuration interface is as follows:

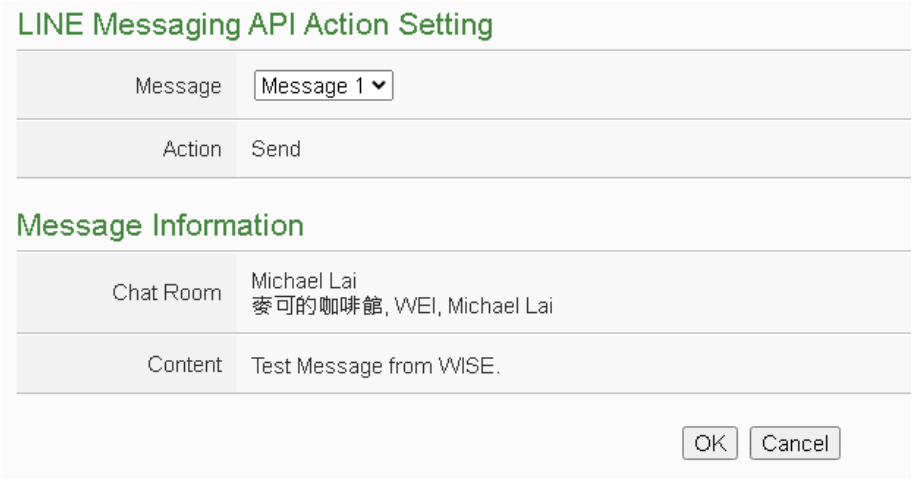


Figure11-47 : LINE Notify action setting page

Follow the steps below:

i In the “Message” field, select a pre-configured LINE Messaging API message. After selecting the LINE Messaging API message, the system will display the chat room to which the message will be sent and the content of the message. This allows the user to verify that the selected LINE Messaging API message will be sent to the correct recipient and with the correct content.

ii Click the “OK” button to save this setting and exit this page to return to the rule configuration page.

11.2.13 IoTstar Bot Service

You can send a specific IoTstar Bot Service message to the LINE personal account or Telegram bot account which is bound with IoTstar when executing a THEN/ELSE Action statement. The setting page is show as below:

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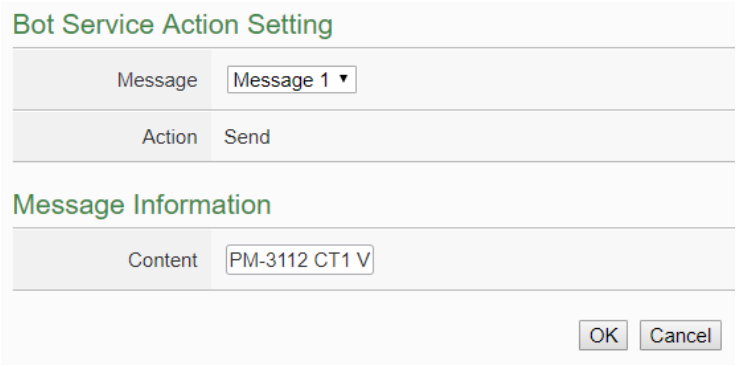


Figure11-48 : IoTstar Bot Service action setting page

Follow the steps below:

i. In the “Message” field, specify the message you want to send in Action from the dropdown list. The content of the selected IoTstar Bot Service message will be displayed for you to verify if this is the message you want to send.

ii. Click “OK” button to confirm the settings and return to the Rule settings page.

11.2.14 IoTstar Alarm

Users can configure actions to send alarms to the IoTstar server when specific conditions are met, along with the severity level of the alarm. The configuration interface is shown below:

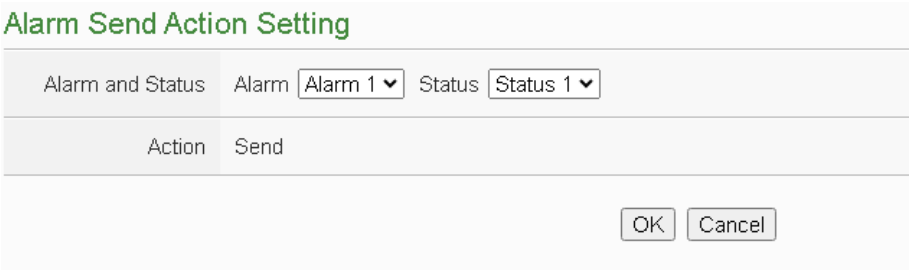


Figure11-49 : IoTstar Alarm action setting page

Follow the steps below:

i. In the “Alarm and Status” field, select the alarm and its corresponding status to be sent.

ii. Click “OK” button to confirm the settings and return to the Rule settings page.

11.2.15 Telegram

You can send a specific Telegram message to Telegram bot account or group chat rooms when executing a THEN/ELSE Action statement.

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The setting page is show as below:

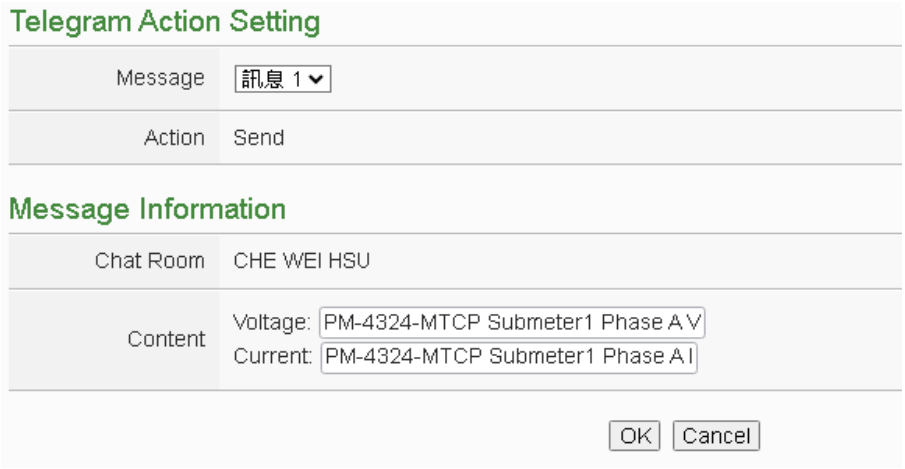


Figure11-50 : Telegram action setting page

Follow the steps below:

i In the “Message” field, specify the Telegram message you want to send in Action from the dropdown list. The selected Telegram message such as “Chat Room” and message content will be displayed for you to verify if this is the Telegram message you want to send.

ii Click “OK” button to confirm the settings and return to the Rule settings page.

11.2.16 Re-boot System

You can reboot the PMC/PMD controller when executing a THEN/ELSE Action statement. The setting page is show as below:

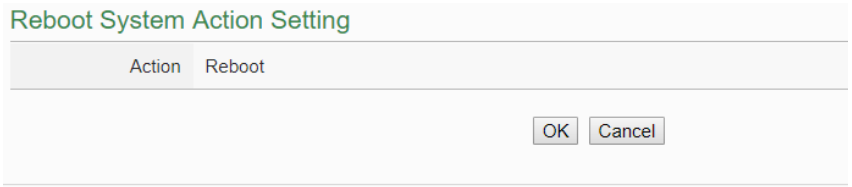


Figure11-51 : Re-boot system Action setting page

Follow the steps below:

i Click “OK” button to confirm the settings and return to the Rule settings page.

11.2.17 Reset Modem

The Reset modem action would power off and then power on the modem again to force the modem back to the initial status, and then the

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mobile connection would be re-started if the mobile network connection is enabled. The setting page is show as below:



Figure11-52 : Reset modem action setting page

Follow the steps below:

i Click “OK” button to confirm the settings and return to the Rule settings page.

11.2.18 Data Logger

You can execute “One-Time Log” in the Action statements to perform data recording one-time only when an event is triggered. User can also perform "Start” or “Stop” operation on data logger. The setting page is show as below:



Figure11-53 : Data Logger action setting page

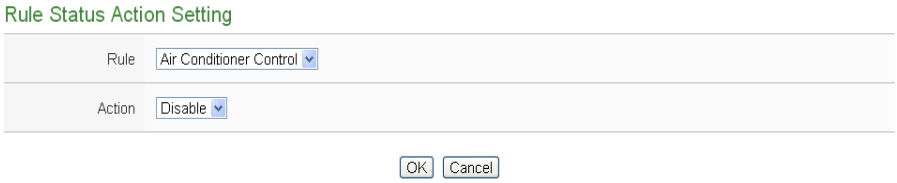
Follow the steps below:

i In the “Action” field, specify the data logger operation you want to execute in Action from the dropdown list.

ii Click “OK” button to confirm the settings and return to the Rule settings page.

11.2.19 Rule Status

The Rule Status can be modified to be Disable or Enable in the Action. The editing page for Rule Status Action Setting is shown as below:



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Figure11-54 : Rule Status action setting page

Follow the steps below:

ii Specify the Rule (It has to be a previously saved Rule) that is going to be changed in the Action Condition statement from the dropdown list of the “Rule” field.

iii Specify the Rule status to be Disable or Enable from the dropdown list of the “Action” field. When the Action being executed, the Rule status will be changed to specified status.

iv Click “OK” button to confirm the settings and return to the Rule settings page.

11.2.20 Internal Register

You can modify the value of Internal Register in the THEN/ELSE Action statement; the editing page for Internal Register Action Setting is shown as below:

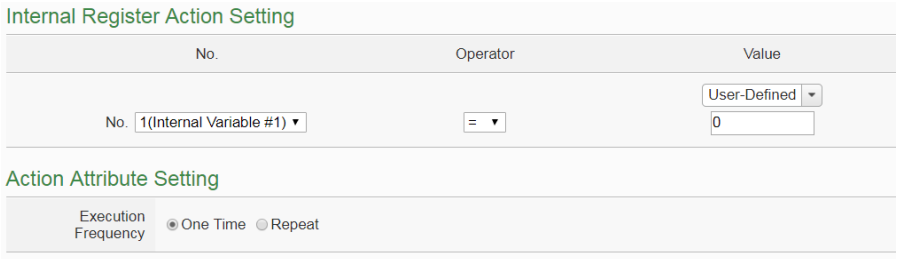


Figure11-55 : Internal Register action setting page

Follow the steps below:

i Select the pre-defined Internal Register from the dropdown list of the “No” field. Please note: the Internal Register you select has to be enabled in Advanced Setting.

ii Specify the Operator in the “Operator” field. The 5 operators are as follow:

- “=” : Indicate assign the new Internal Register value as the value in “Value” field.
- “+=” : Indicate assign the new Internal Register value as the original Internal Register value plus the value in “Value” field.
- “-=” : Indicate assign the new Internal Register value as the original Internal Register value minus the value in “Value” field.

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- "*=" : Indicate assign the new Internal Register value as the original Internal Register value times the value in "Value" field.
- "/=" : Indicate assign the new Internal Register value as the original Internal Register value divided by the value in "Value" field.

iii Set up the value in the "Value" field, PMC/PMD provides 12 value options. Please refer to "11.2.1.3 AO" section for more detailed information for value settings of these 7 options.

iv Specify the "Frequency" to be "One-Time" or "Repeat".

v Click "OK" button to confirm the settings and return to the Rule settings page.

11.2.21 Delay

Users can add the Delay action to define the delay time before the execution of next actions. The editing page for Delay Action Setting is shown as below:

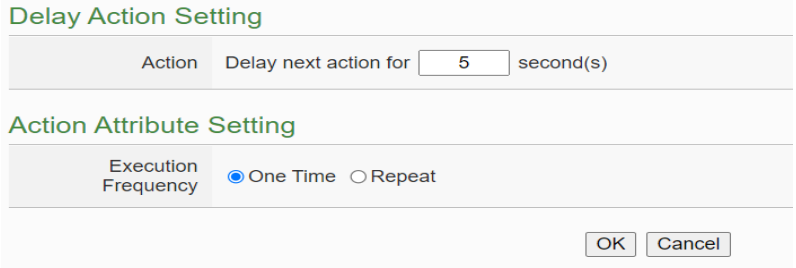


Figure11-56 : Delay action setting page

Follow the steps below:

i In the "Action" field, set the delay time (unit: second) before the execution of next actions. The counting of the delay time would start when the previous action starts, rather than when the previous action is done.

ii Specify the "Execution Frequency" to be "One Time" or "Repeat". Please refer to "11.2 THEN/ELSE Action Setting" for detail.

iii Click "OK" button to confirm the settings and return to the Rule settings page.

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Appendix I：Modbus Address Table

PMC/PMD allows SCADA software or HMI device to retrieve the power data, I/O channel data and system information via Modbus TCP/RTU protocol. PMC/PMD register addresses are specified according to Modbus register mapping tables (more detailed information will follow).

Please Note:

- The addresses are in **Base 0** format
- The addresses are in **Decimal** format
- The **default value of NetID is 1,** and you can modify the NetID value in the Network Setting page. (Please refer to 6.2 Network Setting).
- If the data is displayed in Floating format, each record of data will take two registers to hold the data. The following code example demonstrates how to join the two registers into one floating point value.

```
float register_to_float(short r1, short r2)
{
      float f;
      int *a = &f;
      *a = r1;
      a++;
      *a = r2;
      return f;
}
```

For the compilers are different (big endian or little endian) the floating point composing order might be different. For example: if r1 represent the address of 30100 register and r2 represent the address of 30101 register, to join r1 and r2 to a floating point, if the system is big endian system you will need to call:

float value = register_to_float(r1, r2);

On the other hand, if the system is little endian system, you will need to call:

float value = register_to_float(r2, r1);

Please Note:

1. If you are not sure your compiler belongs to which system, try both ways to find the accurate one.
2. The way to join the two registers value into DWORD is similar to Floating point; change the return value to DWORD or Unsigned Long.

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PMC/PMD Modbus Address Table

Please note：Because each PMC/PMD product model provide different COM Port capability. So please verify the mapping information between RS-485-1 & RS-485-2 and actual COM Port as below.

	RS-485-1	RS-485-2
PMC-5231/PMC-2241M	COM3	COM4
PMC-5231M-3GWA	COM3	COM4
PMC-5231M-4GE/4GC	COM3	COM4
PMD-220x	COM1	COM2
PMD-420x	COM1	COM2

<table>
<tr><th>Modbus Address</th><th>Coil Output (0x)</th><th>Discrete Input (1x)</th><th>Input Register (3x)</th><th>Holding Register (4x)</th></tr>
<tr><td>0~59</td><td colspan="4">PMC/PMD System Data(1)</td></tr>
<tr><td>60~75</td><td></td><td>RS-485-1 connection status(2)</td><td>RS-485-1 Information(3)</td><td rowspan="6">Internal Register Data(4)</td></tr>
<tr><td>76~91</td><td></td><td>RS-485-2 connection status(2)</td><td>RS-485-2 Information(3)</td></tr>
<tr><td>92~107</td><td></td><td>LAN(Modbus TCP) module connection status(2)</td><td>LAN(Modbus TCP) module Information(3)</td></tr>
<tr><td>108~123</td><td></td><td></td><td></td></tr>
<tr><td>124~139</td><td></td><td></td><td></td></tr>
<tr><td>140~155</td><td></td><td></td><td></td></tr>
<tr><td>200~299</td><td colspan="4">XV Board Data(5)</td></tr>
<tr><td>300~319</td><td colspan="4">PUE Data(6)</td></tr>
<tr><td rowspan="2">1000~20999</td><td colspan="4">Module / Power Meter Data of RS-485-1</td></tr>
<tr><td colspan="4">(1) Each Module/Power Data block contains 1200 addresses.
(2) Each Power Meter Information block contains 50 addresses.</td></tr>
</table>

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	1000~2199	Module/Power Data $_{(Index=1)}$ of RS-485-1$_{(7)}$
	2200~3399	Module/Power Data $_{(Index=2)}$ of RS-485-1$_{(7)}$
	3400~4599	Module/Power Data $_{(Index=3)}$ of RS-485-1$_{(7)}$
	4600~5799	Module/Power Data $_{(Index=4)}$ of RS-485-1$_{(7)}$
	5800~6999	Module/Power Data $_{(Index=5)}$ of RS-485-1$_{(7)}$
	7000~8199	Module/Power Data $_{(Index=6)}$ of RS-485-1$_{(7)}$
	8200~9399	Module/Power Data $_{(Index=7)}$ of RS-485-1$_{(7)}$
	9400~10599	Module/Power Data $_{(Index=8)}$ of RS-485-1$_{(7)}$
	10600~11799	Module/Power Data $_{(Index=9)}$ of RS-485-1$_{(7)}$
	11800~12999	Module/Power Data $_{(Index=10)}$ of RS-485-1$_{(7)}$
	13000~14199	Module/Power Data $_{(Index=11)}$ of RS-485-1$_{(7)}$
	14200~15399	Module/Power Data $_{(Index=12)}$ of RS-485-1$_{(7)}$
	15400~16599	Module/Power Data $_{(Index=13)}$ of RS-485-1$_{(7)}$
	16600~17799	Module/Power Data $_{(Index=14)}$ of RS-485-1$_{(7)}$
	17800~18999	Module/Power Data $_{(Index=15)}$ of RS-485-1$_{(7)}$
	19000~20199	Module/Power Data $_{(Index=16)}$ of RS-485-1$_{(7)}$
	20200~20249	Power Meter Information $_{(Index=1)}$ of RS-485-1$_{(7)}$
	20250~20299	Power Meter Information $_{(Index=2)}$ of RS-485-1$_{(7)}$
	20300~20349	Power Meter Information $_{(Index=3)}$ of RS-485-1$_{(7)}$
	20350~20399	Power Meter Information $_{(Index=4)}$ of RS-485-1$_{(7)}$
	20400~20449	Power Meter Information $_{(Index=5)}$ of RS-485-1$_{(7)}$
	20450~20499	Power Meter Information $_{(Index=6)}$ of RS-485-1$_{(7)}$
	20500~20549	Power Meter Information $_{(Index=7)}$ of RS-485-1$_{(7)}$
	20550~20599	Power Meter Information $_{(Index=8)}$ of RS-485-1$_{(7)}$
	20600~20649	Power Meter Information $_{(Index=9)}$ of RS-485-1$_{(7)}$
	20650~20699	Power Meter Information $_{(Index=10)}$ of RS-485-1$_{(7)}$
	20700~20749	Power Meter Information $_{(Index=11)}$ of RS-485-1$_{(7)}$
	20750~20799	Power Meter Information $_{(Index=12)}$ of RS-485-1$_{(7)}$
	20800~20849	Power Meter Information $_{(Index=13)}$ of RS-485-1$_{(7)}$
	20850~20899	Power Meter Information $_{(Index=14)}$ of RS-485-1$_{(7)}$
	20900~20949	Power Meter Information $_{(Index=15)}$ of RS-485-1$_{(7)}$
	20950~20999	Power Meter Information $_{(Index=16)}$ of RS-485-1$_{(7)}$
21000~40999	Module / Power Meter Data of RS-485-2	
	(1) Each Module/Power Data block contains 1200 addresses. (2) Each Power Meter Information block contains 50 addresses.	

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	21000~22199	Module/Power Data $_{(Index=1)}$ of RS-485-2$_{(7)}$
	22200~23399	Module/Power Data $_{(Index=2)}$ of RS-485-2$_{(7)}$
	23400~24599	Module/Power Data $_{(Index=3)}$ of RS-485-2$_{(7)}$
	24600~25799	Module/Power Data $_{(Index=4)}$ of RS-485-2$_{(7)}$
	25800~26999	Module/Power Data $_{(Index=5)}$ of RS-485-2$_{(7)}$
	27000~28199	Module/Power Data $_{(Index=6)}$ of RS-485-2$_{(7)}$
	28200~29399	Module/Power Data $_{(Index=7)}$ of RS-485-2$_{(7)}$
	29400~30599	Module/Power Data $_{(Index=8)}$ of RS-485-2$_{(7)}$
	30600~31799	Module/Power Data $_{(Index=9)}$ of RS-485-2$_{(7)}$
	31800~32999	Module/Power Data $_{(Index=10)}$ of RS-485-2$_{(7)}$
	33000~34199	Module/Power Data $_{(Index=11)}$ of RS-485-2$_{(7)}$
	34200~35399	Module/Power Data $_{(Index=12)}$ of RS-485-2$_{(7)}$
	35400~36599	Module/Power Data $_{(Index=13)}$ of RS-485-2$_{(7)}$
	36600~37799	Module/Power Data $_{(Index=14)}$ of RS-485-2$_{(7)}$
	37800~38999	Module/Power Data $_{(Index=15)}$ of RS-485-2$_{(7)}$
	39000~40199	Module/Power Data $_{(Index=16)}$ of RS-485-2$_{(7)}$
	40200~40249	Power Meter Information $_{(Index=1)}$ of RS-485-2$_{(7)}$
	40250~40299	Power Meter Information $_{(Index=2)}$ of RS-485-2$_{(7)}$
	40300~40349	Power Meter Information $_{(Index=3)}$ of RS-485-2$_{(7)}$
	40350~40399	Power Meter Information $_{(Index=4)}$ of RS-485-2$_{(7)}$
	40400~40449	Power Meter Information $_{(Index=5)}$ of RS-485-2$_{(7)}$
	40450~40499	Power Meter Information $_{(Index=6)}$ of RS-485-2$_{(7)}$
	40500~40549	Power Meter Information $_{(Index=7)}$ of RS-485-2$_{(7)}$
	40550~40599	Power Meter Information $_{(Index=8)}$ of RS-485-2$_{(7)}$
	40600~40649	Power Meter Information $_{(Index=9)}$ of RS-485-2$_{(7)}$
	40650~40699	Power Meter Information $_{(Index=10)}$ of RS-485-2$_{(7)}$
	40700~40749	Power Meter Information $_{(Index=11)}$ of RS-485-2$_{(7)}$
	40750~40799	Power Meter Information $_{(Index=12)}$ of RS-485-2$_{(7)}$
	40800~40849	Power Meter Information $_{(Index=13)}$ of RS-485-2$_{(7)}$
	40850~40899	Power Meter Information $_{(Index=14)}$ of RS-485-2$_{(7)}$
	40900~40949	Power Meter Information $_{(Index=15)}$ of RS-485-2$_{(7)}$
	40950~40999	Power Meter Information $_{(Index=16)}$ of RS-485-2$_{(7)}$
41000~60999	Module / Power Meter Data of LAN	
	(1) Each Module/Power Data block contains 1200 addresses. (2) Each Power Meter Information block contains 50 addresses.	

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	41000~42199	Module/Power Data $_{(Index=1)}$ of LAN$_{(7)}$
	42200~43399	Module/Power Data $_{(Index=2)}$ of LAN$_{(7)}$
	43400~44599	Module/Power Data $_{(Index=3)}$ of LAN$_{(7)}$
	44600~45799	Module/Power Data $_{(Index=4)}$ of LAN$_{(7)}$
	45800~46999	Module/Power Data $_{(Index=5)}$ of LAN$_{(7)}$
	47000~48199	Module/Power Data $_{(Index=6)}$ of LAN$_{(7)}$
	48200~49399	Module/Power Data $_{(Index=7)}$ of LAN$_{(7)}$
	49400~50599	Module/Power Data $_{(Index=8)}$ of LAN$_{(7)}$
	50600~51799	Module/Power Data $_{(Index=9)}$ of LAN$_{(7)}$
	51800~52999	Module/Power Data $_{(Index=10)}$ of LAN$_{(7)}$
	53000~54199	Module/Power Data $_{(Index=11)}$ of LAN$_{(7)}$
	54200~55399	Module/Power Data $_{(Index=12)}$ of LAN$_{(7)}$
	55400~56599	Module/Power Data $_{(Index=13)}$ of LAN$_{(7)}$
	56600~57799	Module/Power Data $_{(Index=14)}$ of LAN$_{(7)}$
	57800~58999	Module/Power Data $_{(Index=15)}$ of LAN$_{(7)}$
	59000~60199	Module/Power Data $_{(Index=16)}$ of LAN$_{(7)}$
	60200~60249	Power Meter Information $_{(Index=1)}$ of LAN$_{(7)}$
	60250~60299	Power Meter Information $_{(Index=2)}$ of LAN$_{(7)}$
	60300~60349	Power Meter Information $_{(Index=3)}$ of LAN$_{(7)}$
	60350~60399	Power Meter Information $_{(Index=4)}$ of LAN$_{(7)}$
	60400~60449	Power Meter Information $_{(Index=5)}$ of LAN$_{(7)}$
	60450~60499	Power Meter Information $_{(Index=6)}$ of LAN$_{(7)}$
	60500~60549	Power Meter Information $_{(Index=7)}$ of LAN$_{(7)}$
	60550~60599	Power Meter Information $_{(Index=8)}$ of LAN$_{(7)}$
	60600~60649	Power Meter Information $_{(Index=9)}$ of LAN$_{(7)}$
	60650~60699	Power Meter Information $_{(Index=10)}$ of LAN$_{(7)}$
	60700~60749	Power Meter Information $_{(Index=11)}$ of LAN$_{(7)}$
	60750~60799	Power Meter Information $_{(Index=12)}$ of LAN$_{(7)}$
	60800~60849	Power Meter Information $_{(Index=13)}$ of LAN$_{(7)}$
	60850~60899	Power Meter Information $_{(Index=14)}$ of LAN$_{(7)}$
	60900~60949	Power Meter Information $_{(Index=15)}$ of LAN$_{(7)}$
	60950~60999	Power Meter Information $_{(Index=16)}$ of LAN$_{(7)}$

More detailed information for each block please refer to the number in quotes and find the related information in the following section.

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(1) PMC/PMD System Data

This block stores the system information of PMC/PMD, shown as below:

Parameter Name	Modbus Address	Length	Data Type	Range
[1x] Discrete Input, Unit : Coil(8 Bits)				
Local FTP Server	100000	1	Byte	0=Disable 1=Enable
[3x] Input Register, Unit : Register(16 Bits)				
Module Name	300000	1	UInt16	0~65535
Firmware Version	300002	2	Float	Floating Point
Serial Number 1	300004	1	UInt16	0~65535
Serial Number 2	300005	1	UInt16	0~65535
Serial Number 3	300006	1	UInt16	0~65535
Serial Number 4	300007	1	UInt16	0~65535
Serial Number 5	300008	1	UInt16	0~65535
Serial Number 6	300009	1	UInt16	0~65535
Serial Number 7	300010	1	UInt16	0~65535
Serial Number 8	300011	1	UInt16	0~65535
Boot Date(Year)	300012	1	UInt16	1752~
Boot Date(Month)	300013	1	UInt16	1~12
Boot Date(Day)	300014	1	UInt16	1~31
Boot Time(Hour)	300015	1	UInt16	0~23
Boot Time(Minute)	300016	1	UInt16	0~59
Boot Time(Second)	300017	1	UInt16	0~59
Alive Count	300018	1	UInt16	0~65535
Cycle Time	300019	1	UInt16	0~65535(ms)
XV-Board Name	300020	1	UInt16	0~65535
RS-485-1 Connection Status	300021	1	UInt16	0=Offline, 1=Online Each bit represents a module.
RS-485-2 Connection Status	300022	1	UInt16	
LAN Connection Status	300023	1	UInt16	
XV-Board Update Rate	300024	1	UInt16	0~65535(ms)
RS-485-1 Update Rate	300025	1	UInt16	0~65535(ms)
RS-485-2 Update Rate	300026	1	UInt16	0~65535(ms)
Modbus Slave NetID	300028	1	UInt16	1~247
Modbus TCP Port	300029	1	UInt16	1~65535
Web Port	300030	1	UInt16	1~65535
SMS Register Status	300031	1	UInt16	1~65535

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Mobile Network Signal Strength	300032	1	Int16	-32768~32767(dbm)
Mobile Network Signal Strength (Percent)	300033	1	Int16	0, 20, 40, 60, 80, 100
micro SD Free Space	300034	1	UInt16	0~65535(MB)
FTP Upload Status	300035	1	Int16	-1=Initializing 0=Failed 1=Success
Contract Capacity	300036	2	Float	0~99999999(kW)
Carbon Emissions Factor	300038	2	Float	0.001~99999999
Calculation Interval for Demand	300040	1	UInt16	15/30/60(minutes)

(2) RS-485-1 / RS-485-2 / LAN Modules Connection Status

This block stores the connection status of M-7000/DL/IR, power meter and Modbus TCP/RTU modules that are connected to the PMC/PMD, detailed information is shown as below:

Parameter Name	Modbus Address	Length	Data Type	Range
[1x] Discrete Input, Unit : Coil (8 Bits)				
The connection status of M-7000/DL/IR, power meter and Modbus RTU modules that are connected to RS-485-1.	100060-100075	1	Byte	0=Offline 1=Online
The connection status of M-7000/DL/IR, power meter and Modbus RTU modules that are connected to RS-485-2.	100076-100091	1	Byte	0=Offline 1=Online
The connection status of power meter and Modbus TCP modules that are connected to LAN.	100092-100107	1	Byte	0=Offline 1=Online

(3) RS-485-1 / RS-485-2 / LAN Modules Information

This block stores the module type or address information of M-7000/DL/IR, power

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meter and Modbus TCP/RTU modules that are connected to the PMC/PMD. If the module is M-7000/DL/IR or power meter, it will show the module type. If it is the Modbus TCP/RTU module, it will show the Address or NetID of the module. Detailed information is shown as below:

Parameter Name	Modbus Address	Length	Data Type	Range
[3x] Input Register, Unit : Register(16 Bits)				
The module type or address of M-7000/DL/IR, power meter or Modbus RTU modules that are connected to RS-485-1.	300060-300075	1	UInt16	7002 ~ 7088 / 2133 ~ 4324 / Module Address(1~64)
The module type or address of M-7000/DL/IR, power meter or Modbus RTU modules that are connected to RS-485-2.	300076-300091	1	UInt16	7002 ~ 7088 / 2133 ~ 4324 / Module Address(1~64)
The module type or NetID of power meter or Modbus TCP modules that are connected to LAN.	300092-300107	1	UInt16	2133 ~ 4324 / Module NetID(1~247)

(4) Internal Register Data

This block stores the Internal Register data provided by PMC/PMD. For PMC/PMD, it provides 70 sets of Internal Register.

Parameter Name	Modbus Address	Length	Data Type	Range
[4x] Holding Register, Unit : Register(16 Bits)				
Internal Register 1	400060	2	Float	Floating Point
Internal Register 2	400062	2	Float	Floating Point
Internal Register 3	400064	2	Float	Floating Point
Internal Register 4	400066	2	Float	Floating Point
Internal Register 5	400068	2	Float	Floating Point
Internal Register 6	400070	2	Float	Floating Point
Internal Register 7	400072	2	Float	Floating Point
Internal Register 8	400074	2	Float	Floating Point
⋮				

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Internal Register 45	400148	2	Float	Floating Point
Internal Register 46	400150	2	Float	Floating Point
Internal Register 47	400152	2	Float	Floating Point
Internal Register 48	400154	2	Float	Floating Point
⋮				
Internal Register 67	400192	2	Float	Floating Point
Internal Register 68	400194	2	Float	Floating Point
Internal Register 69	400196	2	Float	Floating Point
Internal Register 70	400198	2	Float	Floating Point

(5) XV-Board Data

This block stores information of XV-Board. For different XV-Board modules, the data will be store in different address, the following section shows corresponding address information for different modules.

- **XV107、XV107A**

Parameter Name	Modbus Address	Length	Data Type	Range
Coil Output (0x), Unit : Coil(8 Bits)				
DO Ch.0	000200	1	Byte	0=OFF, 1=ON
DO Ch.1	000201	1	Byte	0=OFF, 1=ON
DO Ch.2	000202	1	Byte	0=OFF, 1=ON
DO Ch.3	000203	1	Byte	0=OFF, 1=ON
DO Ch.4	000204	1	Byte	0=OFF, 1=ON
DO Ch.5	000205	1	Byte	0=OFF, 1=ON
DO Ch.6	000206	1	Byte	0=OFF, 1=ON
DO Ch.7	000207	1	Byte	0=OFF, 1=ON
Discrete Input (1x), Unit : Coil(8 Bits)				
DI Ch.0	100200	1	Byte	0=OFF, 1=ON
DI Ch.1	100201	1	Byte	0=OFF, 1=ON
DI Ch.2	100202	1	Byte	0=OFF, 1=ON
DI Ch.3	100203	1	Byte	0=OFF, 1=ON
DI Ch.4	100204	1	Byte	0=OFF, 1=ON
DI Ch.5	100205	1	Byte	0=OFF, 1=ON
DI Ch.6	100206	1	Byte	0=OFF, 1=ON
DI Ch.7	100207	1	Byte	0=OFF, 1=ON
Input Register (3x), Unit : Register(16 Bits)				

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DI Counter 0	300200	2	Uint32	0~4294967295
DI Counter 1	300202	2	UInt32	0~4294967295
DI Counter 2	300204	2	UInt32	0~4294967295
DI Counter 3	300206	2	UInt32	0~4294967295
DI Counter 4	300208	2	UInt32	0~4294967295
DI Counter 5	300210	2	UInt32	0~4294967295
DI Counter 6	300212	2	UInt32	0~4294967295
DI Counter 7	300214	2	UInt32	0~4294967295

- **XV110**

Parameter Name	Modbus Address	Length	Data Type	Range
Discrete Input (1x), Unit : Coil(8 Bits)				
DI Ch.0	100200	1	Byte	0=OFF, 1=ON
DI Ch.1	100201	1	Byte	0=OFF, 1=ON
DI Ch.2	100202	1	Byte	0=OFF, 1=ON
DI Ch.3	100203	1	Byte	0=OFF, 1=ON
DI Ch.4	100204	1	Byte	0=OFF, 1=ON
DI Ch.5	100205	1	Byte	0=OFF, 1=ON
DI Ch.6	100206	1	Byte	0=OFF, 1=ON
DI Ch.7	100207	1	Byte	0=OFF, 1=ON
DI Ch.8	100208	1	Byte	0=OFF, 1=ON
DI Ch.9	100209	1	Byte	0=OFF, 1=ON
DI Ch.10	100210	1	Byte	0=OFF, 1=ON
DI Ch.11	100211	1	Byte	0=OFF, 1=ON
DI Ch.12	100212	1	Byte	0=OFF, 1=ON
DI Ch.13	100213	1	Byte	0=OFF, 1=ON
DI Ch.14	100214	1	Byte	0=OFF, 1=ON
DI Ch.15	100215	1	Byte	0=OFF, 1=ON
Input Register (3x), Unit : Register(16 Bits)				
DI Counter 0	300200	2	UInt32	0~4294967295
DI Counter 1	300202	2	UInt32	0~4294967295
DI Counter 2	300204	2	UInt32	0~4294967295
DI Counter 3	300206	2	UInt32	0~4294967295
DI Counter 4	300208	2	UInt32	0~4294967295
DI Counter 5	300210	2	UInt32	0~4294967295
DI Counter 6	300212	2	UInt32	0~4294967295

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DI Counter 7	300214	2	UInt32	0~4294967295
DI Counter 8	300216	2	UInt32	0~4294967295
DI Counter 9	300218	2	UInt32	0~4294967295
DI Counter 10	300220	2	UInt32	0~4294967295
DI Counter 11	300222	2	UInt32	0~4294967295
DI Counter 12	300224	2	UInt32	0~4294967295
DI Counter 13	300226	2	UInt32	0~4294967295
DI Counter 14	300228	2	UInt32	0~4294967295
DI Counter 15	300230	2	UInt32	0~4294967295

- **XV111、XV111A**

Parameter Name	Modbus Address	Length	Data Type	Range
Coil Output (0x), Unit : Coil(8 Bits)				
DO Ch.0	000200	1	Byte	0=OFF, 1=ON
DO Ch.1	000201	1	Byte	0=OFF, 1=ON
DO Ch.2	000202	1	Byte	0=OFF, 1=ON
DO Ch.3	000203	1	Byte	0=OFF, 1=ON
DO Ch.4	000204	1	Byte	0=OFF, 1=ON
DO Ch.5	000205	1	Byte	0=OFF, 1=ON
DO Ch.6	000206	1	Byte	0=OFF, 1=ON
DO Ch.7	000207	1	Byte	0=OFF, 1=ON
DO Ch.8	000208	1	Byte	0=OFF, 1=ON
DO Ch.9	000209	1	Byte	0=OFF, 1=ON
DO Ch.10	000210	1	Byte	0=OFF, 1=ON
DO Ch.11	000211	1	Byte	0=OFF, 1=ON
DO Ch.12	000212	1	Byte	0=OFF, 1=ON
DO Ch.13	000213	1	Byte	0=OFF, 1=ON
DO Ch.14	000214	1	Byte	0=OFF, 1=ON
DO Ch.15	000215	1	Byte	0=OFF, 1=ON

- **XV116**

Parameter Name	Modbus Address	Length	Data Type	Range
Coil Output (0x), Unit : Coil(8 Bits)				
DO Ch.0	000200	1	Byte	0=OFF, 1=ON
DO Ch.1	000201	1	Byte	0=OFF, 1=ON

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DO Ch.2	000202	1	Byte	0=OFF, 1=ON
DO Ch.3	000203	1	Byte	0=OFF, 1=ON
DO Ch.4	000204	1	Byte	0=OFF, 1=ON
DO Ch.5	000205	1	Byte	0=OFF, 1=ON
Discrete Input (1x), Unit : Coil(8 Bits)				
DI Ch.0	100200	1	Byte	0=OFF, 1=ON
DI Ch.1	100201	1	Byte	0=OFF, 1=ON
DI Ch.2	100202	1	Byte	0=OFF, 1=ON
DI Ch.3	100203	1	Byte	0=OFF, 1=ON
DI Ch.4	100204	1	Byte	0=OFF, 1=ON
Input Register (3x), Unit : Register(16 Bits)				
DI Counter 0	300200	2	UInt32	0~4294967295
DI Counter 1	300202	2	UInt32	0~4294967295
DI Counter 2	300204	2	UInt32	0~4294967295
DI Counter 3	300206	2	UInt32	0~4294967295
DI Counter 4	300208	2	UInt32	0~4294967295

- **XV306**

Parameter Name	Modbus Address	Length	Data Type	Range
Coil Output (0x), Unit : Coil(8 Bits)				
DO Ch.0	000200	1	Byte	0=OFF, 1=ON
DO Ch.1	000201	1	Byte	0=OFF, 1=ON
DO Ch.2	000202	1	Byte	0=OFF, 1=ON
DO Ch.3	000203	1	Byte	0=OFF, 1=ON
Discrete Input (1x), Unit : Coil(8 Bits)				
DI Ch.0	100200	1	Byte	0=OFF, 1=ON
DI Ch.1	100201	1	Byte	0=OFF, 1=ON
DI Ch.2	100202	1	Byte	0=OFF, 1=ON
DI Ch.3	100203	1	Byte	0=OFF, 1=ON
Input Register (3x), Unit : Register(16 Bits)				
AI Ch.0	300200	2	Float	Floating Point
AI Ch.1	300202	2	Float	Floating Point
AI Ch.2	300204	2	Float	Floating Point
AI Ch.3	300206	2	Float	Floating Point
DI Counter 0	300208	2	UInt32	0~4294967295
DI Counter 1	300210	2	UInt32	0~4294967295

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DI Counter 2	300212	2	UInt32	0~4294967295
DI Counter 3	300214	2	UInt32	0~4294967295

- **XV307**

Parameter Name	Modbus Address	Length	Data Type	Range
Coil Output (0x), Unit : Coil(8 Bits)				
DO Ch.0	000200	1	Byte	0=OFF, 1=ON
DO Ch.1	000201	1	Byte	0=OFF, 1=ON
DO Ch.2	000202	1	Byte	0=OFF, 1=ON
DO Ch.3	000203	1	Byte	0=OFF, 1=ON
Discrete Input (1x), Unit : Coil(8 Bits)				
DI Ch.0	100200	1	Byte	0=OFF, 1=ON
DI Ch.1	100201	1	Byte	0=OFF, 1=ON
DI Ch.2	100202	1	Byte	0=OFF, 1=ON
DI Ch.3	100203	1	Byte	0=OFF, 1=ON
Input Register (3x), Unit : Register(16 Bits)				
DI Counter 0	300200	2	UInt32	0~4294967295
DI Counter 1	300202	2	UInt32	0~4294967295
DI Counter 2	300204	2	UInt32	0~4294967295
DI Counter 3	300206	2	UInt32	0~4294967295
Holding Register (4x), Unit : Register(16 Bits)				
AO Ch.0	400200	2	Float	Floating Point
AO Ch.1	400202	2	Float	Floating Point

- **XV308**

Parameter Name	Modbus Address	Length	Data Type	Range
Coil Output (0x), Unit : Coil(8 Bits)				
DO Ch.0	000200	1	Byte	0=OFF, 1=ON
DO Ch.1	000201	1	Byte	0=OFF, 1=ON
DO Ch.2	000202	1	Byte	0=OFF, 1=ON
DO Ch.3	000203	1	Byte	0=OFF, 1=ON
DO Ch.4	000204	1	Byte	0=OFF, 1=ON
DO Ch.5	000205	1	Byte	0=OFF, 1=ON
DO Ch.6	000206	1	Byte	0=OFF, 1=ON
DO Ch.7	000207	1	Byte	0=OFF, 1=ON

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Discrete Input (1x), Unit : Coil(8 Bits)				
DI Ch.0	100200	1	Byte	0=OFF, 1=ON
DI Ch.1	100201	1	Byte	0=OFF, 1=ON
DI Ch.2	100202	1	Byte	0=OFF, 1=ON
DI Ch.3	100203	1	Byte	0=OFF, 1=ON
DI Ch.4	100204	1	Byte	0=OFF, 1=ON
DI Ch.5	100205	1	Byte	0=OFF, 1=ON
DI Ch.6	100206	1	Byte	0=OFF, 1=ON
DI Ch.7	100207	1	Byte	0=OFF, 1=ON
Input Register (3x), Unit : Register(16 Bits)				
AI Ch.0	300200	2	Float	Floating Point
AI Ch.1	300202	2	Float	Floating Point
AI Ch.2	300204	2	Float	Floating Point
AI Ch.3	300206	2	Float	Floating Point
AI Ch.4	300208	2	Float	Floating Point
AI Ch.5	300210	2	Float	Floating Point
AI Ch.6	300212	2	Float	Floating Point
AI Ch.7	300214	2	Float	Floating Point
DI Counter 0	300216	2	UInt32	0~4294967295
DI Counter 1	300218	2	UInt32	0~4294967295
DI Counter 2	300220	2	UInt32	0~4294967295
DI Counter 3	300222	2	UInt32	0~4294967295
DI Counter 4	300224	2	UInt32	0~4294967295
DI Counter 5	300226	2	UInt32	0~4294967295
DI Counter 6	300228	2	UInt32	0~4294967295
DI Counter 7	300230	2	UInt32	0~4294967295

- **XV310**

Parameter Name	Modbus Address	Length	Data Type	Range
Coil Output (0x), Unit : Coil(8 Bits)				
DO Ch.0	000200	1	Byte	0=OFF, 1=ON
DO Ch.1	000201	1	Byte	0=OFF, 1=ON
DO Ch.2	000202	1	Byte	0=OFF, 1=ON
DO Ch.3	000203	1	Byte	0=OFF, 1=ON
Discrete Input (1x), Unit : Coil(8 Bits)				
DI Ch.0	100200	1	Byte	0=OFF, 1=ON

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DI Ch.1	100201	1	Byte	0=OFF, 1=ON
DI Ch.2	100202	1	Byte	0=OFF, 1=ON
DI Ch.3	100203	1	Byte	0=OFF, 1=ON
Input Register (3x), Unit : Register(16 Bits)				
AI Ch.0	300200	2	Float	Floating Point
AI Ch.1	300202	2	Float	Floating Point
AI Ch.2	300204	2	Float	Floating Point
AI Ch.3	300206	2	Float	Floating Point
DI Counter 0	300208	2	UInt32	0~4294967295
DI Counter 1	300210	2	UInt32	0~4294967295
DI Counter 2	300212	2	UInt32	0~4294967295
DI Counter 3	300214	2	UInt32	0~4294967295
Holding Register (4x), Unit : Register(16 Bits)				
AO Ch.0	400200	2	Float	Floating Point
AO Ch.1	400202	2	Float	Floating Point

(6) PUE Data

This block stores information of 10 user-defined PUEs.

Parameter Name	Modbus Address	Length	Data Type	Range
[3x] Input Register, Unit : Register(16 Bits)				
PUE 1	300300	2	Float	Floating Point
PUE 2	300302	2	Float	Floating Point
PUE 3	300304	2	Float	Floating Point
PUE 4	300306	2	Float	Floating Point
PUE 5	300308	2	Float	Floating Point
PUE 6	300310	2	Float	Floating Point
PUE 7	300312	2	Float	Floating Point
PUE 8	300314	2	Float	Floating Point
PUE 9	300316	2	Float	Floating Point
PUE 10	300318	2	Float	Floating Point

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(7) Module Data

This block stores all I/O channel data of M-7000/DL/IR modules, power data of power meters and I/O channel data of Modbus TCP/RTU modules. Depend on different configuration of I/O modules and power meters, the arrangement of data block will be different. Detailed information is shown as below：

1. Make sure which connection port (RS-485-1, RS-485-2 or LAN), and which index number the module is.

Connection port	Starting Modbus address of Module/Power data(1)	Starting Modbus address of Power Meter Information(2)
RS-485-1	1000	20200
RS-485-2	21000	40200
LAN	41000	60200

2. [Module/Power Data]Calculate the value of SA (The starting Modbus address of the data block of the module) based on the type of the connection port and the index number.
   SA = The starting Modbus address of Module/Power data(1) of the connection port + (Module/Power Meter Index number - 1) x 1200
3. [Power Meter Information] Calculate the value of PM_SA (The starting Modbus address of basic information block of the power meter) based on the type of the connection port and the index number.
   PM_SA = The starting Modbus address of Power Meter Information(2) of the connection port + (Power Meter Index number - 1) x 50
4. Check the Modbus Address Table of each type module (shown as below), to calculate the real I/O channel Modbus Address or real Loop (or Phase) power data Modbus Address with SA value for the M-7000/DL, power meter and Modbus TCP/RTU module that are connected to PMC/PMD.
5. Check the Modbus Address Table of each type power meter (shown as below), to calculate the real power meter attributes Modbus Address with PM_SA value for the power meter that are connected to PMC/PMD.

For example: Assume there is an M-7024 module connected to the RS-485-2 of PMC/PMD. Its module index number is 3. So the SA value of the M-7024 is 21000 + (3 – 1) x 200) = 23400. The Modbus Address of the AO channel 2 of the module is 23400 + 04 = 23404. The M-7000/DL module Modbus Address Table is shown as below:

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- **M-7002 (5 DI、4 DO、4 AI channel)**

Parameter Name	Modbus Address	Length	Data Type	Range
[0x] Coil Output, Unit : Coil(8 Bits)				
DO Ch.0	SA + 000000	1	Byte	0=OFF, 1=ON
DO Ch.1	SA + 000001	1	Byte	0=OFF, 1=ON
DO Ch.2	SA + 000002	1	Byte	0=OFF, 1=ON
DO Ch.3	SA + 000003	1	Byte	0=OFF, 1=ON
DO Ch.4	SA + 000000	1	Byte	0=OFF, 1=ON
[1x] Discrete Input, Unit : Coil (8 Bits)				
DI Ch.0	SA + 100000	1	Byte	0=OFF, 1=ON
DI Ch.1	SA + 100001	1	Byte	0=OFF, 1=ON
DI Ch.2	SA + 100002	1	Byte	0=OFF, 1=ON
DI Ch.3	SA + 100003	1	Byte	0=OFF, 1=ON
DI Ch.4	SA + 100004	1	Byte	0=OFF, 1=ON
[3x] Input Register, Unit : Register(16 Bits)				
AI Ch.0	SA + 300000	2	Float	Floating Point
AI Ch.1	SA + 300002	2	Float	Floating Point
AI Ch.2	SA + 300004	2	Float	Floating Point
AI Ch.3	SA + 300006	2	Float	Floating Point
DI Counter 0	SA + 300008	1	UInt16	0~65535
DI Counter 1	SA + 300009	1	UInt16	0~65535
DI Counter 2	SA + 300010	1	UInt16	0~65535
DI Counter 3	SA + 300011	1	UInt16	0~65535
DI Counter 4	SA + 300012	1	UInt16	0~65535

- **M-7005 (6 DO、8 AI channel)**

Parameter Name	Modbus Address	Length	Data Type	Range
[0x] Coils Output, Unit : Coil(8 Bits)				
DO Ch.0	SA + 000000	1	Byte	0=OFF, 1=ON
DO Ch.1	SA + 000001	1	Byte	0=OFF, 1=ON
DO Ch.2	SA + 000002	1	Byte	0=OFF, 1=ON
DO Ch.3	SA + 000003	1	Byte	0=OFF, 1=ON
DO Ch.4	SA + 000004	1	Byte	0=OFF, 1=ON
DO Ch.5	SA + 000005	1	Byte	0=OFF, 1=ON

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[3x] Input Register, Unit : Register(16 Bits)				
AI Ch.0	SA + 300000	2	Float	Floating Point
AI Ch.1	SA + 300002	2	Float	Floating Point
AI Ch.2	SA + 300004	2	Float	Floating Point
AI Ch.3	SA + 300006	2	Float	Floating Point
AI Ch.4	SA + 300008	2	Float	Floating Point
AI Ch.5	SA + 300010	2	Float	Floating Point
AI Ch.6	SA + 300012	2	Float	Floating Point
AI Ch.7	SA + 300014	2	Float	Floating Point

- **M-7011 (1 DI、2 DO、1 AI channel)**

Parameter Name	Modbus Address	Length	Data Type	Range
[0x] Coils Output, Unit : Coil(8 Bits)				
DO Ch.0	SA + 000000	1	Byte	0=OFF, 1=ON
DO Ch.1	SA + 000001	1	Byte	0=OFF, 1=ON
[1x] Discrete Input, Unit : Coil (8 Bits)				
DI Ch.0	SA + 100000	1	Byte	0=OFF, 1=ON
[3x] Input Register, Unit : Register(16 Bits)				
AI Ch.0	SA + 300000	2	Float	Floating Point
DI Counter 0	SA + 300002	1	UInt16	0~65535

- **M-7015、M-7015P (6 AI channel)**

Parameter Name	Modbus Address	Length	Data Type	Range
[3x] Input Register, Unit : Register(16 Bits)				
AI Ch.0	SA + 300000	2	Float	Floating Point
AI Ch.1	SA + 300002	2	Float	Floating Point
AI Ch.2	SA + 300004	2	Float	Floating Point
AI Ch.3	SA + 300006	2	Float	Floating Point
AI Ch.4	SA + 300008	2	Float	Floating Point
AI Ch.5	SA + 300010	2	Float	Floating Point

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- **M-7016 (1 DI、4 DO、2 AI、1 AO channel)**

Parameter Name	Modbus Address	Length	Data Type	Range
[0x] Coils Output, Unit : Coil(8 Bits)				
DO Ch.0	SA + 000000	1	Byte	0=OFF, 1=ON
DO Ch.1	SA + 000001	1	Byte	0=OFF, 1=ON
DO Ch.2	SA + 000002	1	Byte	0=OFF, 1=ON
DO Ch.3	SA + 000003	1	Byte	0=OFF, 1=ON
[1x] Discrete Input, Unit : Coil (8 Bits)				
DI Ch.0	SA + 100000	1	Byte	0=OFF, 1=ON
[3x] Input Register, Unit : Register(16 Bits)				
AI Ch.0	SA + 300000	2	Float	Floating Point
AI Ch.1	SA + 300002	2	Float	Floating Point
DI Counter 0	SA + 300004	1	UInt16	0~65535
[4x] Holding Register, Unit : Register(16 Bits)				
AO Ch.0	SA + 400000	2	Float	Floating Point

- **M-7017、M-7017R、M-7017C、M-7017RC、M-7017R-A5、M-7018、M-7018R、M-7019R (8 AI channel)**

Parameter Name	Modbus Address	Length	Data Type	Range
[3x] Input Register, Unit : Register(16 Bits)				
AI Ch.0	SA + 300000	2	Float	Floating Point
AI Ch.1	SA + 300002	2	Float	Floating Point
AI Ch.2	SA + 300004	2	Float	Floating Point
AI Ch.3	SA + 300006	2	Float	Floating Point
AI Ch.4	SA + 300008	2	Float	Floating Point
AI Ch.5	SA + 300010	2	Float	Floating Point
AI Ch.6	SA + 300012	2	Float	Floating Point
AI Ch.7	SA + 300014	2	Float	Floating Point

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- **M-7017Z (10 Differential AI channel)**

Parameter Name	Modbus Address	Length	Data Type	Range
[3x] Input Register, Unit : Register(16 Bits)				
AI Ch.0	SA + 300000	2	Float	Floating Point
AI Ch.1	SA + 300002	2	Float	Floating Point
AI Ch.2	SA + 300004	2	Float	Floating Point
AI Ch.3	SA + 300006	2	Float	Floating Point
AI Ch.4	SA + 300008	2	Float	Floating Point
AI Ch.5	SA + 300010	2	Float	Floating Point
AI Ch.6	SA + 300012	2	Float	Floating Point
AI Ch.7	SA + 300014	2	Float	Floating Point
AI Ch.8	SA + 300016	2	Float	Floating Point
AI Ch.9	SA + 300018	2	Float	Floating Point

- **M-7017Z (20 Single-Ended AI channel)**

Parameter Name	Modbus Address	Length	Data Type	Range
[3x] Input Register, Unit : Register(16 Bits)				
AI Ch.0	SA + 300000	2	Float	Floating Point
AI Ch.1	SA + 300002	2	Float	Floating Point
AI Ch.2	SA + 300004	2	Float	Floating Point
AI Ch.3	SA + 300006	2	Float	Floating Point
AI Ch.4	SA + 300008	2	Float	Floating Point
AI Ch.5	SA + 300010	2	Float	Floating Point
AI Ch.6	SA + 300012	2	Float	Floating Point
AI Ch.7	SA + 300014	2	Float	Floating Point
AI Ch.8	SA + 300016	2	Float	Floating Point
AI Ch.9	SA + 300018	2	Float	Floating Point
AI Ch.10	SA + 300020	2	Float	Floating Point
AI Ch.11	SA + 300022	2	Float	Floating Point
AI Ch.12	SA + 300024	2	Float	Floating Point
AI Ch.13	SA + 300026	2	Float	Floating Point
AI Ch.14	SA + 300028	2	Float	Floating Point
AI Ch.15	SA + 300030	2	Float	Floating Point

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AI Ch.16	SA + 300032	2	Float	Floating Point
AI Ch.17	SA + 300034	2	Float	Floating Point
AI Ch.18	SA + 300036	2	Float	Floating Point
AI Ch.19	SA + 300038	2	Float	Floating Point

- **M-7018Z、M-7019Z (10 AI channel)**

Parameter Name	Modbus Address	Length	Data Type	Range
[3x] Input Register, Unit : Register(16 Bits)				
AI Ch.0	SA + 300000	2	Float	Floating Point
AI Ch.1	SA + 300002	2	Float	Floating Point
AI Ch.2	SA + 300004	2	Float	Floating Point
AI Ch.3	SA + 300006	2	Float	Floating Point
AI Ch.4	SA + 300008	2	Float	Floating Point
AI Ch.5	SA + 300010	2	Float	Floating Point
AI Ch.6	SA + 300012	2	Float	Floating Point
AI Ch.7	SA + 300014	2	Float	Floating Point
AI Ch.8	SA + 300016	2	Float	Floating Point
AI Ch.9	SA + 300018	2	Float	Floating Point

- **M-7022 (2 AO channel)**

Parameter Name	Modbus Address	Length	Data Type	Range
[4x] Holding Register, Unit : Register(16 Bits)				
AO Ch.0	SA + 400000	2	Float	Floating Point
AO Ch.1	SA + 400002	2	Float	Floating Point

- **M-7024 (4 AO channel)**

Parameter Name	Modbus Address	Length	Data Type	Range
[4x] Holding Register, Unit : Register(16 Bits)				
AO Ch.0	SA + 400000	2	Float	Floating Point
AO Ch.1	SA + 400002	2	Float	Floating Point
AO Ch.2	SA + 400004	2	Float	Floating Point
AO Ch.3	SA + 400006	2	Float	Floating Point

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- **M-7024R (5 DI、4 AO channel)**

Parameter Name	Modbus Address	Length	Data Type	Range
[1x] Discrete Input, Unit : Coil (8 Bits)				
DI Ch.0	SA + 100000	1	Byte	0=OFF, 1=ON
DI Ch.1	SA + 100001	1	Byte	0=OFF, 1=ON
DI Ch.2	SA + 100002	1	Byte	0=OFF, 1=ON
DI Ch.3	SA + 100003	1	Byte	0=OFF, 1=ON
DI Ch.4	SA + 100004	1	Byte	0=OFF, 1=ON
[3x] Input Register, Unit : Register(16 Bits)				
DI Counter 0	SA + 300000	1	UInt16	0~65535
DI Counter 1	SA + 300001	1	UInt16	0~65535
DI Counter 2	SA + 300002	1	UInt16	0~65535
DI Counter 3	SA + 300003	1	UInt16	0~65535
DI Counter 4	SA + 300004	1	UInt16	0~65535
[4x] Holding Register, Unit : Register(16 Bits)				
AO Ch.0	SA + 400000	2	Float	Floating Point
AO Ch.1	SA + 400002	2	Float	Floating Point
AO Ch.2	SA + 400004	2	Float	Floating Point
AO Ch.3	SA + 400006	2	Float	Floating Point

- **M-7000 DI/DO Module (Maximum 16 DI channel / 16 DO channel)**

  By the channel numbers of M-7000 DI/DO Module, the user can look up the address of the M-7000 DI/DO Module channel from the following table:

Parameter Name	Modbus Address	Length	Data Type	Range
[0x] Coil Output, Unit : Coil(8 Bits)				
DO Ch.0	SA + 000000	1	Byte	0=OFF, 1=ON
DO Ch.1	SA + 000001	1	Byte	0=OFF, 1=ON
DO Ch.2	SA + 000002	1	Byte	0=OFF, 1=ON
DO Ch.3	SA + 000003	1	Byte	0=OFF, 1=ON
DO Ch.4	SA + 000004	1	Byte	0=OFF, 1=ON
DO Ch.5	SA + 000005	1	Byte	0=OFF, 1=ON
DO Ch.6	SA + 000006	1	Byte	0=OFF, 1=ON
DO Ch.7	SA + 000007	1	Byte	0=OFF, 1=ON
DO Ch.8	SA + 000008	1	Byte	0=OFF, 1=ON

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DO Ch.9	SA + 000009	1	Byte	0=OFF, 1=ON
DO Ch.10	SA + 000010	1	Byte	0=OFF, 1=ON
DO Ch.11	SA + 000011	1	Byte	0=OFF, 1=ON
DO Ch.12	SA + 000012	1	Byte	0=OFF, 1=ON
DO Ch.13	SA + 000013	1	Byte	0=OFF, 1=ON
DO Ch.14	SA + 000014	1	Byte	0=OFF, 1=ON
DO Ch.15	SA + 000015	1	Byte	0=OFF, 1=ON
[1x] Discrete Input, Unit : Coil (8 Bits)				
DI Ch.0	SA + 100000	1	Byte	0=OFF, 1=ON
DI Ch.1	SA + 100001	1	Byte	0=OFF, 1=ON
DI Ch.2	SA + 100002	1	Byte	0=OFF, 1=ON
DI Ch.3	SA + 100003	1	Byte	0=OFF, 1=ON
DI Ch.4	SA + 100004	1	Byte	0=OFF, 1=ON
DI Ch.5	SA + 100005	1	Byte	0=OFF, 1=ON
DI Ch.6	SA + 100006	1	Byte	0=OFF, 1=ON
DI Ch.7	SA + 100007	1	Byte	0=OFF, 1=ON
DI Ch.8	SA + 100008	1	Byte	0=OFF, 1=ON
DI Ch.9	SA + 100009	1	Byte	0=OFF, 1=ON
DI Ch.10	SA + 100010	1	Byte	0=OFF, 1=ON
DI Ch.11	SA + 100011	1	Byte	0=OFF, 1=ON
DI Ch.12	SA + 100012	1	Byte	0=OFF, 1=ON
DI Ch.13	SA + 100013	1	Byte	0=OFF, 1=ON
DI Ch.14	SA + 100014	1	Byte	0=OFF, 1=ON
DI Ch.15	SA + 100015	1	Byte	0=OFF, 1=ON
[3x] Input Register, Unit : Register(16 Bits)				
DI Counter 0	SA + 300000	1	UInt16	0~65535
DI Counter 1	SA + 300001	1	UInt16	0~65535
DI Counter 2	SA + 300002	1	UInt16	0~65535
DI Counter 3	SA + 300003	1	UInt16	0~65535
DI Counter 4	SA + 300004	1	UInt16	0~65535
DI Counter 5	SA + 300005	1	UInt16	0~65535
DI Counter 6	SA + 300006	1	UInt16	0~65535
DI Counter 7	SA + 300007	1	UInt16	0~65535
DI Counter 8	SA + 300008	1	UInt16	0~65535
DI Counter 9	SA + 300009	1	UInt16	0~65535
DI Counter 10	SA + 300010	1	UInt16	0~65535
DI Counter 11	SA + 300011	1	UInt16	0~65535

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DI Counter 12	SA + 300012	1	UInt16	0~65535
DI Counter 13	SA + 300013	1	UInt16	0~65535
DI Counter 14	SA + 300014	1	UInt16	0~65535
DI Counter 15	SA + 300015	1	UInt16	0~65535

- **M-7080、M-7080B (2 Counter/Frequency、2 DO channel)**

Parameter Name	Modbus Address	Length	Data Type	Range
[0x] Coils Output, Unit : Coil(8 Bits)				
DO Ch.0	SA + 000000	1	Byte	0=OFF, 1=ON
DO Ch.1	SA + 000001	1	Byte	0=OFF, 1=ON
[3x] Input Register, Unit : Register(16 Bits)				
DI Counter 0	SA + 300000	2	UInt32	0~4294967295
DI Counter 1	SA + 300002	2	UInt32	0~4294967295

- **M-7084 (8 Counter/Frequency)**

Parameter Name	Modbus Address	Length	Data Type	Range
[3x] Input Register, Unit : Register(16 Bits)				
DI Counter 0	SA + 300000	2	UInt32	0~4294967295
DI Counter 1	SA + 300002	2	UInt32	0~4294967295
DI Counter 2	SA + 300004	2	UInt32	0~4294967295
DI Counter 3	SA + 300006	2	UInt32	0~4294967295
DI Counter 4	SA + 300008	2	UInt32	0~4294967295
DI Counter 5	SA + 300010	2	UInt32	0~4294967295
DI Counter 6	SA + 300012	2	UInt32	0~4294967295
DI Counter 7	SA + 300014	2	UInt32	0~4294967295

- **M-7088 (8 DI、8 PWM Output channel)**

Parameter Name	Modbus Address	Length	Data Type	Range
[0x] Coils Output, Unit : Coil(8 Bits)				
PWM Output Ch.0	SA + 000000	1	Byte	0=OFF, 1=ON
PWM Output Ch.1	SA + 000001	1	Byte	0=OFF, 1=ON

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PWM Output Ch.2	SA + 000002	1	Byte	0=OFF, 1=ON
PWM Output Ch.3	SA + 000003	1	Byte	0=OFF, 1=ON
PWM Output Ch.4	SA + 000004	1	Byte	0=OFF, 1=ON
PWM Output Ch.5	SA + 000005	1	Byte	0=OFF, 1=ON
PWM Output Ch.6	SA + 000006	1	Byte	0=OFF, 1=ON
PWM Output Ch.7	SA + 000007	1	Byte	0=OFF, 1=ON
[1x] Discrete Input, Unit : Coil (8 Bits)				
DI Ch.0	SA + 100000	1	Byte	0=OFF, 1=ON
DI Ch.1	SA + 100001	1	Byte	0=OFF, 1=ON
DI Ch.2	SA + 100002	1	Byte	0=OFF, 1=ON
DI Ch.3	SA + 100003	1	Byte	0=OFF, 1=ON
DI Ch.4	SA + 100004	1	Byte	0=OFF, 1=ON
DI Ch.5	SA + 100005	1	Byte	0=OFF, 1=ON
DI Ch.6	SA + 100006	1	Byte	0=OFF, 1=ON
DI Ch.7	SA + 100007	1	Byte	0=OFF, 1=ON
[3x] Input Register, Unit : Register(16 Bits)				
DI Counter 0	SA + 300000	2	UInt32	0~4294967295
DI Counter 1	SA + 300002	2	UInt32	0~4294967295
DI Counter 2	SA + 300004	2	UInt32	0~4294967295
DI Counter 3	SA + 300006	2	UInt32	0~4294967295
DI Counter 4	SA + 300008	2	UInt32	0~4294967295
DI Counter 5	SA + 300010	2	UInt32	0~4294967295
DI Counter 6	SA + 300012	2	UInt32	0~4294967295
DI Counter 7	SA + 300014	2	UInt32	0~4294967295

- **DL-100 (Temperature、Humidity)**

Parameter Name	Modbus Address	Length	Data Type	Range
[3x] Input Register, Unit : Register(16 Bits)				
Humidity	SA + 300000	2	Float	Floating Point
Temperature(℃)	SA + 300002	2	Float	Floating Point
Temperature(℉)	SA + 300004	2	Float	Floating Point

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- **DL-302 (CO2、Temperature、Humidity、1 DO Channel)**

Parameter Name	Modbus Address	Length	Data Type	Range
[0x] Coil Output, Unit : Coil(8 Bits)				
DO Ch.0	**SA + 000000**	**1**	**Byte**	**0=OFF, 1=ON**
[3x] Input Register, Unit : Register(16 Bits)				
CO2	**SA + 300000**	**2**	**Float**	**Floating Point**
Humidity	**SA + 300002**	**2**	**Float**	**Floating Point**
Temperature(℃)	SA + 300004	2	Float	Floating Point
Temperature(℉)	SA + 300006	2	Float	Floating Point
Dew Point(℃)	SA + 300008	2	Float	Floating Point
Dew Point(℉)	SA + 300010	2	Float	Floating Point

- **IR-210**

Parameter Name	Modbus Address	Length	Data Type	Range
[4x] Holding Register, Unit : Register(16 Bits)				
IR Command	SA + 400000	1	UInt16	1~224
IR Output Channels	SA + 400001	1	Uint16	1~63 The LSB represents ch.1.

- **IR-712、IR-712A**

Parameter Name	Modbus Address	Length	Data Type	Range
[4x] Holding Register, Unit : Register(16 Bits)				
IR Command	SA + 400000	1	UInt16	IR-712:1~36 IR-712A:1~224
IR Output Channels	SA + 400001	1	Uint16	1~3 The LSB represents ch.1.

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- **PM-2133**

Parameter Name		Modbus Address	Length	Data Type	Range
[3x] Input Register, Unit : Register(16 Bits)					
Phase A	V	SA + 300000	2	Float	Floating Point
	I	SA + 300002	2	Float	Floating Point
	kW	SA + 300004	2	Float	Floating Point
	kvar	SA + 300006	2	Float	Floating Point
	kVA	SA + 300008	2	Float	Floating Point
	PF	SA + 300010	2	Float	Floating Point
	kWh	SA + 300012	2	Float	Floating Point
	kvarh	SA + 300014	2	Float	Floating Point
	kVAh	SA + 300016	2	Float	Floating Point
Phase B	V	SA + 300018	2	Float	Floating Point
	I	SA + 300020	2	Float	Floating Point
	kW	SA + 300022	2	Float	Floating Point
	kvar	SA + 300024	2	Float	Floating Point
	kVA	SA + 300026	2	Float	Floating Point
	PF	SA + 300028	2	Float	Floating Point
	kWh	SA + 300030	2	Float	Floating Point
	kvarh	SA + 300032	2	Float	Floating Point
	kVAh	SA + 300034	2	Float	Floating Point
Phase C	V	SA + 300036	2	Float	Floating Point
	I	SA + 300038	2	Float	Floating Point
	kW	SA + 300040	2	Float	Floating Point
	kvar	SA + 300042	2	Float	Floating Point
	kVA	SA + 300044	2	Float	Floating Point
	PF	SA + 300046	2	Float	Floating Point
	kWh	SA + 300048	2	Float	Floating Point
	kvarh	SA + 300050	2	Float	Floating Point
	kVAh	SA + 300052	2	Float	Floating Point
Total / Average	V	SA + 300054	2	Float	Floating Point
	I	SA + 300056	2	Float	Floating Point
	kW	SA + 300058	2	Float	Floating Point
	kvar	SA + 300060	2	Float	Floating Point
	kVA	SA + 300062	2	Float	Floating Point

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	PF	SA + 300064	2	Float	Floating Point
	kWh	SA + 300066	2	Float	Floating Point
	kvarh	SA + 300068	2	Float	Floating Point
	kVAh	SA + 300070	2	Float	Floating Point
Phase A	15/30/60 mins Actual Demand	SA + 300072	2	Float	Floating Point
	15/30/60 mins Forecast Demand	SA + 300074	2	Float	Floating Point
	Max. Demand (Hourly)	SA + 300076	2	Float	Floating Point
	Max. Demand (Daily)	SA + 300078	2	Float	Floating Point
	Max. Demand (Monthly)	SA + 300080	2	Float	Floating Point
	Daily Accumulated Electricity	SA + 300082	2	Float	Floating Point
	Monthly Accumulated Electricity	SA + 300084	2	Float	Floating Point
	Yearly Accumulated Electricity	SA + 300086	2	Float	Floating Point
Phase B	15/30/60 mins Actual Demand	SA + 300088	2	Float	Floating Point
	15/30/60 mins Forecast Demand	SA + 300090	2	Float	Floating Point
	Max. Demand (Hourly)	SA + 300092	2	Float	Floating Point
	Max. Demand (Daily)	SA + 300094	2	Float	Floating Point
	Max. Demand (Monthly)	SA + 300096	2	Float	Floating Point
	Daily Accumulated Electricity	SA + 300098	2	Float	Floating Point
	Monthly Accumulated Electricity	SA + 300100	2	Float	Floating Point

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	Yearly Accumulated Electricity	SA + 300102	2	Float	Floating Point
Phase C	15/30/60 mins Actual Demand	SA + 300104	2	Float	Floating Point
	15/30/60 mins Forecast Demand	SA + 300106	2	Float	Floating Point
	Max. Demand (Hourly)	SA + 300108	2	Float	Floating Point
	Max. Demand (Daily)	SA + 300110	2	Float	Floating Point
	Max. Demand (Monthly)	SA + 300112	2	Float	Floating Point
	Daily Accumulated Electricity	SA + 300114	2	Float	Floating Point
	Monthly Accumulated Electricity	SA + 300116	2	Float	Floating Point
	Yearly Accumulated Electricity	SA + 300118	2	Float	Floating Point
Total / Average	15/30/60 mins Actual Demand	SA + 300120	2	Float	Floating Point
	15/30/60 mins Forecast Demand	SA + 300122	2	Float	Floating Point
	Max. Demand (Hourly)	SA + 300124	2	Float	Floating Point
	Max. Demand (Daily)	SA + 300126	2	Float	Floating Point
	Max. Demand (Monthly)	SA + 300128	2	Float	Floating Point
	Daily Accumulated Electricity	SA + 300130	2	Float	Floating Point
	Monthly Accumulated Electricity	SA + 300132	2	Float	Floating Point

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	Yearly Accumulated Electricity	SA + 300134	2	Float	Floating Point
[3x] Input Register, Unit : Register(16 Bits)					
Power Meter Type		PM_SA + 300000	1	Int16	2133
Reserved		PM_SA + 300001	1	-	Reserved
Reserved		PM_SA + 300002	1	-	Reserved
Firmware Version		PM_SA + 300003	1	BCD	0x0100~
Address		PM_SA + 300004	1	UInt16	1~247
Error Code		PM_SA + 300005	1	UInt16	-1=Initializing 0=Failed 1=Success
Reserved		PM_SA + 300011	1	-	Reserved
PT Ratio		PM_SA + 300012	2	Float	0.01~655.35
CTRatio		PM_SA + 300014	2	Float	1~65535

- **PM-2134**

Parameter Name		Modbus Address	Length	Data Type	Range
[3x]Input Register, Unit : Register(16 Bits)					
CT1	V	SA + 300000	2	Float	Floating Point
	I	SA + 300002	2	Float	Floating Point
	kW	SA + 300004	2	Float	Floating Point
	kvar	SA + 300006	2	Float	Floating Point
	kVA	SA + 300008	2	Float	Floating Point
	PF	SA + 300010	2	Float	Floating Point
	kWh	SA + 300012	2	Float	Floating Point
	kvarh	SA + 300014	2	Float	Floating Point
	kVAh	SA + 300016	2	Float	Floating Point
CT2	V	SA + 300018	2	Float	Floating Point
	I	SA + 300020	2	Float	Floating Point
	kW	SA + 300022	2	Float	Floating Point
	kvar	SA + 300024	2	Float	Floating Point
	kVA	SA + 300026	2	Float	Floating Point
	PF	SA + 300028	2	Float	Floating Point
	kWh	SA + 300030	2	Float	Floating Point

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	kvarh	SA + 300032	2	Float	Floating Point
	kVAh	SA + 300034	2	Float	Floating Point
CT3	V	SA + 300036	2	Float	Floating Point
	I	SA + 300038	2	Float	Floating Point
	kW	SA + 300040	2	Float	Floating Point
	kvar	SA + 300042	2	Float	Floating Point
	kVA	SA + 300044	2	Float	Floating Point
	PF	SA + 300046	2	Float	Floating Point
	kWh	SA + 300048	2	Float	Floating Point
	kvarh	SA + 300050	2	Float	Floating Point
	kVAh	SA + 300052	2	Float	Floating Point
CT4	V	SA + 300054	2	Float	Floating Point
	I	SA + 300056	2	Float	Floating Point
	kW	SA + 300058	2	Float	Floating Point
	kvar	SA + 300060	2	Float	Floating Point
	kVA	SA + 300062	2	Float	Floating Point
	PF	SA + 300064	2	Float	Floating Point
	kWh	SA + 300066	2	Float	Floating Point
	kvarh	SA + 300068	2	Float	Floating Point
	kVAh	SA + 300070	2	Float	Floating Point
CT1	15/30/60 mins Actual Demand	SA + 300072	2	Float	Floating Point
	15/30/60 mins Forecast Demand	SA + 300074	2	Float	Floating Point
	Max. Demand (Hourly)	SA + 300076	2	Float	Floating Point
	Max. Demand (Daily)	SA + 300078	2	Float	Floating Point
	Max. Demand (Monthly)	SA + 300080	2	Float	Floating Point
	Daily Accumulated Electricity	SA + 300082	2	Float	Floating Point
	Monthly Accumulated Electricity	SA + 300084	2	Float	Floating Point
	Yearly	SA + 300086	2	Float	Floating Point

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	Accumulated Electricity				
CT2	15/30/60 mins Actual Demand	SA + 300088	2	Float	Floating Point
	15/30/60 mins Forecast Demand	SA + 300090	2	Float	Floating Point
	Max. Demand (Hourly)	SA + 300092	2	Float	Floating Point
	Max. Demand (Daily)	SA + 300094	2	Float	Floating Point
	Max. Demand (Monthly)	SA + 300096	2	Float	Floating Point
	Daily Accumulated Electricity	SA + 300098	2	Float	Floating Point
	Monthly Accumulated Electricity	SA + 300100	2	Float	Floating Point
	Yearly Accumulated Electricity	SA + 300102	2	Float	Floating Point
CT3	15/30/60 mins Actual Demand	SA + 300104	2	Float	Floating Point
	15/30/60 mins Forecast Demand	SA + 300106	2	Float	Floating Point
	Max. Demand (Hourly)	SA + 300108	2	Float	Floating Point
	Max. Demand (Daily)	SA + 300110	2	Float	Floating Point
	Max. Demand (Monthly)	SA + 300112	2	Float	Floating Point
	Daily Accumulated Electricity	SA + 300114	2	Float	Floating Point
	Monthly Accumulated Electricity	SA + 300116	2	Float	Floating Point
	Yearly	SA + 300118	2	Float	Floating Point

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	Accumulated Electricity				
CT4	15/30/60 mins Actual Demand	SA + 300120	2	Float	Floating Point
	15/30/60 mins Forecast Demand	SA + 300122	2	Float	Floating Point
	Max. Demand (Hourly)	SA + 300124	2	Float	Floating Point
	Max. Demand (Daily)	SA + 300126	2	Float	Floating Point
	Max. Demand (Monthly)	SA + 300128	2	Float	Floating Point
	Daily Accumulated Electricity	SA + 300130	2	Float	Floating Point
	Monthly Accumulated Electricity	SA + 300132	2	Float	Floating Point
	Yearly Accumulated Electricity	SA + 300134	2	Float	Floating Point

[3x]Input Register, Unit : Register(16 Bits)				
Power Meter Type	PM_SA + 300000	1	Int16	2134
Reserved	PM_SA + 300001	1	-	Reserved
Reserved	PM_SA + 300002	1	-	Reserved
Firmware Version	PM_SA + 300003	1	BCD	0x0100~
Address	PM_SA + 300004	1	UInt16	1~247
Error Code	PM_SA + 300005	1	UInt16	-1=Initializing 0=Failed 1=Success
Reserved	PM_SA + 300011	1	-	Reserved
PT Ratio	PM_SA + 300012	2	Float	0.01~655.35
CTRatio	PM_SA + 300014	2	Float	1~65535

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- **PM-3133、PM-3133-MTCP、PM-3033、PM-3033-MTCP**

Parameter Name		Modbus Address	Length	Data Type	Range
[0x] Coils Output, Unit : Coil(8 Bits) (PM-3033/PM-3033-MTCP does not support this function.)					
DO Ch.0		SA + 000000	1	Byte	0=OFF, 1=ON
DO Ch.1		SA + 000001	1	Byte	0=OFF, 1=ON
[4x] Holding Register, Unit : Register(16 Bits)					
Harmonic Selector		SA + 400000	1	UInt16	0: Disable 1: Phase A 2: Phase B 3: Phase C
[3x] Input Register, Unit : Register(16 Bits)					
Phase A	V	SA + 300000	2	Float	Floating Point
	I	SA + 300002	2	Float	Floating Point
	kW	SA + 300004	2	Float	Floating Point
	kvar	SA + 300006	2	Float	Floating Point
	kVA	SA + 300008	2	Float	Floating Point
	PF	SA + 300010	2	Float	Floating Point
	kWh	SA + 300012	2	Float	Floating Point
	kvarh	SA + 300014	2	Float	Floating Point
	kVAh	SA + 300016	2	Float	Floating Point
Phase B	V	SA + 300018	2	Float	Floating Point
	I	SA + 300020	2	Float	Floating Point
	kW	SA + 300022	2	Float	Floating Point
	kvar	SA + 300024	2	Float	Floating Point
	kVA	SA + 300026	2	Float	Floating Point
	PF	SA + 300028	2	Float	Floating Point
	kWh	SA + 300030	2	Float	Floating Point
	kvarh	SA + 300032	2	Float	Floating Point
	kVAh	SA + 300034	2	Float	Floating Point
Phase C	V	SA + 300036	2	Float	Floating Point
	I	SA + 300038	2	Float	Floating Point
	kW	SA + 300040	2	Float	Floating Point
	kvar	SA + 300042	2	Float	Floating Point
	kVA	SA + 300044	2	Float	Floating Point

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	PF	SA + 300046	2	Float	Floating Point
	kWh	SA + 300048	2	Float	Floating Point
	kvarh	SA + 300050	2	Float	Floating Point
	kVAh	SA + 300052	2	Float	Floating Point
Total / Average	V	SA + 300054	2	Float	Floating Point
	I	SA + 300056	2	Float	Floating Point
	kW	SA + 300058	2	Float	Floating Point
	kvar	SA + 300060	2	Float	Floating Point
	kVA	SA + 300062	2	Float	Floating Point
	PF	SA + 300064	2	Float	Floating Point
	kWh	SA + 300066	2	Float	Floating Point
	kvarh	SA + 300068	2	Float	Floating Point
	kVAh	SA + 300070	2	Float	Floating Point
Phase A	15/30/60 mins Actual Demand	SA + 300072	2	Float	Floating Point
	15/30/60 mins Forecast Demand	SA + 300074	2	Float	Floating Point
	Max. Demand (Hourly)	SA + 300076	2	Float	Floating Point
	Max. Demand (Daily)	SA + 300078	2	Float	Floating Point
	Max. Demand (Monthly)	SA + 300080	2	Float	Floating Point
	Daily Accumulated Electricity	SA + 300082	2	Float	Floating Point
	Monthly Accumulated Electricity	SA + 300084	2	Float	Floating Point
	Yearly Accumulated Electricity	SA + 300086	2	Float	Floating Point
Phase B	15/30/60 mins Actual Demand	SA + 300088	2	Float	Floating Point
	15/30/60 mins Forecast Demand	SA + 300090	2	Float	Floating Point
	Max. Demand (Hourly)	SA + 300092	2	Float	Floating Point

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	Max. Demand (Daily)	SA + 300094	2	Float	Floating Point
	Max. Demand (Monthly)	SA + 300096	2	Float	Floating Point
	Daily Accumulated Electricity	SA + 300098	2	Float	Floating Point
	Monthly Accumulated Electricity	SA + 300100	2	Float	Floating Point
	Yearly Accumulated Electricity	SA + 300102	2	Float	Floating Point
Phase C	15/30/60 mins Actual Demand	SA + 300104	2	Float	Floating Point
	15/30/60 mins Forecast Demand	SA + 300106	2	Float	Floating Point
	Max. Demand (Hourly)	SA + 300108	2	Float	Floating Point
	Max. Demand (Daily)	SA + 300110	2	Float	Floating Point
	Max. Demand (Monthly)	SA + 300112	2	Float	Floating Point
	Daily Accumulated Electricity	SA + 300114	2	Float	Floating Point
	Monthly Accumulated Electricity	SA + 300116	2	Float	Floating Point
	Yearly Accumulated Electricity	SA + 300118	2	Float	Floating Point
Total / Average	15/30/60 mins Actual Demand	SA + 300120	2	Float	Floating Point
	15/30/60 mins Forecast Demand	SA + 300122	2	Float	Floating Point
	Max. Demand (Hourly)	SA + 300124	2	Float	Floating Point
	Max. Demand	SA + 300126	2	Float	Floating Point

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	(Daily)				
	Max. Demand (Monthly)	SA + 300128	2	Float	Floating Point
	Daily Accumulated Electricity	SA + 300130	2	Float	Floating Point
	Monthly Accumulated Electricity	SA + 300132	2	Float	Floating Point
	Yearly Accumulated Electricity	SA + 300134	2	Float	Floating Point
[3x] Input Register, Unit : Register(16 Bits)					
VTHD		SA + 300136	2	Float	Floating Point
ITHD		SA + 300138	2	Float	Floating Point
Frequency Phase A		SA + 300140	2	Float	Floating Point
Frequency Phase B		SA + 300142	2	Float	Floating Point
Frequency Phase C		SA + 300144	2	Float	Floating Point
Frequency Maximum		SA + 300146	2	Float	Floating Point
[3x] Input Register, Unit : Register(16 Bits)					
Power Meter Type		PM_SA + 300000	1	Int16	3133
Reserved		PM_SA + 300001	1	-	Reserved
Reserved		PM_SA + 300002	1	-	Reserved
Firmware Version		PM_SA + 300003	1	BCD	0x0100~
Address / NetID		PM_SA + 300004	1	UInt16	1~247
Error Code		PM_SA + 300005	1	UInt16	-1=Initializing 0=Failed 1=Success
IP1		PM_SA + 300006	1	Int16	0~255
IP2		PM_SA + 300007	1	Int16	0~255
IP3		PM_SA + 300008	1	Int16	0~255
IP4		PM_SA + 300009	1	Int16	0~255
Port Number		PM_SA + 300010	1	UInt16	1~65535
Reserved		PM_SA + 300011	1	-	Reserved
PT Ratio		PM_SA + 300012	2	Float	0.01~655.35
CT Ratio		PM_SA + 300014	2	Float	1~65535

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- **PM-3112、PM-3112-MTCP (2 Loops 1 Phase)**

Parameter Name		Modbus Address	Length	Data Type	Range
[0x] Coils Output, Unit : Coil(8 Bits)					
DO Ch.0		SA + 000000	1	Byte	0=OFF, 1=ON
DO Ch.1		SA + 000001	1	Byte	0=OFF, 1=ON
[3x] Input Register, Unit : Register(16 Bits)					
CT1	V	SA + 300000	2	Float	Floating Point
	I	SA + 300002	2	Float	Floating Point
	kW	SA + 300004	2	Float	Floating Point
	kvar	SA + 300006	2	Float	Floating Point
	kVA	SA + 300008	2	Float	Floating Point
	PF	SA + 300010	2	Float	Floating Point
	kWh	SA + 300012	2	Float	Floating Point
	kvarh	SA + 300014	2	Float	Floating Point
	kVAh	SA + 300016	2	Float	Floating Point
CT2	V	SA + 300018	2	Float	Floating Point
	I	SA + 300020	2	Float	Floating Point
	kW	SA + 300022	2	Float	Floating Point
	kvar	SA + 300024	2	Float	Floating Point
	kVA	SA + 300026	2	Float	Floating Point
	PF	SA + 300028	2	Float	Floating Point
	kWh	SA + 300030	2	Float	Floating Point
	kvarh	SA + 300032	2	Float	Floating Point
	kVAh	SA + 300034	2	Float	Floating Point
CT1	15/30/60 mins Actual Demand	SA + 300036	2	Float	Floating Point
	15/30/60 mins Forecast Demand	SA + 300038	2	Float	Floating Point
	Max. Demand (Hourly)	SA + 300040	2	Float	Floating Point
	Max. Demand (Daily)	SA + 300042	2	Float	Floating Point
	Max. Demand (Monthly)	SA + 300044	2	Float	Floating Point
	Daily Accumulated	SA + 300046	2	Float	Floating Point

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	Electricity				
	Monthly Accumulated Electricity	SA + 300048	2	Float	Floating Point
	Yearly Accumulated Electricity	SA + 300050	2	Float	Floating Point
CT2	15/30/60 mins Actual Demand	SA + 300052	2	Float	Floating Point
	15/30/60 mins Forecast Demand	SA + 300054	2	Float	Floating Point
	Max. Demand (Hourly)	SA + 300056	2	Float	Floating Point
	Max. Demand (Daily)	SA + 300058	2	Float	Floating Point
	Max. Demand (Monthly)	SA + 300060	2	Float	Floating Point
	Daily Accumulated Electricity	SA + 300062	2	Float	Floating Point
	Monthly Accumulated Electricity	SA + 300064	2	Float	Floating Point
	Yearly Accumulated Electricity	SA + 300066	2	Float	Floating Point
[3x] Input Register, Unit : Register(16 Bits)					
Frequency CT1		SA + 300068	2	Float	Floating Point
Frequency CT2		SA + 300070	2	Float	Floating Point
[3x] Input Register, Unit : Register(16 Bits)					
Power Meter Type		PM_SA + 300000	1	Int16	3112
Reserved		PM_SA + 300001	1	-	Reserved
Reserved		PM_SA + 300002	1	-	Reserved
Firmware Version		PM_SA + 300003	1	BCD	0x0100~
Address / NetID		PM_SA + 300004	1	UInt16	1~247
Error Code		PM_SA + 300005	1	UInt16	-1=Initializing 0=Failed 1=Success

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IP1	PM_SA + 300006	1	Int16	0~255
IP2	PM_SA + 300007	1	Int16	0~255
IP3	PM_SA + 300008	1	Int16	0~255
IP4	PM_SA + 300009	1	Int16	0~255
Port Number	PM_SA + 300010	1	UInt16	1~65535
Reserved	PM_SA + 300011	1	-	Reserved
PT Ratio	PM_SA + 300012	2	Float	0.01~655.35
CT Ratio	PM_SA + 300014	2	Float	1~65535

- **PM-3114、PM-3114-MTCP (4 Loops 1 Phase)**

Parameter Name		Modbus Address	Length	Data Type	Range
[0x] Coils Output, Unit : Coil(8 Bits)					
DO Ch.0		SA + 000000	1	Byte	0=OFF, 1=ON
DO Ch.1		SA + 000001	1	Byte	0=OFF, 1=ON
[3x] Input Register, Unit : Register(16 Bits)					
CT1	V	SA + 300000	2	Float	Floating Point
	I	SA + 300002	2	Float	Floating Point
	kW	SA + 300004	2	Float	Floating Point
	kvar	SA + 300006	2	Float	Floating Point
	kVA	SA + 300008	2	Float	Floating Point
	PF	SA + 300010	2	Float	Floating Point
	kWh	SA + 300012	2	Float	Floating Point
	kvarh	SA + 300014	2	Float	Floating Point
	kVAh	SA + 300016	2	Float	Floating Point
CT2	V	SA + 300018	2	Float	Floating Point
	I	SA + 300020	2	Float	Floating Point
	kW	SA + 300022	2	Float	Floating Point
	kvar	SA + 300024	2	Float	Floating Point
	kVA	SA + 300026	2	Float	Floating Point
	PF	SA + 300028	2	Float	Floating Point
	kWh	SA + 300030	2	Float	Floating Point
	kvarh	SA + 300032	2	Float	Floating Point
	kVAh	SA + 300034	2	Float	Floating Point
T	V	SA + 300036	2	Float	Floating Point

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	I	SA + 300038	2	Float	Floating Point
	kW	SA + 300040	2	Float	Floating Point
	kvar	SA + 300042	2	Float	Floating Point
	kVA	SA + 300044	2	Float	Floating Point
	PF	SA + 300046	2	Float	Floating Point
	kWh	SA + 300048	2	Float	Floating Point
	kvarh	SA + 300050	2	Float	Floating Point
	kVAh	SA + 300052	2	Float	Floating Point
CT4	V	SA + 300054	2	Float	Floating Point
	I	SA + 300056	2	Float	Floating Point
	kW	SA + 300058	2	Float	Floating Point
	kvar	SA + 300060	2	Float	Floating Point
	kVA	SA + 300062	2	Float	Floating Point
	PF	SA + 300064	2	Float	Floating Point
	kWh	SA + 300066	2	Float	Floating Point
	kvarh	SA + 300068	2	Float	Floating Point
	kVAh	SA + 300070	2	Float	Floating Point
CT1	15/30/60 mins Actual Demand	SA + 300072	2	Float	Floating Point
	15/30/60 mins Forecast Demand	SA + 300074	2	Float	Floating Point
	Max. Demand (Hourly)	SA + 300076	2	Float	Floating Point
	Max. Demand (Daily)	SA + 300078	2	Float	Floating Point
	Max. Demand (Monthly)	SA + 300080	2	Float	Floating Point
	Daily Accumulated Electricity	SA + 300082	2	Float	Floating Point
	Monthly Accumulated Electricity	SA + 300084	2	Float	Floating Point
	Yearly Accumulated Electricity	SA + 300086	2	Float	Floating Point
CT2	15/30/60 mins Actual Demand	SA + 300088	2	Float	Floating Point

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	15/30/60 mins Forecast Demand	SA + 300090	2	Float	Floating Point
	Max. Demand (Hourly)	SA + 300092	2	Float	Floating Point
	Max. Demand (Daily)	SA + 300094	2	Float	Floating Point
	Max. Demand (Monthly)	SA + 300096	2	Float	Floating Point
	Daily Accumulated Electricity	SA + 300098	2	Float	Floating Point
	Monthly Accumulated Electricity	SA + 300100	2	Float	Floating Point
	Yearly Accumulated Electricity	SA + 300102	2	Float	Floating Point
CT3	15/30/60 mins Actual Demand	SA + 300104	2	Float	Floating Point
	15/30/60 mins Forecast Demand	SA + 300106	2	Float	Floating Point
	Max. Demand (Hourly)	SA + 300108	2	Float	Floating Point
	Max. Demand (Daily)	SA + 300110	2	Float	Floating Point
	Max. Demand (Monthly)	SA + 300112	2	Float	Floating Point
	Daily Accumulated Electricity	SA + 300114	2	Float	Floating Point
	Monthly Accumulated Electricity	SA + 300116	2	Float	Floating Point
	Yearly Accumulated Electricity	SA + 300118	2	Float	Floating Point
CT4	15/30/60 mins Actual Demand	SA + 300120	2	Float	Floating Point
	15/30/60 mins	SA + 300122	2	Float	Floating Point

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	Forecast Demand				
	Max. Demand (Hourly)	SA + 300124	2	Float	Floating Point
	Max. Demand (Daily)	SA + 300126	2	Float	Floating Point
	Max. Demand (Monthly)	SA + 300128	2	Float	Floating Point
	Daily Accumulated Electricity	SA + 300130	2	Float	Floating Point
	Monthly Accumulated Electricity	SA + 300132	2	Float	Floating Point
	Yearly Accumulated Electricity	SA + 300134	2	Float	Floating Point
[3x] Input Register, Unit : Register(16 Bits)					
Frequency CT1		SA + 300136	2	Float	Floating Point
Frequency CT2		SA + 300138	2	Float	Floating Point
Frequency CT3		SA + 300140	2	Float	Floating Point
Frequency CT4		SA + 300142	2	Float	Floating Point
[3x] Input Register, Unit : Register(16 Bits)					
Power Meter Type		PM_SA + 300000	1	Int16	3114
Reserved		PM_SA + 300001	1	-	Reserved
Reserved		PM_SA + 300002	1	-	Reserved
Firmware Version		PM_SA + 300003	1	BCD	0x0100~
Address / NetID		PM_SA + 300004	1	UInt16	1~247
Error Code		PM_SA + 300005	1	UInt16	-1=Initializing 0=Failed 1=Success
IP1		PM_SA + 300006	1	Int16	0~255
IP2		PM_SA + 300007	1	Int16	0~255
IP3		PM_SA + 300008	1	Int16	0~255
IP4		PM_SA + 300009	1	Int16	0~255
Port Number		PM_SA + 300010	1	UInt16	1~65535
Reserved		PM_SA + 300011	1	-	Reserved
PT Ratio		PM_SA + 300012	2	Float	0.01~655.35
CT Ratio		PM_SA + 300014	2	Float	1~65535

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- **PM-4324, PM-4324A, PM-4324-MTCP, PM-4324A-MTCP**

Parameter Name	Modbus Address	Length	Data Type	Range
[0x] Coils Output, Unit : Coil(8 Bits)				
DO Ch.0	SA + 000000	1	Byte	0=OFF, 1=ON
DO Ch.1	SA + 000001	1	Byte	0=OFF, 1=ON
[4x] Holding Register, Unit : Register(16 Bits)				
Harmonic Selector [Submeter 1]	SA + 400000	1	UInt16	0: Disable 1: Phase A / CT1 2: Phase B / CT2 3: Phase C / CT3
Harmonic Selector [Submeter 2]	SA + 400001	1	UInt16	0: Disable 1: Phase A / CT4 2: Phase B / CT5 3: Phase C / CT6
Harmonic Selector [Submeter 3]	SA + 400002	1	UInt16	0: Disable 1: Phase A / CT7 2: Phase B / CT8 3: Phase C / CT9
Harmonic Selector [Submeter 4]	SA + 400003	1	UInt16	0: Disable 1: Phase A / CT10 2: Phase B / CT11 3: Phase C / CT12
Harmonic Selector [Submeter 5]	SA + 400004	1	UInt16	0: Disable 1: Phase A / CT13 2: Phase B / CT14 3: Phase C / CT15
Harmonic Selector [Submeter 6]	SA + 400005	1	UInt16	0: Disable 1: Phase A / CT16 2: Phase B / CT17 3: Phase C / CT18

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Harmonic Selector [Submeter 7]	SA + 400006	1	UInt16	0: Disable 1: Phase A / CT19 2: Phase B / CT20 3: Phase C / CT21
Harmonic Selector [Submeter 8]	SA + 400007	1	UInt16	0: Disable 1: Phase A / CT22 2: Phase B / CT23 3: Phase C / CT24
[3x] Input Register, Unit : Register(16 Bits)				
Submeter 1				
Phase A / CT1	V	SA + 300000	2	Float	Floating Point
	I	SA + 300002	2	Float	Floating Point
	kW	SA + 300004	2	Float	Floating Point
	kvar	SA + 300006	2	Float	Floating Point
	kVA	SA + 300008	2	Float	Floating Point
	PF	SA + 300010	2	Float	Floating Point
	kWh	SA + 300012	2	Float	Floating Point
	kvarh	SA + 300014	2	Float	Floating Point
	kVAh	SA + 300016	2	Float	Floating Point
Phase B / CT2	V	SA + 300018	2	Float	Floating Point
	I	SA + 300020	2	Float	Floating Point
	kW	SA + 300022	2	Float	Floating Point
	kvar	SA + 300024	2	Float	Floating Point
	kVA	SA + 300026	2	Float	Floating Point
	PF	SA + 300028	2	Float	Floating Point
	kWh	SA + 300030	2	Float	Floating Point
	kvarh	SA + 300032	2	Float	Floating Point
	kVAh	SA + 300034	2	Float	Floating Point
Phase C / CT3	V	SA + 300036	2	Float	Floating Point
	I	SA + 300038	2	Float	Floating Point
	kW	SA + 300040	2	Float	Floating Point
	kvar	SA + 300042	2	Float	Floating Point
	kVA	SA + 300044	2	Float	Floating Point
	PF	SA + 300046	2	Float	Floating Point
	kWh	SA + 300048	2	Float	Floating Point
	kvarh	SA + 300050	2	Float	Floating Point
	kVAh	SA + 300052	2	Float	Floating Point

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Total / Average	V	SA + 300054	2	Float	Floating Point
	I	SA + 300056	2	Float	Floating Point
	kW	SA + 300058	2	Float	Floating Point
	kvar	SA + 300060	2	Float	Floating Point
	kVA	SA + 300062	2	Float	Floating Point
	PF	SA + 300064	2	Float	Floating Point
	kWh	SA + 300066	2	Float	Floating Point
	kvarh	SA + 300068	2	Float	Floating Point
	kVAh	SA + 300070	2	Float	Floating Point
Submeter 2					
Phase A / CT4	V	SA + 300072	2	Float	Floating Point
	I	SA + 300074	2	Float	Floating Point
	kW	SA + 300076	2	Float	Floating Point
	kvar	SA + 300078	2	Float	Floating Point
	kVA	SA + 300080	2	Float	Floating Point
	PF	SA + 300082	2	Float	Floating Point
	kWh	SA + 300084	2	Float	Floating Point
	kvarh	SA + 300086	2	Float	Floating Point
	kVAh	SA + 300088	2	Float	Floating Point
Phase B / CT5	V	SA + 300090	2	Float	Floating Point
	I	SA + 300092	2	Float	Floating Point
	kW	SA + 300094	2	Float	Floating Point
	kvar	SA + 300096	2	Float	Floating Point
	kVA	SA + 300098	2	Float	Floating Point
	PF	SA + 300100	2	Float	Floating Point
	kWh	SA + 300102	2	Float	Floating Point
	kvarh	SA + 300104	2	Float	Floating Point
	kVAh	SA + 300106	2	Float	Floating Point
Phase C / CT6	V	SA + 300108	2	Float	Floating Point
	I	SA + 300110	2	Float	Floating Point
	kW	SA + 300112	2	Float	Floating Point
	kvar	SA + 300114	2	Float	Floating Point
	kVA	SA + 300116	2	Float	Floating Point
	PF	SA + 300118	2	Float	Floating Point
	kWh	SA + 300120	2	Float	Floating Point
	kvarh	SA + 300122	2	Float	Floating Point
	kVAh	SA + 300124	2	Float	Floating Point

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Total / Average	V	SA + 300126	2	Float	Floating Point
	I	SA + 300128	2	Float	Floating Point
	kW	SA + 300130	2	Float	Floating Point
	kvar	SA + 300132	2	Float	Floating Point
	kVA	SA + 300134	2	Float	Floating Point
	PF	SA + 300136	2	Float	Floating Point
	kWh	SA + 300138	2	Float	Floating Point
	kvarh	SA + 300140	2	Float	Floating Point
	kVAh	SA + 300142	2	Float	Floating Point
Submeter 3					
Phase A / CT7	V	SA + 300144	2	Float	Floating Point
	I	SA + 300146	2	Float	Floating Point
	kW	SA + 300148	2	Float	Floating Point
	kvar	SA + 300150	2	Float	Floating Point
	kVA	SA + 300152	2	Float	Floating Point
	PF	SA + 300154	2	Float	Floating Point
	kWh	SA + 300156	2	Float	Floating Point
	kvarh	SA + 300158	2	Float	Floating Point
	kVAh	SA + 300160	2	Float	Floating Point
Phase B / CT8	V	SA + 300162	2	Float	Floating Point
	I	SA + 300164	2	Float	Floating Point
	kW	SA + 300166	2	Float	Floating Point
	kvar	SA + 300168	2	Float	Floating Point
	kVA	SA + 300170	2	Float	Floating Point
	PF	SA + 300172	2	Float	Floating Point
	kWh	SA + 300174	2	Float	Floating Point
	kvarh	SA + 300176	2	Float	Floating Point
	kVAh	SA + 300178	2	Float	Floating Point
Phase C / CT9	V	SA + 300180	2	Float	Floating Point
	I	SA + 300182	2	Float	Floating Point
	kW	SA + 300184	2	Float	Floating Point
	kvar	SA + 300186	2	Float	Floating Point
	kVA	SA + 300188	2	Float	Floating Point
	PF	SA + 300190	2	Float	Floating Point
	kWh	SA + 300192	2	Float	Floating Point
	kvarh	SA + 300194	2	Float	Floating Point
	kVAh	SA + 300196	2	Float	Floating Point

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Total / Average	V	SA + 300198	2	Float	Floating Point
	I	SA + 300200	2	Float	Floating Point
	kW	SA + 300202	2	Float	Floating Point
	kvar	SA + 300204	2	Float	Floating Point
	kVA	SA + 300206	2	Float	Floating Point
	PF	SA + 300208	2	Float	Floating Point
	kWh	SA + 300210	2	Float	Floating Point
	kvarh	SA + 300212	2	Float	Floating Point
	kVAh	SA + 300214	2	Float	Floating Point
Submeter 4					
Phase A / CT10	V	SA + 300216	2	Float	Floating Point
	I	SA + 300218	2	Float	Floating Point
	kW	SA + 300220	2	Float	Floating Point
	kvar	SA + 300222	2	Float	Floating Point
	kVA	SA + 300224	2	Float	Floating Point
	PF	SA + 300226	2	Float	Floating Point
	kWh	SA + 300228	2	Float	Floating Point
	kvarh	SA + 300230	2	Float	Floating Point
	kVAh	SA + 300232	2	Float	Floating Point
Phase B / CT11	V	SA + 300234	2	Float	Floating Point
	I	SA + 300236	2	Float	Floating Point
	kW	SA + 300238	2	Float	Floating Point
	kvar	SA + 300240	2	Float	Floating Point
	kVA	SA + 300242	2	Float	Floating Point
	PF	SA + 300244	2	Float	Floating Point
	kWh	SA + 300246	2	Float	Floating Point
	kvarh	SA + 300248	2	Float	Floating Point
	kVAh	SA + 300250	2	Float	Floating Point
Phase C / CT12	V	SA + 300252	2	Float	Floating Point
	I	SA + 300254	2	Float	Floating Point
	kW	SA + 300256	2	Float	Floating Point
	kvar	SA + 300258	2	Float	Floating Point
	kVA	SA + 300260	2	Float	Floating Point
	PF	SA + 300262	2	Float	Floating Point
	kWh	SA + 300264	2	Float	Floating Point
	kvarh	SA + 300266	2	Float	Floating Point
	kVAh	SA + 300268	2	Float	Floating Point

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Total / Average	V	SA + 300270	2	Float	Floating Point
	I	SA + 300272	2	Float	Floating Point
	kW	SA + 300274	2	Float	Floating Point
	kvar	SA + 300276	2	Float	Floating Point
	kVA	SA + 300278	2	Float	Floating Point
	PF	SA + 300280	2	Float	Floating Point
	kWh	SA + 300282	2	Float	Floating Point
	kvarh	SA + 300284	2	Float	Floating Point
	kVAh	SA + 300286	2	Float	Floating Point
Submeter 5					
Phase A / CT13	V	SA + 300288	2	Float	Floating Point
	I	SA + 300290	2	Float	Floating Point
	kW	SA + 300292	2	Float	Floating Point
	kvar	SA + 300294	2	Float	Floating Point
	kVA	SA + 300296	2	Float	Floating Point
	PF	SA + 300298	2	Float	Floating Point
	kWh	SA + 300300	2	Float	Floating Point
	kvarh	SA + 300302	2	Float	Floating Point
	kVAh	SA + 300304	2	Float	Floating Point
Phase B / CT14	V	SA + 300306	2	Float	Floating Point
	I	SA + 300308	2	Float	Floating Point
	kW	SA + 300310	2	Float	Floating Point
	kvar	SA + 300312	2	Float	Floating Point
	kVA	SA + 300314	2	Float	Floating Point
	PF	SA + 300316	2	Float	Floating Point
	kWh	SA + 300318	2	Float	Floating Point
	kvarh	SA + 300320	2	Float	Floating Point
	kVAh	SA + 300322	2	Float	Floating Point
Phase C / CT15	V	SA + 300324	2	Float	Floating Point
	I	SA + 300326	2	Float	Floating Point
	kW	SA + 300328	2	Float	Floating Point
	kvar	SA + 300330	2	Float	Floating Point
	kVA	SA + 300332	2	Float	Floating Point
	PF	SA + 300334	2	Float	Floating Point
	kWh	SA + 300336	2	Float	Floating Point
	kvarh	SA + 300338	2	Float	Floating Point
	kVAh	SA + 300340	2	Float	Floating Point

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Total / Average	V	SA + 300342	2	Float	Floating Point
	I	SA + 300344	2	Float	Floating Point
	kW	SA + 300346	2	Float	Floating Point
	kvar	SA + 300348	2	Float	Floating Point
	kVA	SA + 300350	2	Float	Floating Point
	PF	SA + 300352	2	Float	Floating Point
	kWh	SA + 300354	2	Float	Floating Point
	kvarh	SA + 300356	2	Float	Floating Point
	kVAh	SA + 300358	2	Float	Floating Point
Submeter 6					
Phase A / CT16	V	SA + 300360	2	Float	Floating Point
	I	SA + 300362	2	Float	Floating Point
	kW	SA + 300364	2	Float	Floating Point
	kvar	SA + 300366	2	Float	Floating Point
	kVA	SA + 300368	2	Float	Floating Point
	PF	SA + 300370	2	Float	Floating Point
	kWh	SA + 300372	2	Float	Floating Point
	kvarh	SA + 300374	2	Float	Floating Point
	kVAh	SA + 300376	2	Float	Floating Point
Phase B / CT17	V	SA + 300378	2	Float	Floating Point
	I	SA + 300380	2	Float	Floating Point
	kW	SA + 300382	2	Float	Floating Point
	kvar	SA + 300384	2	Float	Floating Point
	kVA	SA + 300386	2	Float	Floating Point
	PF	SA + 300388	2	Float	Floating Point
	kWh	SA + 300390	2	Float	Floating Point
	kvarh	SA + 300392	2	Float	Floating Point
	kVAh	SA + 300394	2	Float	Floating Point
Phase C / CT18	V	SA + 300396	2	Float	Floating Point
	I	SA + 300398	2	Float	Floating Point
	kW	SA + 300400	2	Float	Floating Point
	kvar	SA + 300402	2	Float	Floating Point
	kVA	SA + 300404	2	Float	Floating Point
	PF	SA + 300406	2	Float	Floating Point
	kWh	SA + 300408	2	Float	Floating Point
	kvarh	SA + 300410	2	Float	Floating Point
	kVAh	SA + 300412	2	Float	Floating Point

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Total / Average	V	SA + 300414	2	Float	Floating Point
	I	SA + 300416	2	Float	Floating Point
	kW	SA + 300418	2	Float	Floating Point
	kvar	SA + 300420	2	Float	Floating Point
	kVA	SA + 300422	2	Float	Floating Point
	PF	SA + 300424	2	Float	Floating Point
	kWh	SA + 300426	2	Float	Floating Point
	kvarh	SA + 300428	2	Float	Floating Point
	kVAh	SA + 300430	2	Float	Floating Point
Submeter 7					
Phase A / CT19	V	SA + 300432	2	Float	Floating Point
	I	SA + 300434	2	Float	Floating Point
	kW	SA + 300436	2	Float	Floating Point
	kvar	SA + 300438	2	Float	Floating Point
	kVA	SA + 300440	2	Float	Floating Point
	PF	SA + 300442	2	Float	Floating Point
	kWh	SA + 300444	2	Float	Floating Point
	kvarh	SA + 300446	2	Float	Floating Point
	kVAh	SA + 300448	2	Float	Floating Point
Phase B / CT20	V	SA + 300450	2	Float	Floating Point
	I	SA + 300452	2	Float	Floating Point
	kW	SA + 300454	2	Float	Floating Point
	kvar	SA + 300456	2	Float	Floating Point
	kVA	SA + 300458	2	Float	Floating Point
	PF	SA + 300460	2	Float	Floating Point
	kWh	SA + 300462	2	Float	Floating Point
	kvarh	SA + 300464	2	Float	Floating Point
	kVAh	SA + 300466	2	Float	Floating Point
Phase C / CT21	V	SA + 300468	2	Float	Floating Point
	I	SA + 300470	2	Float	Floating Point
	kW	SA + 300472	2	Float	Floating Point
	kvar	SA + 300474	2	Float	Floating Point
	kVA	SA + 300476	2	Float	Floating Point
	PF	SA + 300478	2	Float	Floating Point
	kWh	SA + 300480	2	Float	Floating Point
	kvarh	SA + 300482	2	Float	Floating Point
	kVAh	SA + 300484	2	Float	Floating Point

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Total / Average	V	SA + 300486	2	Float	Floating Point
	I	SA + 300488	2	Float	Floating Point
	kW	SA + 300490	2	Float	Floating Point
	kvar	SA + 300492	2	Float	Floating Point
	kVA	SA + 300494	2	Float	Floating Point
	PF	SA + 300496	2	Float	Floating Point
	kWh	SA + 300498	2	Float	Floating Point
	kvarh	SA + 300500	2	Float	Floating Point
	kVAh	SA + 300502	2	Float	Floating Point
Submeter 8					
Phase A / CT22	V	SA + 300504	2	Float	Floating Point
	I	SA + 300506	2	Float	Floating Point
	kW	SA + 300508	2	Float	Floating Point
	kvar	SA + 300510	2	Float	Floating Point
	kVA	SA + 300512	2	Float	Floating Point
	PF	SA + 300514	2	Float	Floating Point
	kWh	SA + 300516	2	Float	Floating Point
	kvarh	SA + 300518	2	Float	Floating Point
	kVAh	SA + 300520	2	Float	Floating Point
Phase B / CT23	V	SA + 300522	2	Float	Floating Point
	I	SA + 300524	2	Float	Floating Point
	kW	SA + 300526	2	Float	Floating Point
	kvar	SA + 300528	2	Float	Floating Point
	kVA	SA + 300530	2	Float	Floating Point
	PF	SA + 300532	2	Float	Floating Point
	kWh	SA + 300534	2	Float	Floating Point
	kvarh	SA + 300536	2	Float	Floating Point
	kVAh	SA + 300538	2	Float	Floating Point
Phase C / CT24	V	SA + 300540	2	Float	Floating Point
	I	SA + 300542	2	Float	Floating Point
	kW	SA + 300544	2	Float	Floating Point
	kvar	SA + 300546	2	Float	Floating Point
	kVA	SA + 300548	2	Float	Floating Point
	PF	SA + 300550	2	Float	Floating Point
	kWh	SA + 300552	2	Float	Floating Point
	kvarh	SA + 300554	2	Float	Floating Point
	kVAh	SA + 300556	2	Float	Floating Point

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Total / Average	V	SA + 300558	2	Float	Floating Point
	I	SA + 300560	2	Float	Floating Point
	kW	SA + 300562	2	Float	Floating Point
	kvar	SA + 300564	2	Float	Floating Point
	kVA	SA + 300566	2	Float	Floating Point
	PF	SA + 300568	2	Float	Floating Point
	kWh	SA + 300570	2	Float	Floating Point
	kvarh	SA + 300572	2	Float	Floating Point
	kVAh	SA + 300574	2	Float	Floating Point
Submeter 1					
Phase A / CT1	15/30/60 mins Actual Demand	SA + 300576	2	Float	Floating Point
	15/30/60 mins Forecast Demand	SA + 300578	2	Float	Floating Point
	Max. Demand (Hourly)	SA + 300580	2	Float	Floating Point
	Max. Demand (Daily)	SA + 300582	2	Float	Floating Point
	Max. Demand (Monthly)	SA + 300584	2	Float	Floating Point
	Daily Accumulated Electricity	SA + 300586	2	Float	Floating Point
	Monthly Accumulated Electricity	SA + 300588	2	Float	Floating Point
	Yearly Accumulated Electricity	SA + 300590	2	Float	Floating Point
Phase B / CT2	15/30/60 mins Actual Demand	SA + 300592	2	Float	Floating Point
	15/30/60 mins Forecast Demand	SA + 300594	2	Float	Floating Point
	Max. Demand (Hourly)	SA + 300596	2	Float	Floating Point
	Max. Demand (Daily)	SA + 300598	2	Float	Floating Point
	Max. Demand	SA + 300600	2	Float	Floating Point

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	(Monthly)				
	Daily Accumulated Electricity	SA + 300602	2	Float	Floating Point
	Monthly Accumulated Electricity	SA + 300604	2	Float	Floating Point
	Yearly Accumulated Electricity	SA + 300606	2	Float	Floating Point
Phase C / CT3	15/30/60 mins Actual Demand	SA + 300608	2	Float	Floating Point
	15/30/60 mins Forecast Demand	SA + 300610	2	Float	Floating Point
	Max. Demand (Hourly)	SA + 300612	2	Float	Floating Point
	Max. Demand (Daily)	SA + 300614	2	Float	Floating Point
	Max. Demand (Monthly)	SA + 300616	2	Float	Floating Point
	Daily Accumulated Electricity	SA + 300618	2	Float	Floating Point
	Monthly Accumulated Electricity	SA + 300620	2	Float	Floating Point
	Yearly Accumulated Electricity	SA + 300622	2	Float	Floating Point
Total / Average	15/30/60 mins Actual Demand	SA + 300624	2	Float	Floating Point
	15/30/60 mins Forecast Demand	SA + 300626	2	Float	Floating Point
	Max. Demand (Hourly)	SA + 300628	2	Float	Floating Point
	Max. Demand (Daily)	SA + 300630	2	Float	Floating Point
	Max. Demand	SA + 300632	2	Float	Floating Point

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	(Monthly)				
	Daily Accumulated Electricity	SA + 300634	2	Float	Floating Point
	Monthly Accumulated Electricity	SA + 300636	2	Float	Floating Point
	Yearly Accumulated Electricity	SA + 300638	2	Float	Floating Point
Submeter 2					
Phase A / CT4	15/30/60 mins Actual Demand	SA + 300640	2	Float	Floating Point
	15/30/60 mins Forecast Demand	SA + 300642	2	Float	Floating Point
	Max. Demand (Hourly)	SA + 300644	2	Float	Floating Point
	Max. Demand (Daily)	SA + 300646	2	Float	Floating Point
	Max. Demand (Monthly)	SA + 300648	2	Float	Floating Point
	Daily Accumulated Electricity	SA + 300650	2	Float	Floating Point
	Monthly Accumulated Electricity	SA + 300652	2	Float	Floating Point
	Yearly Accumulated Electricity	SA + 300654	2	Float	Floating Point
Phase B / CT5	15/30/60 mins Actual Demand	SA + 300656	2	Float	Floating Point
	15/30/60 mins Forecast Demand	SA + 300658	2	Float	Floating Point
	Max. Demand (Hourly)	SA + 300660	2	Float	Floating Point
	Max. Demand (Daily)	SA + 300662	2	Float	Floating Point
	Max. Demand	SA + 300664	2	Float	Floating Point

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	(Monthly)				
	Daily Accumulated Electricity	SA + 300666	2	Float	Floating Point
	Monthly Accumulated Electricity	SA + 300668	2	Float	Floating Point
	Yearly Accumulated Electricity	SA + 300670	2	Float	Floating Point
Phase C / CT6	15/30/60 mins Actual Demand	SA + 300672	2	Float	Floating Point
	15/30/60 mins Forecast Demand	SA + 300674	2	Float	Floating Point
	Max. Demand (Hourly)	SA + 300676	2	Float	Floating Point
	Max. Demand (Daily)	SA + 300678	2	Float	Floating Point
	Max. Demand (Monthly)	SA + 300680	2	Float	Floating Point
	Daily Accumulated Electricity	SA + 300682	2	Float	Floating Point
	Monthly Accumulated Electricity	SA + 300684	2	Float	Floating Point
	Yearly Accumulated Electricity	SA + 300686	2	Float	Floating Point
Total / Average	15/30/60 mins Actual Demand	SA + 300688	2	Float	Floating Point
	15/30/60 mins Forecast Demand	SA + 300690	2	Float	Floating Point
	Max. Demand (Hourly)	SA + 300692	2	Float	Floating Point
	Max. Demand (Daily)	SA + 300694	2	Float	Floating Point
	Max. Demand (Monthly)	SA + 300696	2	Float	Floating Point

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	Daily Accumulated Electricity	SA + 300698	2	Float	Floating Point
	Monthly Accumulated Electricity	SA + 300700	2	Float	Floating Point
	Yearly Accumulated Electricity	SA + 300702	2	Float	Floating Point
Submeter 3					
Phase A / CT7	15/30/60 mins Actual Demand	SA + 300704	2	Float	Floating Point
	15/30/60 mins Forecast Demand	SA + 300706	2	Float	Floating Point
	Max. Demand (Hourly)	SA + 300708	2	Float	Floating Point
	Max. Demand (Daily)	SA + 300710	2	Float	Floating Point
	Max. Demand (Monthly)	SA + 300712	2	Float	Floating Point
	Daily Accumulated Electricity	SA + 300714	2	Float	Floating Point
	Monthly Accumulated Electricity	SA + 300716	2	Float	Floating Point
	Yearly Accumulated Electricity	SA + 300718	2	Float	Floating Point
Phase B / CT8	15/30/60 mins Actual Demand	SA + 300720	2	Float	Floating Point
	15/30/60 mins Forecast Demand	SA + 300722	2	Float	Floating Point
	Max. Demand (Hourly)	SA + 300724	2	Float	Floating Point
	Max. Demand (Daily)	SA + 300726	2	Float	Floating Point
	Max. Demand	SA + 300728	2	Float	Floating Point

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	(Monthly)				
	Daily Accumulated Electricity	SA + 300730	2	Float	Floating Point
	Monthly Accumulated Electricity	SA + 300732	2	Float	Floating Point
	Yearly Accumulated Electricity	SA + 300734	2	Float	Floating Point
Phase C / CT9	15/30/60 mins Actual Demand	SA + 300736	2	Float	Floating Point
	15/30/60 mins Forecast Demand	SA + 300738	2	Float	Floating Point
	Max. Demand (Hourly)	SA + 300740	2	Float	Floating Point
	Max. Demand (Daily)	SA + 300742	2	Float	Floating Point
	Max. Demand (Monthly)	SA + 300744	2	Float	Floating Point
	Daily Accumulated Electricity	SA + 300746	2	Float	Floating Point
	Monthly Accumulated Electricity	SA + 300748	2	Float	Floating Point
	Yearly Accumulated Electricity	SA + 300750	2	Float	Floating Point
Total / Average	15/30/60 mins Actual Demand	SA + 300752	2	Float	Floating Point
	15/30/60 mins Forecast Demand	SA + 300754	2	Float	Floating Point
	Max. Demand (Hourly)	SA + 300756	2	Float	Floating Point
	Max. Demand (Daily)	SA + 300758	2	Float	Floating Point
	Max. Demand	SA + 300760	2	Float	Floating Point

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	(Monthly)				
	Daily Accumulated Electricity	SA + 300762	2	Float	Floating Point
	Monthly Accumulated Electricity	SA + 300764	2	Float	Floating Point
	Yearly Accumulated Electricity	SA + 300766	2	Float	Floating Point
Submeter 4					
Phase A / CT10	15/30/60 mins Actual Demand	SA + 300768	2	Float	Floating Point
	15/30/60 mins Forecast Demand	SA + 300770	2	Float	Floating Point
	Max. Demand (Hourly)	SA + 300772	2	Float	Floating Point
	Max. Demand (Daily)	SA + 300774	2	Float	Floating Point
	Max. Demand (Monthly)	SA + 300776	2	Float	Floating Point
	Daily Accumulated Electricity	SA + 300778	2	Float	Floating Point
	Monthly Accumulated Electricity	SA + 300780	2	Float	Floating Point
	Yearly Accumulated Electricity	SA + 300782	2	Float	Floating Point
Phase B / CT11	15/30/60 mins Actual Demand	SA + 300784	2	Float	Floating Point
	15/30/60 mins Forecast Demand	SA + 300786	2	Float	Floating Point
	Max. Demand (Hourly)	SA + 300788	2	Float	Floating Point
	Max. Demand (Daily)	SA + 300790	2	Float	Floating Point
	Max. Demand	SA + 300792	2	Float	Floating Point

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	(Monthly)				
	Daily Accumulated Electricity	SA + 300794	2	Float	Floating Point
	Monthly Accumulated Electricity	SA + 300796	2	Float	Floating Point
	Yearly Accumulated Electricity	SA + 300798	2	Float	Floating Point
Phase C / CT12	15/30/60 mins Actual Demand	SA + 300800	2	Float	Floating Point
	15/30/60 mins Forecast Demand	SA + 300802	2	Float	Floating Point
	Max. Demand (Hourly)	SA + 300804	2	Float	Floating Point
	Max. Demand (Daily)	SA + 300806	2	Float	Floating Point
	Max. Demand (Monthly)	SA + 300808	2	Float	Floating Point
	Daily Accumulated Electricity	SA + 300810	2	Float	Floating Point
	Monthly Accumulated Electricity	SA + 300812	2	Float	Floating Point
	Yearly Accumulated Electricity	SA + 300814	2	Float	Floating Point
Total / Average	15/30/60 mins Actual Demand	SA + 300816	2	Float	Floating Point
	15/30/60 mins Forecast Demand	SA + 300818	2	Float	Floating Point
	Max. Demand (Hourly)	SA + 300820	2	Float	Floating Point
	Max. Demand (Daily)	SA + 300822	2	Float	Floating Point
	Max. Demand	SA + 300824	2	Float	Floating Point

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	(Monthly)				
	Daily Accumulated Electricity	SA + 300826	2	Float	Floating Point
	Monthly Accumulated Electricity	SA + 300828	2	Float	Floating Point
	Yearly Accumulated Electricity	SA + 300830	2	Float	Floating Point
Submeter 5					
Phase A / CT13	15/30/60 mins Actual Demand	SA + 300832	2	Float	Floating Point
	15/30/60 mins Forecast Demand	SA + 300834	2	Float	Floating Point
	Max. Demand (Hourly)	SA + 300836	2	Float	Floating Point
	Max. Demand (Daily)	SA + 300838	2	Float	Floating Point
	Max. Demand (Monthly)	SA + 300840	2	Float	Floating Point
	Daily Accumulated Electricity	SA + 300842	2	Float	Floating Point
	Monthly Accumulated Electricity	SA + 300844	2	Float	Floating Point
	Yearly Accumulated Electricity	SA + 300846	2	Float	Floating Point
Phase B / CT14	15/30/60 mins Actual Demand	SA + 300848	2	Float	Floating Point
	15/30/60 mins Forecast Demand	SA + 300850	2	Float	Floating Point
	Max. Demand (Hourly)	SA + 300852	2	Float	Floating Point
	Max. Demand (Daily)	SA + 300854	2	Float	Floating Point
	Max. Demand	SA + 300856	2	Float	Floating Point

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	(Monthly)				
	Daily Accumulated Electricity	SA + 300858	2	Float	Floating Point
	Monthly Accumulated Electricity	SA + 300860	2	Float	Floating Point
	Yearly Accumulated Electricity	SA + 300862	2	Float	Floating Point
Phase C / CT15	15/30/60 mins Actual Demand	SA + 300864	2	Float	Floating Point
	15/30/60 mins Forecast Demand	SA + 300866	2	Float	Floating Point
	Max. Demand (Hourly)	SA + 300868	2	Float	Floating Point
	Max. Demand (Daily)	SA + 300870	2	Float	Floating Point
	Max. Demand (Monthly)	SA + 300872	2	Float	Floating Point
	Daily Accumulated Electricity	SA + 300874	2	Float	Floating Point
	Monthly Accumulated Electricity	SA + 300876	2	Float	Floating Point
	Yearly Accumulated Electricity	SA + 300878	2	Float	Floating Point
Total / Average	15/30/60 mins Actual Demand	SA + 300880	2	Float	Floating Point
	15/30/60 mins Forecast Demand	SA + 300882	2	Float	Floating Point
	Max. Demand (Hourly)	SA + 300884	2	Float	Floating Point
	Max. Demand (Daily)	SA + 300886	2	Float	Floating Point
	Max. Demand	SA + 300888	2	Float	Floating Point

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	(Monthly)				
	Daily Accumulated Electricity	SA + 300890	2	Float	Floating Point
	Monthly Accumulated Electricity	SA + 300892	2	Float	Floating Point
	Yearly Accumulated Electricity	SA + 300894	2	Float	Floating Point
Submeter 6					
Phase A / CT16	15/30/60 mins Actual Demand	SA + 300896	2	Float	Floating Point
	15/30/60 mins Forecast Demand	SA + 300898	2	Float	Floating Point
	Max. Demand (Hourly)	SA + 300900	2	Float	Floating Point
	Max. Demand (Daily)	SA + 300902	2	Float	Floating Point
	Max. Demand (Monthly)	SA + 300904	2	Float	Floating Point
	Daily Accumulated Electricity	SA + 300906	2	Float	Floating Point
	Monthly Accumulated Electricity	SA + 300908	2	Float	Floating Point
	Yearly Accumulated Electricity	SA + 300910	2	Float	Floating Point
Phase B / CT17	15/30/60 mins Actual Demand	SA + 300912	2	Float	Floating Point
	15/30/60 mins Forecast Demand	SA + 300914	2	Float	Floating Point
	Max. Demand (Hourly)	SA + 300916	2	Float	Floating Point
	Max. Demand (Daily)	SA + 300918	2	Float	Floating Point
	Max. Demand	SA + 300920	2	Float	Floating Point

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	(Monthly)				
	Daily Accumulated Electricity	SA + 300922	2	Float	Floating Point
	Monthly Accumulated Electricity	SA + 300924	2	Float	Floating Point
	Yearly Accumulated Electricity	SA + 300926	2	Float	Floating Point
Phase C / CT18	15/30/60 mins Actual Demand	SA + 300928	2	Float	Floating Point
	15/30/60 mins Forecast Demand	SA + 300930	2	Float	Floating Point
	Max. Demand (Hourly)	SA + 300932	2	Float	Floating Point
	Max. Demand (Daily)	SA + 300934	2	Float	Floating Point
	Max. Demand (Monthly)	SA + 300936	2	Float	Floating Point
	Daily Accumulated Electricity	SA + 300938	2	Float	Floating Point
	Monthly Accumulated Electricity	SA + 300940	2	Float	Floating Point
	Yearly Accumulated Electricity	SA + 300942	2	Float	Floating Point
Total / Average	15/30/60 mins Actual Demand	SA + 300944	2	Float	Floating Point
	15/30/60 mins Forecast Demand	SA + 300946	2	Float	Floating Point
	Max. Demand (Hourly)	SA + 300948	2	Float	Floating Point
	Max. Demand (Daily)	SA + 300950	2	Float	Floating Point
	Max. Demand	SA + 300952	2	Float	Floating Point

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	(Monthly)				
	Daily Accumulated Electricity	SA + 300954	2	Float	Floating Point
	Monthly Accumulated Electricity	SA + 300956	2	Float	Floating Point
	Yearly Accumulated Electricity	SA + 300958	2	Float	Floating Point
Submeter 7					
Phase A / CT19	15/30/60 mins Actual Demand	SA + 300960	2	Float	Floating Point
	15/30/60 mins Forecast Demand	SA + 300962	2	Float	Floating Point
	Max. Demand (Hourly)	SA + 300964	2	Float	Floating Point
	Max. Demand (Daily)	SA + 300966	2	Float	Floating Point
	Max. Demand (Monthly)	SA + 300968	2	Float	Floating Point
	Daily Accumulated Electricity	SA + 300970	2	Float	Floating Point
	Monthly Accumulated Electricity	SA + 300972	2	Float	Floating Point
	Yearly Accumulated Electricity	SA + 300974	2	Float	Floating Point
Phase B / CT20	15/30/60 mins Actual Demand	SA + 300976	2	Float	Floating Point
	15/30/60 mins Forecast Demand	SA + 300978	2	Float	Floating Point
	Max. Demand (Hourly)	SA + 300980	2	Float	Floating Point
	Max. Demand (Daily)	SA + 300982	2	Float	Floating Point
	Max. Demand	SA + 300984	2	Float	Floating Point

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	(Monthly)				
	Daily Accumulated Electricity	SA + 300986	2	Float	Floating Point
	Monthly Accumulated Electricity	SA + 300988	2	Float	Floating Point
	Yearly Accumulated Electricity	SA + 300990	2	Float	Floating Point
Phase C / CT21	15/30/60 mins Actual Demand	SA + 300992	2	Float	Floating Point
	15/30/60 mins Forecast Demand	SA + 300994	2	Float	Floating Point
	Max. Demand (Hourly)	SA + 300996	2	Float	Floating Point
	Max. Demand (Daily)	SA + 300998	2	Float	Floating Point
	Max. Demand (Monthly)	SA + 301000	2	Float	Floating Point
	Daily Accumulated Electricity	SA + 301002	2	Float	Floating Point
	Monthly Accumulated Electricity	SA + 301004	2	Float	Floating Point
	Yearly Accumulated Electricity	SA + 301006	2	Float	Floating Point
Total / Average	15/30/60 mins Actual Demand	SA + 301008	2	Float	Floating Point
	15/30/60 mins Forecast Demand	SA + 301010	2	Float	Floating Point
	Max. Demand (Hourly)	SA + 301012	2	Float	Floating Point
	Max. Demand (Daily)	SA + 301014	2	Float	Floating Point
	Max. Demand	SA + 301016	2	Float	Floating Point

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	(Monthly)				
	Daily Accumulated Electricity	SA + 301018	2	Float	Floating Point
	Monthly Accumulated Electricity	SA + 301020	2	Float	Floating Point
	Yearly Accumulated Electricity	SA + 301022	2	Float	Floating Point
Submeter 8					
Phase A / CT22	15/30/60 mins Actual Demand	SA + 301024	2	Float	Floating Point
	15/30/60 mins Forecast Demand	SA + 301026	2	Float	Floating Point
	Max. Demand (Hourly)	SA + 301028	2	Float	Floating Point
	Max. Demand (Daily)	SA + 301030	2	Float	Floating Point
	Max. Demand (Monthly)	SA + 301032	2	Float	Floating Point
	Daily Accumulated Electricity	SA + 301034	2	Float	Floating Point
	Monthly Accumulated Electricity	SA + 301036	2	Float	Floating Point
	Yearly Accumulated Electricity	SA + 301038	2	Float	Floating Point
Phase B / CT23	15/30/60 mins Actual Demand	SA + 301040	2	Float	Floating Point
	15/30/60 mins Forecast Demand	SA + 301042	2	Float	Floating Point
	Max. Demand (Hourly)	SA + 301044	2	Float	Floating Point
	Max. Demand (Daily)	SA + 301046	2	Float	Floating Point
	Max. Demand	SA + 301048	2	Float	Floating Point

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	(Monthly)				
	Daily Accumulated Electricity	SA + 301050	2	Float	Floating Point
	Monthly Accumulated Electricity	SA + 301052	2	Float	Floating Point
	Yearly Accumulated Electricity	SA + 301054	2	Float	Floating Point
Phase C / CT24	15/30/60 mins Actual Demand	SA + 301056	2	Float	Floating Point
	15/30/60 mins Forecast Demand	SA + 301058	2	Float	Floating Point
	Max. Demand (Hourly)	SA + 301060	2	Float	Floating Point
	Max. Demand (Daily)	SA + 301062	2	Float	Floating Point
	Max. Demand (Monthly)	SA + 301064	2	Float	Floating Point
	Daily Accumulated Electricity	SA + 301066	2	Float	Floating Point
	Monthly Accumulated Electricity	SA + 301068	2	Float	Floating Point
	Yearly Accumulated Electricity	SA + 301070	2	Float	Floating Point
Total / Average	15/30/60 mins Actual Demand	SA + 301072	2	Float	Floating Point
	15/30/60 mins Forecast Demand	SA + 301074	2	Float	Floating Point
	Max. Demand (Hourly)	SA + 301076	2	Float	Floating Point
	Max. Demand (Daily)	SA + 301078	2	Float	Floating Point
	Max. Demand	SA + 301080	2	Float	Floating Point

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	(Monthly)				
	Daily Accumulated Electricity	SA + 301082	2	Float	Floating Point
	Monthly Accumulated Electricity	SA + 301084	2	Float	Floating Point
	Yearly Accumulated Electricity	SA + 301086	2	Float	Floating Point
[3x] Input Register, Unit : Register(16 Bits)					
Submeter 1 VTHD		SA + 301088	2	Float	Floating Point
Submeter 1 ITHD		SA + 301090	2	Float	Floating Point
Submeter 2 VTHD		SA + 301092	2	Float	Floating Point
Submeter 2 ITHD		SA + 301094	2	Float	Floating Point
Submeter 3 VTHD		SA + 301096	2	Float	Floating Point
Submeter 3 ITHD		SA + 301098	2	Float	Floating Point
Submeter 4 VTHD		SA + 301100	2	Float	Floating Point
Submeter 4 ITHD		SA + 301102	2	Float	Floating Point
Submeter 5 VTHD		SA + 301104	2	Float	Floating Point
Submeter 5 ITHD		SA + 301106	2	Float	Floating Point
Submeter 6 VTHD		SA + 301108	2	Float	Floating Point
Submeter 6 ITHD		SA + 301110	2	Float	Floating Point
Submeter 7 VTHD		SA + 301112	2	Float	Floating Point
Submeter 7		SA + 301114	2	Float	Floating Point

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ITHD				
Submeter 8 VTHD	SA + 301116	2	Float	Floating Point
Submeter 8 ITHD	SA + 301118	2	Float	Floating Point
Frequency CT1/ Phase A	SA + 301120	2	Float	Floating Point
Frequency CT2/ Phase B	SA + 301122	2	Float	Floating Point
Frequency CT3/ Phase C	SA + 301124	2	Float	Floating Point
Frequency Maximum	SA + 301126	2	Float	Floating Point
Frequency CT4/ Phase A	SA + 301128	2	Float	Floating Point
Frequency CT5/ Phase B	SA + 301130	2	Float	Floating Point
Frequency CT6/ Phase C	SA + 301132	2	Float	Floating Point
Frequency Maximum	SA + 301134	2	Float	Floating Point
Frequency CT7/ Phase A	SA + 301136	2	Float	Floating Point
Frequency CT8/ Phase B	SA + 301138	2	Float	Floating Point
Frequency CT9/ Phase C	SA + 301140	2	Float	Floating Point
Frequency Maximum	SA + 301142	2	Float	Floating Point
Frequency CT10/ Phase A	SA + 301144	2	Float	Floating Point
Frequency CT11/ Phase B	SA + 301146	2	Float	Floating Point
Frequency CT12/ Phase C	SA + 301148	2	Float	Floating Point
Frequency Maximum	SA + 301150	2	Float	Floating Point
Frequency CT13/ Phase A	SA + 301152	2	Float	Floating Point
Frequency CT14/ Phase B	SA + 301154	2	Float	Floating Point

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Frequency CT15/ Phase C	SA + 301156	2	Float	Floating Point
Frequency Maximum	SA + 301158	2	Float	Floating Point
Frequency CT16/ Phase A	SA + 301160	2	Float	Floating Point
Frequency CT17/ Phase B	SA + 301162	2	Float	Floating Point
Frequency CT18/ Phase C	SA + 301164	2	Float	Floating Point
Frequency Maximum	SA + 301166	2	Float	Floating Point
Frequency CT19/ Phase A	SA + 301168	2	Float	Floating Point
Frequency CT20/ Phase B	SA + 301170	2	Float	Floating Point
Frequency CT21/ Phase C	SA + 301172	2	Float	Floating Point
Frequency Maximum	SA + 301174	2	Float	Floating Point
Frequency CT22/ Phase A	SA + 301176	2	Float	Floating Point
Frequency CT23/ Phase B	SA + 301178	2	Float	Floating Point
Frequency CT24/ Phase C	SA + 301180	2	Float	Floating Point
Frequency Maximum	SA + 301182	2	Float	Floating Point
[3x] Input Register, Unit : Register(16 Bits) (PM-4324, PM-4324-MTCP)				
Power Meter Type	PM_SA + 300000	1	Int16	4324
Reserved	PM_SA + 300001	1	-	Reserved
Reserved	PM_SA + 300002	1	-	Reserved
Firmware Version	PM_SA + 300003	1	BCD	0x0100~
Address	PM_SA + 300004	1	UInt16	1~247
Error Code	PM_SA + 300005	1	UInt16	-1=Initializing 0=Failed 1=Success
Reserved	PM_SA + 300011	1	-	Reserved
PT Ratio	PM_SA + 300012	2	Float	0.01~655.35
CT Ratio [1]	PM_SA + 300014	2	Float	1~65535
CT Ratio [2]	PM_SA + 300016	2	Float	1~65535

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CT Ratio [3]	PM_SA + 300018	2	Float	1~65535
CT Ratio [4]	PM_SA + 300020	2	Float	1~65535
CT Ratio [5]	PM_SA + 300022	2	Float	1~65535
CT Ratio [6]	PM_SA + 300024	2	Float	1~65535
CT Ratio [7]	PM_SA + 300026	2	Float	1~65535
CT Ratio [8]	PM_SA + 300028	2	Float	1~65535
[3x] Input Register, Unit : Register(16 Bits) (PM-4324A, PM-4324A-MTCP)				
Power Meter Type	PM_SA + 300000	1	Int16	43240
Reserved	PM_SA + 300001	1	-	Reserved
Reserved	PM_SA + 300002	1	-	Reserved
Firmware Version	PM_SA + 300003	1	BCD	0x0100~
Address	PM_SA + 300004	1	UInt16	1~247
Error Code	PM_SA + 300005	1	UInt16	-1=Initializing 0=Failed 1=Success
Reserved	PM_SA + 300011	1	-	Reserved
PT Ratio [1]	PM_SA + 300012	2	Float	0.01~655.35
PT Ratio [2]	PM_SA + 300014	2	Float	0.01~655.35
CT Ratio [1]	PM_SA + 300016	2	Float	1~65535
CT Ratio [2]	PM_SA + 300018	2	Float	1~65535
CT Ratio [3]	PM_SA + 300020	2	Float	1~65535
CT Ratio [4]	PM_SA + 300022	2	Float	1~65535
CT Ratio [5]	PM_SA + 300024	2	Float	1~65535
CT Ratio [6]	PM_SA + 300026	2	Float	1~65535
CT Ratio [7]	PM_SA + 300028	2	Float	1~65535
CT Ratio [8]	PM_SA + 300030	2	Float	1~65535

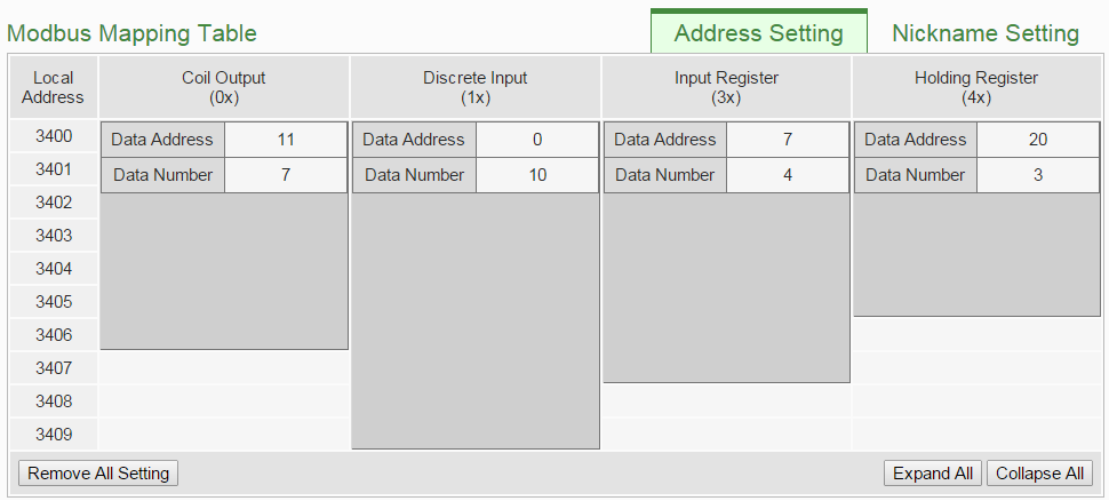
- **Modbus Module**

  This block stores the Modbus TCP/RTU module I/O channel data in PMC/PMD. The start address of the block is from the SA value. The allocation of the Modbus address of I / O channel for each Modbus TCP/RTU module is in sequence arrangement from the module starting address(SA). Please refer to the following example.

  The Modbus RTU module is connected to RS-485-1 of PMC/PMD. Its module index number is 3. So the SA value of the Modbus RTU module in PMC/PMD is 1000 + (3 - 1) x 1200 = 3400. The Modbus address of the I/O channel of the

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module is in sequence arrangement from the module starting address 3400.



The detailed I/O channel information of the module：

Modbus Data Model	The Starting Address of Modbus RTU Module	Continuous Data Number
Coil Output	11	7
Discrete Input	0	10
Input Register	7	4(32-bit Floating Point)
Holding Register	20	3(32-bit Floating Point)

The allocation of the Modbus Address in PMC/PMD for the Coil Output setting of this Modbus RTU module is shown as below：

Coil Output Index	The Modbus Address in Modbus RTU Module	The mapping Modbus Address in PMC/PMD
1	00011	03400
2	00012	03401
3	00013	03402
4	00014	03403
5	00015	03404
6	00016	03405
7	00017	03406

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The allocation of the Modbus Address in PMC/PMD for the Discrete Input setting of this Modbus RTU module is shown as below：

Discrete Input Index	The Modbus Address in Modbus RTU Module	The mapping Modbus Address in PMC/PMD
1	10000	13400
2	10001	13401
3	10002	13402
4	10003	13403
5	10004	13404
6	10005	13405
7	10006	13406
8	10007	13407
9	10008	13408
10	10009	13409

The allocation of the Modbus Address in PMC/PMD for the Input Register setting of this Modbus RTU module is shown as below：

Input Register Index	The Modbus Address in Modbus RTU Module	The mapping Modbus Address in PMC/PMD
1	30007	33400
2	30009	33402
3	30011	33404
4	30013	33406

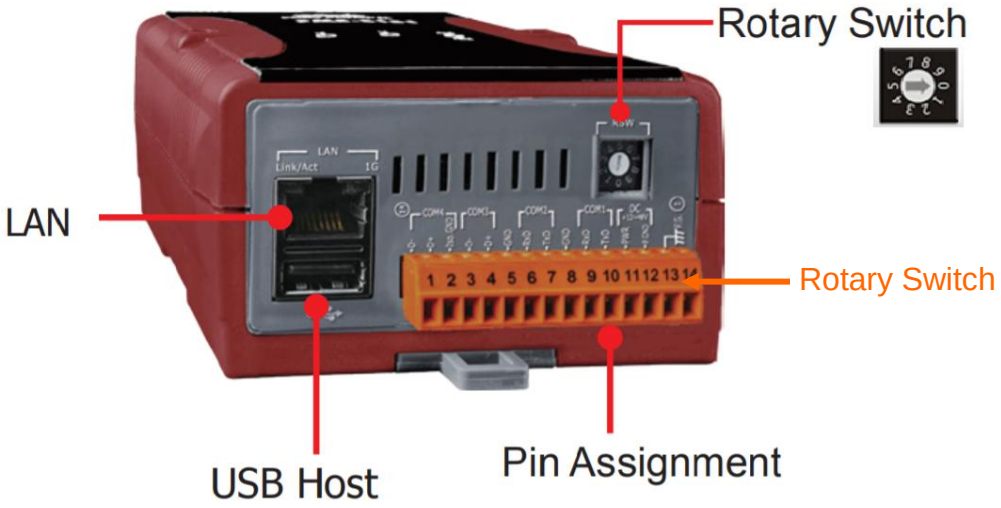
The allocation of the Modbus Address in PMC/PMD for the Holding Register setting of this Modbus RTU module is shown as below：

Holding Register Index	The Modbus Address in Modbus RTU Module	The mapping Modbus Address in PMC/PMD
1	40020	43400
2	40022	43402
3	40024	43404

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Appendix II：Reset to Factory Default Setting and Send Password to Administrator

During the operation of PMC/PMD, if the hardware system setting data is lost or encounters any abnormal problem that you would like to reset the system to factory default, please switch the Rotary Switch to specific positions to restore factory settings or to ask PMC/PMD to send the login password to the Email account of the Administrator. In addition, you can switch the Rotary Switch to the specific position to delete the data logger files and reset the accumulated values of the power meter which connect to PMC/PMD. The following figure shows the location of the Rotary Switch of the PMC-5231.



The function of the position of the Rotary Switch：



Rotary Switch	Function
7	Restore network settings to factory default.
8	■ Send the login password to the Email account of the Administrator. ■ Delete the data logger files and reset the accumulated values of the power meter.
9	Reset all password settings.

Please follow the steps below to restore network settings to factory default or send the login password to the Email account of the Administrator:

- Restore network settings to factory default

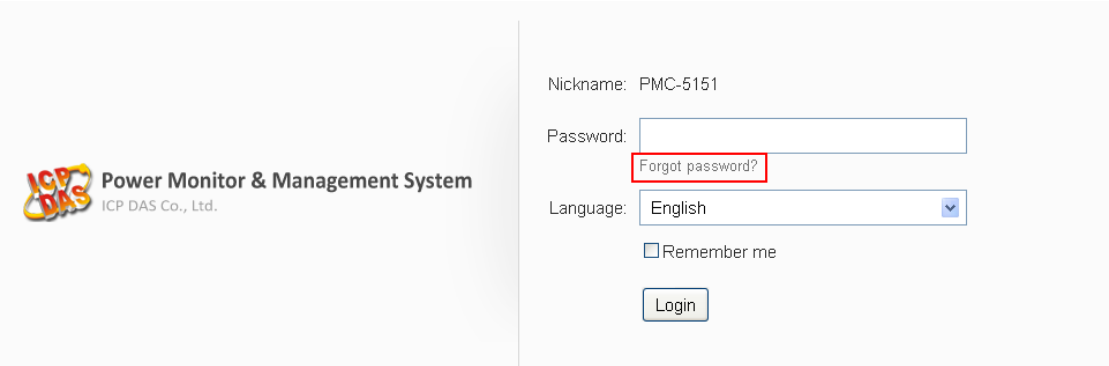
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1. Power off the PMC/PMD.
2. Switch the Rotary Switch to position 7.
3. Power on the PMC/PMD, when the RUN/PWR LED Indicator turns to be Orange(ON state), it indicates that the setting is completed.

IP Address	LAN1：192.168.255.1 LAN2：192.168.255.2
Subnet Mask	255.255.0.0
Gateway	192.168.0.1
DNS	8.8.8.8
Port for Web Server	80
Port for Modbus TCP	502
Modbus TCP NetID	1

4. Switch the Rotary Switch to position 0

- Send the login password to the Email account of the Administrator
  1. Switch the Rotary Switch to position 8.
  2. Connect to PMC/PMD Login webpage via Web browser. Now a “Forget password” message will be displayed under the password field. Click the “Forget password” message, then the system will send the both passwords of the Administrator and the General User to the Email account of the administrator that was previously set by the user in “6.4 Security Setting” section.



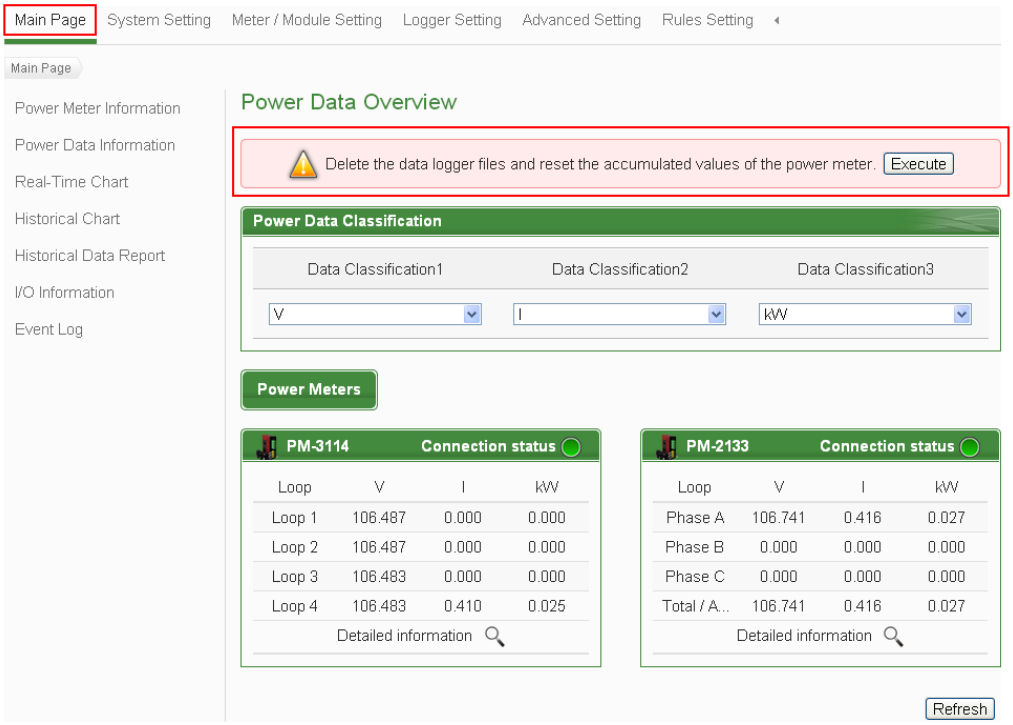
The following figure illustrate an example of the Email the PMC/PMD sends to the Email account of the Administrator. The Email content will include the password of the Administrator, the password of the General User and the password of the FTP Server of PMC/PMD.

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Administrator password is "Admin". Guest password is "User". Local FTP password is "Admin".

3. Switch the Rotary Switch to position 0.

- Delete the data logger files and reset the accumulated values of the power meter.
  1. Switch the Rotary Switch to position 8.
  2. Connect to PMC/PMD login webpage via Web browser, and login as the Administrator.
  3. After login into the system, the message box of “Delete the data logger files and reset the accumulated values of the power meter” will be displayed in the PMC/PMD Main page. Click the “Execute” button for the reset and files delete operation.



4. Switch the Rotary Switch to position 0.

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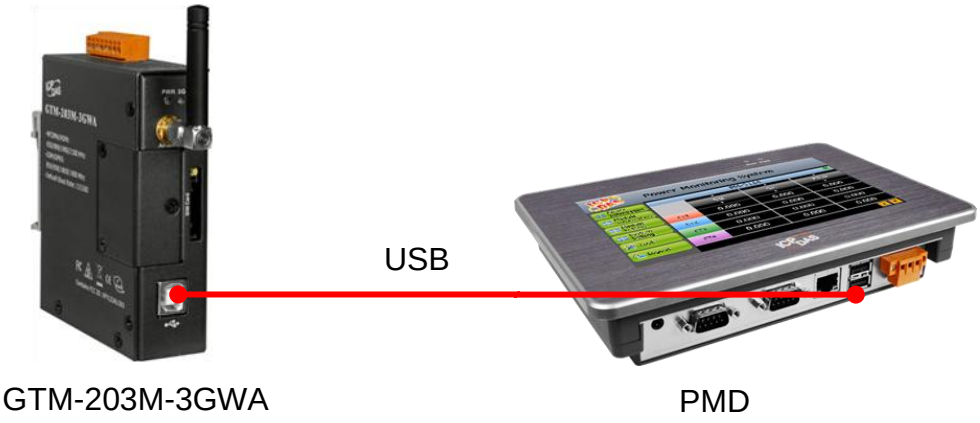
Appendix III：Setup the GTM-203M-3GWA with PMD

- Hardware installation

1. Install the SIM card and antenna on the GTM-203M-3GWA, and connect the device with Power(+10V_{DC} ~ +30V_{DC}).



2. Connect the GTM-203M-3GWA and PMD by USB cable.

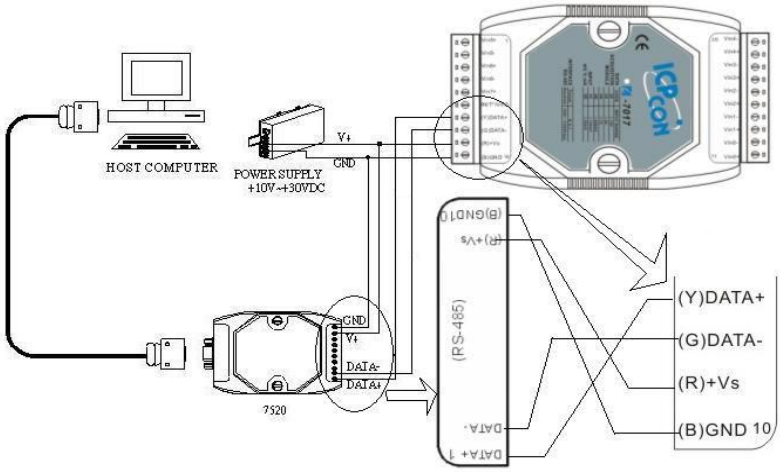


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Appendix IV：The configuration setting of M-7000/DL module

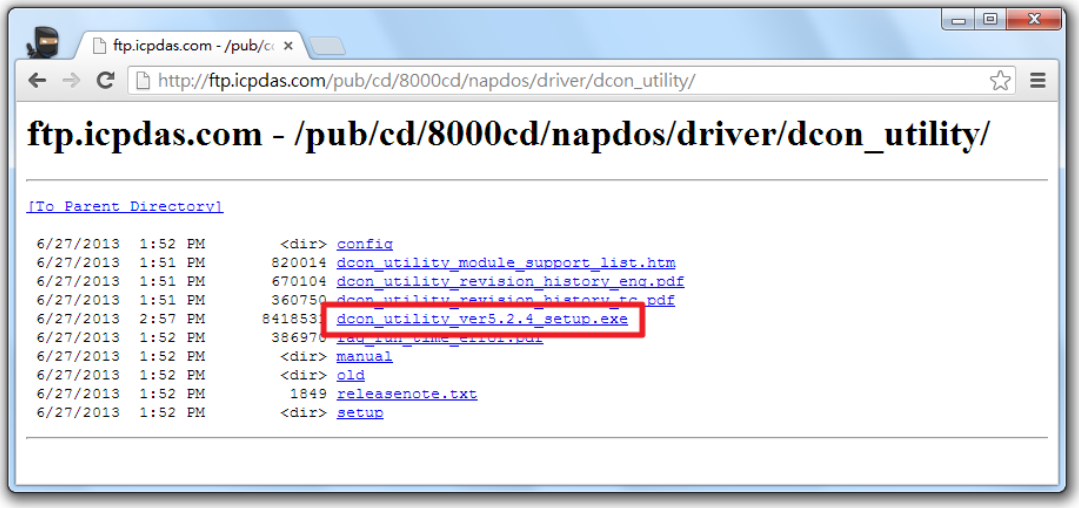
PMC/PMD allows connection to ICP DAS M-7000/DL modules for the I/O channel data settings and data retrieve. However, for other configuration of the M-7000/DL modules must be completed via DCON Utility in advance, so that the PMC/PMD can accurately connect to M-7000/DL module. The procedures for M-7000/DL module parameter settings are as follow:

1. Connect the M-7000/DL modules to the PC (with DCON Utility installed) via RS-485 cable, make sure the RS-485 cable is properly connected. For PC to receive RS-485 signals, a RS-232 to RS-485 or a USB to RS-485 converter is required. For more converter information, please refer to ICP DAS converter product page:
   http://www.icpdas.com/root/product/solutions/industrial_communication/converter/converter_selection.html

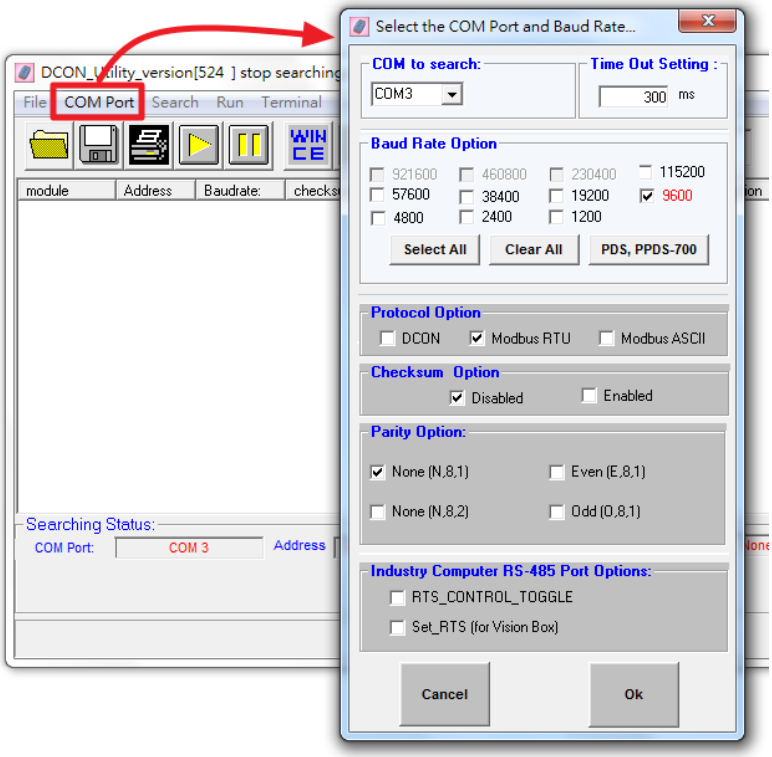


2. If the ICP DAS I/O module is M-7000 series, please follow the steps as below for the configuration setting.
   A. You can download DCON Utility from the link below, and Install the DCON Utility on PC
   http://ftp.icpdas.com/pub/cd/8000cd/napdos/driver/dcon_utility/

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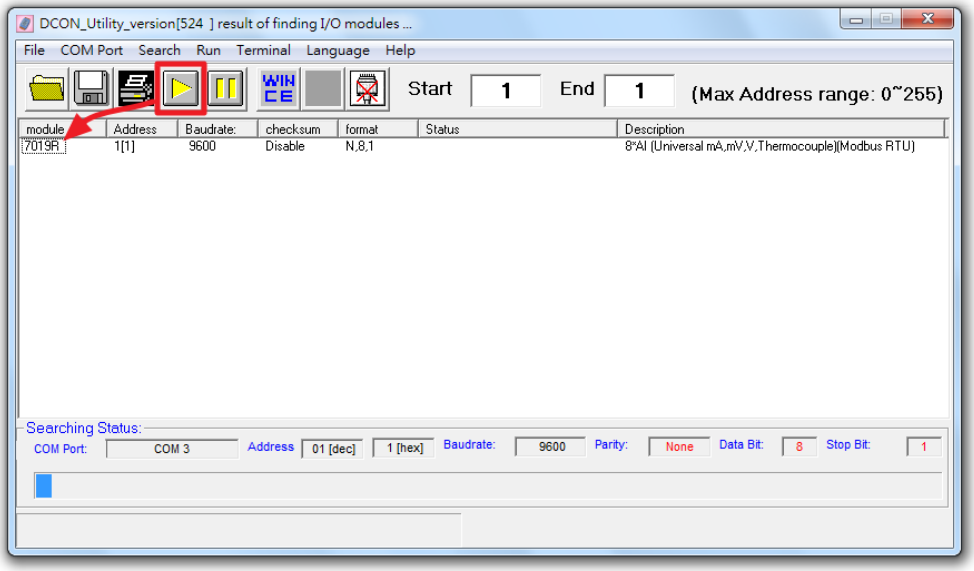


B. Start the DCON Utility and verify if the COM Port parameters are accurate.

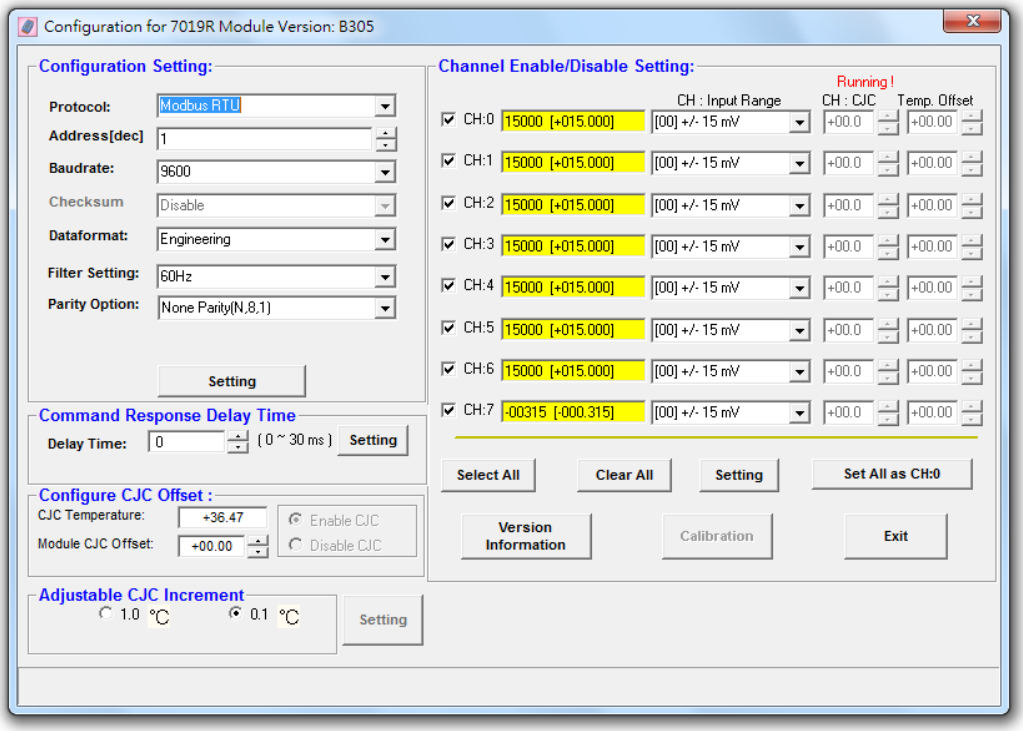


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Perform “Search” to find all M-7000 modules that are connected to the PC.



C. Click on the M-7000 module to bring up the “Configuration Window” and setup the parameters (such as Address, Baudrate) for the module. The “Configuration Window” will be shown as follow (using M-7019R as an example):



Please note: The following parameters has to be accurate to connect with PMC/PMD properly:

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- Communication Protocol: has to be set as Modbus RTU.
- Address: the address has to be set between 1~64, please note: the configuration of M-7000 module address on PMC/PMD has to be set exactly the same.
- Baudrate: the Baudrate has to be set the same as the Baudrate of PMC/PMD COM Port which the module will connect. All M-7000 modules' Baudrate have to be set the same as well
- Data format: set to be "Engineering" format.

Please complete others setting of M-7000/DL module according to system's requirement. For more detailed information, please refer to DCON Utility manual as below.

http://ftp.icpdas.com/pub/cd/8000cd/napdos/driver/dcon_utility/manual/

3. For others ICP DAS I/O module, please refer to related user manual for the configuration setting. In order to accurately connect with PMC/PMD, please make sure of the COM port setting (Module address (1~255), Baudrate, Parity) or Ethernet setting (IP address, Connection Port (1~65535), NetID (1~247)). Please follow the links as below for the user manual of the related ICP DAS I/O modules.

- DL-100 module

Link	http://ftp.icpdas.com.tw/pub/cd/usbcd/napdos/dl_100/dl100tm485/documents/
File name	dl_100tm485_v*XXX*.pdf

- DL-302 module

Link	http://ftp.icpdas.com.tw/pub/cd/usbcd/napdos/dl-300/document/
File name	dl300_user_manial_english_v*XXX*.pdf

- IR module

Link	http://ftp.icpdas.com.tw/pub/cd/usbcd/napdos/ir/
File name	ir-*XXX*/manual/ ir-*XXX*_usermanual_en_v*X*_*X*pdf

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Appendix V：The SNMP Variables for PMC/PMD

The PMC/PMD provides SNMP (Simple Network Management Protocol) Agent to work with the SNMP Network Management software for monitoring the system data, power meter data and I/O module data. The following table lists the SNMP variables for the PMC/PMD.

●RFC1213 MIB II Supported SNMP Variables

The following SNMP variables are built into the PMC/PMD SNMP Agent and are compliant with RFC1213 MIB II.

MIB II	**System**	SysDescr	SysObjectID	SysUpTime
		SysContact	SysName	SysLocation
		SysServices		
	Interface	IfNumber	ifIndex	ifDescr
		IfType	ifMtu	ifSpeed
		ifPhysAddress	ifAdminStatus	ifOperStatus
		ifLastChange	ifInOctets	ifInUcastPkts
		ifInNUcastPkts	ifInDiscards	ifInErrors
		ifInUnknownProtos		ifOutOctets
		ifOutUcastPkts	ifOutNUcastPkts	ifOutDiscards
		ifOutErrors	ifOutQLen	ifSpecific
	IP	ipForwarding	ipDefaultTTL	ipInReceives
		ipInHdrErrors	ipInAddrErrors	ipForwDatagrams
		ipInUnknownProtos		ipInDiscards
		ipInDelivers	ipOutRequests	ipOutDiscards
		ipOutNoRoutes	ipReasmTimeout	ipReasmReqds
		ipReasmOKs	ipReasmFails	ipFragOKs
		ipFragFails	ipFragCreates	ipAdEntAddr
		ipAdEntIfIndex		ipAdEntNetMask
		ipAdEntBcastAddr		ipAdEntReasmMaxSize
		ipRouteDest	ipRouteIfIndex	ipRouteMetric1
		ipRouteMetric2	ipRouteMetric3	ipRouteMetric4
		ipRouteNextHop	ipRouteType	ipRouteProto
		ipRouteAge	ipRouteMask	ipRouteMetric5
		ipRouteInfo		pRoutingDiscards

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	ICMP	icmpInMsgs	icmpInErrors	icmpInDestUnreachs
		icmpInTimeExcds	icmpInParmProbs	
		icmpInSrcQuenchs	icmpInRedirects	icmpInEchos
		icmpInEchoReps	icmpInTimestamps	
		icmpInTimestampReps		icmpInAddrMasks
		icmpInAddrMaskReps		icmpOutMsgs
		icmpOutErrors		icmpOutDestUnreachs
		icmpOutTimeExcds		icmpOutParmProbs
		icmpSrcQuenchs	icmpRedirects	icmpOutEchos
		icmpOutEchoReps		icmpOutTimestamps
		impOutTimestampReps		impOutAddrMasks
		impOutAddrMaskReps		
	TCP	tpRtoAlgorithm	tcpRtoMin	tcpRtoMax
		tcpMaxConn	tcpActiveOpens	tcpPassiveOpens
		tcpAttempFails	tcpEstabResets	tcpCurrEstab
		tcpInSegs	tcpOutSegs	tcpRetransSegs
		tcpConnState	tcpConnLocalAddress	
		tcpConnLocalPort	tcpConnRemAddress	
		tcpConnRemPort	tcpInErrs	tcpOutRsts
	UDP	UdpInDatagrams	UdpNoPorts	UdpInErrors
		UdpOutDatagrams	UdpLocalAddress	UdpLocalPort
	SNMP	SnmpInPkts	snmpOutPkts	
		snmpInBadVersions	snmpInBadCommunityNames	
		snmpInBadCommunityUses	snmpInASNParseErrs	
		snmpInTooBigs	snmpInNoSuchNames	
		snmpInBadValues	snmpInReadOnlys	snmpInGenErrs
		snmpInTotalReqVars	snmpInTotalSetVars	
		snmpInGetRequests	snmpInGetNexts	
		snmpInSetRequests	snmpInGetResponses	
		snmpInTraps	snmpOutTooBigs	
		snmpOutNoSuchNames	snmpOutBadValues	
		snmpOutGenErrs	snmpOutGetRequests	
		snmpOutGetNexts	snmpOutSetRequests	
		snmpOutGetResponses	snmpOutTraps	
		snmpEnableAuthenTraps		

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● Private MIB File and SNMP Variables

PMC/PMD provides the SNMP Agent can be used to monitor the system status, power meter status and I/O module status with the SNMP Network Management software. You can find the PMC/PMD SNMP MIB file on the Software CD or from the ICP DAS PMMS Web site.

PMC-523x/PMC-224x Series			
System	serialNumber	firmwareVersion	nickname
	systemCurrentTime	webserverPort	modbusTcpPort
	modbusTcpNetID	microSDFreeSpace	xvBoardAmount
	powerMeterAmount	ioModuleAmount	demandInterval
	contractCapacity	carbonEmissionsFactor	
	cellularIP	cellularSignal	cellularSignalPercent
Power Meter1 (On Com3)	com3pm1Index	com3pm1Interface	
	com3pm1ModbusID	com3pm1Name	
	com3pm1PTIndex	com3pm1PTValue	com3pm1PTIndex
	com3pm1CTValue	com3pm1PollingTimeout	
	com3pm1DOAmount	com3pm1RetryInterval c	
	com3pm1ScanRate	com3pm1StatusCode	
	com3pm1ChSubmeterIndex	com3pm1ChName	
	com3pm1ChVoltage	com3pm1ChCurrent	
	com3pm1ChKW	com3pm1ChKvar	com3pm1ChKVA
	com3pm1ChPF	com3pm1ChKWh	com3pm1ChKvarh
	com3pm1ChKVAh	com3pm1ChActualDemand	
	com3pm1ChForecastDemand	com3pm1ChMaxDemandH	
	com3pm1ChMaxDemandD	com3pm1ChMaxDemandM	
	com3pm1ChElectricityD	com3pm1ChElectricityM	
	com3pm1ChElectricityY	com3pm1DOIndex	
	com3pm1DOName	com3pm1DOValue	
	com3pm1HarmonicSubmeterIndex	com3pm1HarmonicSelector	
	com3pm1HarmonicVTHD	com3pm1HarmonicITHD	

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The SNMP Variables naming rule of the Power Meter connected with PMC.

- Every power meter that is connected to PMC-523x/PMC-224x provides the SNMP Variables as above (with its specific prefix denoted).
- **The SNMP Variables naming rule of the power meters on Com3**

  The Power Meter1 SNMP Variables are shown as above (with prefix **com3**pm**1**), the Power Meter2 SNMP Variables are similar to listed information above but with prefix **com3**pm**2** instead**,** and the Power Meter16 SNMP Variables are also similar to the listed information above but with prefix **com3**pm**16** instead**.**
- **The SNMP Variables naming rule of the power meters on Com4**

  The Power Meter1 SNMP Variables are similar as listed information above but with prefix **com4**pm**1,** the Power Meter2 SNMP Variables are similar to listed information above but with prefix **com4**pm**2** instead**,** and the Power Meter16 SNMP Variables are also similar to the listed information above but with prefix **com4**pm**16** instead**.**
- **The SNMP Variables naming rule of the power meters on LAN**

  The Power Meter1 SNMP Variables are similar as listed information above but with prefix **lan**pm**1, t**he Power Meter2 SNMP Variables are similar to listed information above but with prefix **lan**pm**2** instead**,** and the Power Meter16 SNMP Variables are also similar to the listed information above but with prefix **lan**pm**16** instead**.**

xvBoard	xvBoardName		xvBoardDIAmount
	xvBoardDOAmount		xvBoardAIAmount
	xvBoardAOAmount	xvBoardDIIndex	xvBoardDIName
	xvBoardDIValue		xvBoardDICounterType
	xvBoardDICounterInitValue		xvBoardDICounterValue
	xvBoardDOIndex	xvBoardDOName	xvBoardDOValue
	xvBoardDOPowerOnValue		xvBoardDOAdvFunction
	xvBoardAIIndex	xvBoardAIName	xvBoardAIValue
	xvBoardAIType		xvBoardAIDeadband
	xvBoardAIScaleMin		xvBoardAIScaleMax
	xvBoardAOIndex	xvBoardAOName	xvBoardAOValue
	xvBoardAOType		xvBoardAOPowerOnValue
I/O Module1 (On Com3)	com3io1Index		com3io1Interface
	com3io1ModbusID		com3io1ModuleName
	com3io1ConnectionStatus		com3io1DiscInputAmount
	com3io1CoilOutputAmount		com3io1InputRegAmount
	com3io1HoldingRegAmount		com3io1DiscInputIndex

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	com3io1DiscInputName	com3io1DiscInputValue
	com3io1DiscInputModbusAdd	com3io1DiscInputCounterValue
	com3io1DiscInputResetCounter	com3io1CoilOutputIndex
	com3io1CoilOutputName	com3io1CoilOutputValue
	com3io1CoilOutputModbusAdd	com3io1CoilOutputAdvFunction
	com3io1InputRegIndex	com3io1InputRegName
	com3io1InputRegValue	com3io1InputRegModbusAdd
	com3io1InputRegType	com3io1InputRegScaleRatio
	com3io1InputRegOffset	com3io1InputRegDeadband
	com3io1InputRegScaleMin	com3io1InputRegScaleMax
	com3io1HoldingRegIndex	com3io1HoldingRegName
	com3io1HoldingRegValue	com3io1HoldingRegModbusAdd
	com3io1HoldingRegType	com3io1HoldingRegScaleRatio
	com3io1HoldingRegOffset	com3io1HoldingRegDeadband

The SNMP Variables naming rule of the I/O modules that are connected to PMC.

- Every I/O module that is connected to PMC-523x/PMC-224x provides the SNMP Variables as above (with its specific prefix denoted).
- **The SNMP Variables naming rule of the I/O modules on Com3**

  The I/O Module1 SNMP Variables are shown as above (with prefix **com3**io**1**), the I/O Module2 SNMP Variables are similar to listed information above but with prefix **com3**io**2** instead**,** and the I/O Module16 SNMP Variables are also similar to the listed information above but with prefix **com3**io**16** instead**.**
- **The SNMP Variables naming rule of the I/O modules on Com4**

  The I/O Module1 SNMP Variables are similar as listed information above but with prefix **com4**io**1,** the I/O Module2 SNMP Variables are similar to listed information above but with prefix **com4**io**2** instead**,** and the I/O Module16 SNMP Variables are also similar to the listed information above but with prefix **com4**io**16** instead**.**
- **The SNMP Variables naming rule of the I/O modules on LAN**

  The I/O Module1 SNMP Variables are similar as listed information above but with prefix **lan**io**1, t**he I/O Module2 SNMP Variables are similar to listed information above but with prefix **lan**io**2** instead**,** and the I/O Module16 SNMP Variables are also similar to the listed information above but with prefix **lan**io**16** instead**.**

otherInfo	irIndex		irName	irValue	
	pueIndex	pueName	pueTotalEnergy	pueITEnergy	pueValue

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<table>
<tr><th colspan="5">PMD Series</th></tr>
<tr><td rowspan="6">System</td><td>serialNumber</td><td>firmwareVersion</td><td colspan="2">nickname</td></tr>
<tr><td>systemCurrentTime</td><td>webserverPort</td><td colspan="2">modbusTcpPort</td></tr>
<tr><td>modbusTcpNetID</td><td>microSDFreeSpace</td><td colspan="2">powerMeterAmount</td></tr>
<tr><td>ioModuleAmount</td><td>demandInterval</td><td colspan="2">contractCapacity</td></tr>
<tr><td>modemStatus</td><td>registerStatus</td><td colspan="2">signal</td></tr>
<tr><td colspan="4">carbonEmissionsFactor</td></tr>
<tr><td rowspan="20">Power Meter1 (On Com1)</td><td colspan="2">com1pm1Index</td><td colspan="2">com1pm1Interface</td></tr>
<tr><td colspan="2">com1pm1ModbusID</td><td colspan="2">com1pm1Name</td></tr>
<tr><td>com1pm1PTIndex</td><td>com1pm1PTValue</td><td colspan="2">com1pm1CTIndex</td></tr>
<tr><td>com1pm1CTValue</td><td colspan="3">com1pm1PollingTimeout</td></tr>
<tr><td colspan="2">com1pm1DOAmount</td><td colspan="2">com1pm1RetryInterval c</td></tr>
<tr><td colspan="2">com1pm1ScanRate</td><td colspan="2">com1pm1StatusCode</td></tr>
<tr><td colspan="2">com1pm1ChSubmeterIndex</td><td colspan="2">com1pm1ChName</td></tr>
<tr><td colspan="2">com1pm1ChVoltage</td><td colspan="2">com1pm1ChCurrent</td></tr>
<tr><td>com1pm1ChKW</td><td>com1pm1ChKvar</td><td colspan="2">com1pm1ChKVA</td></tr>
<tr><td>com1pm1ChPF</td><td>com1pm1ChKWh</td><td colspan="2">com1pm1ChKvarh</td></tr>
<tr><td colspan="2">com1pm1ChKVAh</td><td colspan="2">com1pm1ChActualDemand</td></tr>
<tr><td colspan="2">com1pm1ChForecastDemand</td><td colspan="2">com1pm1ChMaxDemandH</td></tr>
<tr><td colspan="2">com1pm1ChMaxDemandD</td><td colspan="2">com1pm1ChMaxDemandM</td></tr>
<tr><td colspan="2">com1pm1ChElectricityD</td><td colspan="2">com1pm1ChElectricityM</td></tr>
<tr><td colspan="2">com1pm1ChElectricityY</td><td colspan="2">com1pm1DOIndex</td></tr>
<tr><td colspan="2">com1pm1DOName</td><td colspan="2">com1pm1DOValue</td></tr>
<tr><td colspan="2">com1pm1HarmonicSubmeterIndex</td><td colspan="2">com1pm1HarmonicSelector</td></tr>
<tr><td colspan="2">com1pm1HarmonicVTHD</td><td colspan="2">com1pm1HarmonicITHD</td></tr>
<tr><td colspan="5">The SNMP Variables naming rule of the Power Meter connected with PMD.
● Every power meter that is connected to PMD-220x/PMD-420x provides the SNMP Variables as above (with its specific prefix denoted).
● The SNMP Variables naming rule of the power meters on Com1
The Power Meter1 SNMP Variables are shown as above (with prefix com1pm1), the Power Meter2 SNMP Variables are similar to listed information above but with prefix com1pm2 instead, and the Power Meter16 SNMP Variables are also similar to the listed information above but with prefix com1pm16 instead.
● The SNMP Variables naming rule of the power meters on Com2
The Power Meter1 SNMP Variables are similar as listed information above but with prefix com2pm1, the Power Meter2 SNMP Variables are similar to listed information above but with</td></tr>
</table>

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prefix **com2**pm**2** instead**,** and the Power Meter16 SNMP Variables are also similar to the listed information above but with prefix **com2**pm**16** instead**.**

- **The SNMP Variables naming rule of the power meters on LAN**

  The Power Meter1 SNMP Variables are similar as listed information above but with prefix **lan**pm**1, t**he Power Meter2 SNMP Variables are similar to listed information above but with prefix **lan**pm**2** instead**,** and the Power Meter16 SNMP Variables are also similar to the listed information above but with prefix **lan**pm**16** instead**.**

I/O Module1(On Com1)	com1io1Index	com1io1Interface
	com1io1ModbusID	com1io1ModuleName
	com1io1ConnectionStatus	com1io1DiscInputAmount
	com1io1CoilOutputAmount	com1io1InputRegAmount
	com1io1HoldingRegAmount	com1io1DiscInputIndex
	com1io1DiscInputName	com1io1DiscInputValue
	com1io1DiscInputModbusAdd	com1io1DiscInputCounterValue
	com1io1DiscInputResetCounter	com1io1CoilOutputIndex
	com1io1CoilOutputName	com1io1CoilOutputValue
	com1io1CoilOutputModbusAdd	com1io1CoilOutputAdvFunction
	com1io1InputRegIndex	com1io1InputRegName
	com1io1InputRegValue	com1io1InputRegModbusAdd
	com1io1InputRegType	com1io1InputRegScaleRatio
	com1io1InputRegOffset	com1io1InputRegDeadband
	com1io1InputRegScaleMin	com1io1InputRegScaleMax
	com1io1HoldingRegIndex	com1io1HoldingRegName
	com1io1HoldingRegValue	com1io1HoldingRegModbusAdd
	com1io1HoldingRegType	com1io1HoldingRegScaleRatio
	com1io1HoldingRegOffset	com1io1HoldingRegDeadband

The SNMP Variables naming rule of the I/O modules that are connected to PMD.

- Every I/O module that is connected to PMD-220x/PMD-420x provides the SNMP Variables as above (with its specific prefix denoted).
- **The SNMP Variables naming rule of the I/O modules on Com1**

  The I/O Module1 SNMP Variables are shown as above (with prefix **com1**io**1**), the I/O Module2 SNMP Variables are similar to listed information above but with prefix **com1**io**2** instead**,** and the I/O Module16 SNMP Variables are also similar to the listed information above but with prefix **com1**io**16** instead**.**
- **The SNMP Variables naming rule of the I/O modules on Com2**

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The I/O Module1 SNMP Variables are similar as listed information above but with prefix **com2**io**1,** the I/O Module2 SNMP Variables are similar to listed information above but with prefix **com2**io**2** instead**,** and the I/O Module16 SNMP Variables are also similar to the listed information above but with prefix **com2**io**16** instead**.**

- **The SNMP Variables naming rule of the I/O modules on LAN**

The I/O Module1 SNMP Variables are similar as listed information above but with prefix **lan**io**1, t**he I/O Module2 SNMP Variables are similar to listed information above but with prefix **lan**io**2** instead**,** and the I/O Module16 SNMP Variables are also similar to the listed information above but with prefix **lan**io**16** instead**.**

otherInfo	irIndex		irName		irValue
	pueIndex	pueName	pueTotalEnergy	pueITEnergy	pueValue

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Appendix VI：The format of CGI Query command

PMC supports the HTTP protocol to retrieve the Power data value, I/O channel value, Internal Register value or system information. In addition, PMC also supports the JSON format for message exchange. JSON is a popular format; it can reduce the loading of data transfer, and is easy to be integrated with other Network system.

- **CGI Query command**

  The following is the format of CGI Query command:

  ```
  http://IP address:port/dll/query.dll?command
  ```

  The “IP address” is the actual IP address that the PMC is using now. The default IP address is “192.168.255.1”. The “Port” is the port number of Web server port of PMC. The default port number is “80”. If the port number is 80, you can skip it in the setting.

  The Command consist a set of parameters. Each parameter consist one name and one value. The name and the value of a parameter are linked by symbol “=”. The parameters are linked by symbol “&”. Depended on the query items, follow the format to include the corresponding parameters in each CGI command.

- **CGI Query Authentication**

  The CGI Query Authentication have to be added to the CGI command. It consist two parameters: “id” and “password”. The value of “id” is for the user account, and the value of “password” is for the password.

  The following is an example of the CGI Query command shows querying the value of the Internal Register 1 of PMC with CGI Query Authentication.

  ```
  http://192.168.255.1/dll/query.dll?id=admin&password=Admi
  n&job=get_ir_val&ir_no=1
  ```

  In this example, “admin” is the user account, “Admin” is the password. If the user account or password is in error status, then the system will return the following status message.

  ```
  {
     "status": "PASSWORD_ERROR"
  }
  ```


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In the CGI Query command, it consist two parameters: “job=get_ir_val” and “ir_no=1”. For “job=get_ir_val”, “job” is the name of the first parameter, “get_ir_val” is the value of the first parameter. The first parameter is used to query the value of Internal Register of PMC. And then for “ir_no=1”, “ir_no” is the name of the second parameter, “1” is the value of the second parameter. The combination of first parameter and second parameter indicates to query the value of Internal Register 1 of PMC. When PMC receives the CGI Query command, it will reply the following message to the command sender.

```
{
   "status": "OK",
   "result": {
      "value": 2.3
   }
}
```

The returned value will be shown in the JSON format. In the above example, the value of Internal Register 1 is 2.3. It is located in “value” section of the “result” area.

- **JSONP Supported**

If user wants to enable the JSONP, he/she can add an extra parameter “callback” to the original CGI command, and then assign the value of the “callback” parameter to the function which is used to receive the returned values. The following is an example to enable the JSONP.

```
http://192.168.255.1/dll/query.dll?id=admin&password=Admi
n&job=get_ir_val&ir_no=1&callback=foo
```

In this example, the function named “foo” is used to receive the returned values. The returned values are as below.

```
foo({
   "status": "OK",
   "result": {
      "value": 2.3
   }
});
```

The following table gives detailed information of the query command, command parameters and returned values. For parameters “id”, “password” and “callback”, please refer to the examples in section above.

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- **Set up the I/O channel value.**

Command	job=set_channel_val& if_type=*val*&com_port=*val*&module_no=*val*& ch_type=*val*&ch_addr=*val*&ch_value=*val*
Parameters	

Name	if_type
Description	The I/O module Interface
Value	0: XV-Board 1: COM Port 2: Network

Name	com_port
Description	If the I/O interface is XV-Board or Ethernet, skip this parameter. If the I/O interface is COM Port, it is the COM Port number.
Value	0: COM0 1: COM1 …so on.

Name	module_no
Description	The index number of the module. If the I/O interface is XV-Board, skip this parameter.
Value	Integer; start from 1.

Name	ch_type
Description	The channel type
Value	Modbus Module：co, ro ICP DAS I/O Module：do, ao Infrared Module：ir

Name	ch_addr
Description	Channel Address
Value	The ch_addr is Modbus Data Address for the Modbus module. For ICP DAS I/O module, the ch_addr is the

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	channel sequence number starting from 0. For infrared module, the ch_addr is the output channels in binary format. The first bit (LSB) of the value represents the 1st channel. The 2th bit represents the 2th channel. For example: The 1st and 2nd output channels: 0x03 == 0011 (binary)

Name	ch_value
Description	The value you want to assign to the output channel.
Value	Digital type channel: 0 or 1. Analog type channel: Number Infrared module: command index

Response	
	The channel is existed.

	{
	"status": "OK"
	}

	The module or channel does not exist.

	{
	"status": "CHANNEL_NOT_EXIST"
	}

	Password error

	{
	"status": "PASSWORD_INCORRECT"
	}

- **Get the specific channel value of the remote I/O module or Power module.**

Command	Job=get_channel_val& if_type=*val*&com_port=*val*&module_no=*val*& ch_type=*val*&ch_addr=*val* &submeter=*val*&ct_no=*val* (for Power module)

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Parameters

Name	if_type
Description	The type of I/O Interface
Value	0: XV-Board 1: COM Port 2: Ethernet

Name	com_port
Description	If the I/O interface is XV-Board or Ethernet, skip this parameter. If the I/O interface is COM Port, it is for the COM Port number.
Value	0: COM0 1: COM1 …so on.

Name	module_no
Description	The index number of the module.
Value	Integer; start from 1.

Name	ch_type
Description	The channel type
Value	Modbus Module：ci, co, ri, ro Power Module：v, i, kw, kvar, kva, pf, kwh, kvarh, kvah, kw_now, kw_predict, maxkw_hour, maxkw_day, maxkw_month, mwh_day, mwh_month, mwh_year, harmonic_vthd, harmonic_ithd frequency Other Modules：di, dic, do, ai, ao
For Power Module: v: Voltage i: Current kw: kW kvar: kvar kva: kVA pf: PF	

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kwh: kWh
kvarh: kvarh
kvah: kVAh
kw_now: Actual Demand
kw_predict: Forecast Demand
maxkw_hour: Max. Demand (Hourly)
maxkw_day: Max. Demand (Daily)
maxkw_month: Max. Demand (Monthly)
mwh_day: Daily Accumulated Electricity
mwh_month: Monthly Accumulated Electricity
mwh_year: Yearly Accumulated Electricity
harmonic_vthd: Total Harmonic Distortion VTHD
harmonic_ithd: Total Harmonic Distortion ITHD
frequency: Frequency

Name	ch_addr
Description	The channel address
Value	The ch_addr is Modbus Data Address for the Modbus module. For other module, the ch_addr is the channel sequence number starting from 0.

For Power Module:

Name	submeter
Description	The submeter index of Power module
Value	For the PM-4324 module, the submeter value is starting from 1 to 8. For other single/three-phase power module, the submeter value is 1.

Name	ct_no
Description	The CT or phase number of Power module
Value	ct_no: 1/2/3/4 For single-phase power module, it refers to CT1/CT2/ CT3/CT4 channel For three-phase power module, it refers

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<table>
<tr><td></td><td><table><tr><td></td><td>to Phase A/ Phase B/ Phase C/ Total-Average channel.</td></tr></table></td></tr>
<tr><td rowspan="8">Response</td><td>The channel is existed.</td></tr>
<tr><td><pre>{
  "status": "OK",
  "result": {
    "value": 2.5,
    "connection": "ONLINE" //or "OFFLINE"
  }
}</pre></td></tr>
<tr><td>The module or channel does not exist.</td></tr>
<tr><td><pre>{
  "status": "CHANNEL_NOT_EXIST"
}</pre></td></tr>
<tr><td>Password error</td></tr>
<tr><td><pre>{
  "status": "PASSWORD_INCORRECT"
}</pre></td></tr>
</table>

- **Get all channel value of the remote I/O module or Power module.**

<table>
<tr><td>Command</td><td>job=get_module_val&
if_type=val&com_port=val&module_no=val</td></tr>
<tr><td>Parameters</td><td>
<table>
<tr><td>Name</td><td>if_type</td></tr>
<tr><td>Description</td><td>The type of I/O Interface</td></tr>
<tr><td>Value</td><td>0: XV-Board
1: COM Port
2: Ethernet</td></tr>
</table>
<table>
<tr><td>Name</td><td>com_port</td></tr>
<tr><td>Description</td><td>If the I/O interface is XV-Board or Ethernet, skip this parameter. If the I/O interface is COM Port, it is the COM Port number.</td></tr>
<tr><td>Value</td><td>0: COM0
1: COM1</td></tr>
</table>
</td></tr>
</table>

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	…so on.

Name	module_no
Description	The index number of the module.
Value	Integer; start from 1.

Response

The module is existed.

If it is a Modbus module：

```
{
  "status": "OK",
  "result": {
    "ci": [
      {
        "address": "32"
        "value": 0
      },
      …
    ],
    "co": [], //if there is no channel of this type.
    "ri": [
      {
        "address": "10"
        "value": 1.3
      },
      …
    ],
    "ro": [
      {
        "address": "22"
        "value": 2.5
      },
      …
    ],
    "connection": "ONLINE" //or "OFFLINE"
  }
}
```

For other modules:

```
{
  "status": "OK",
  "result": {
    "di": [0, 1, …],
    "dic": [0 , 2, …],
    "do": [], //if there is no channel of this type.
    "ai": [0.2, 1.5, …],
```


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	<pre> "ao": [4.5, 1.1, 2.2, …],
	    "connection": "ONLINE" //or "OFFLINE"
	  }
	}
	
	For power modules:
	{
	  "status": "OK",
	  "result": {
	    "v": [107.9,107.9,…], // list by channel
	    "i": [42.5,0,…],
	    "kw": [2.8,0,…],
	    "kvar": [-3.5,0,…],
	    "kva": [4.5,0,…],
	    "pf": [0.63,0,…],
	    "kwh": [26696.54,2000.93,…],
	    "kvarh": [22803.2,24.7,…],
	    "kvah": [51267.4,3211.1,…],
	    "kw_now": [2.873,0,…],
	    "kw_predict":[2.873,0,…],
	    "maxkw_hour": [2.881,0,…],
	    "maxkw_day": [2.892,0,…],
	    "maxkw_month": [3.076172,0,…],
	    "kwh_day": [3.712,0,…],
	    "kwh_month": [432.0645,0,…],
	    "kwh_year": [898.1973,0,…],
	    "frequency": [0,0,…],
	    "do": [0,0],
	    "connection": "ONLINE" //or "OFFLINE"
	  }
	}</pre>

	The module does not exist.

	<pre>{
	  "status": "MODULE_NOT_EXIST"
	}</pre>

	Password error

	<pre>{
	  "status": "PASSWORD_INCORRECT"
	}</pre>

- **Get the connection status of all remote I/O modules.**

Command	job=get_module_status

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Parameters	None
Response	Normal

	<pre>{
	  "status": "OK",
	  "result": {
	  "com2": [
	  {
	  "no": 1,
	  "connection": "ONLINE" **//or "OFFLINE"**
	  },
	  …
	  ],
	  "com3": [], **//No modules or is in disabled status.**
	  "network": [
	  {
	  "no": 3,
	  "connection": "OFFLINE"
	  },
	  …
	  ]
	  }
	}</pre>

	Password error

	<pre>{
	  "status": "PASSWORD_INCORRECT"
	}</pre>

- **Set up the value of a specific Internal Register.**

Command	job=set_ir_val& ir_no=*val*&ir_value=*val*

Parameters

Name	ir_no
Description	The index number of the Internal Register.
Value	Integer; start from 1.

Name	ir_value
Description	The value you want to assign to the Internal Register.
Value	Number

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Response	The Internal Register is enabled.

	{
	  "status": "OK"
	}

	The Internal Register is disabled.

	{
	  "status": "INTERNAL_REGISTER_NOT_EXIST"
	}

	Password error

	{
	  "status": "PASSWORD_INCORRECT"
	}

- **Get the value of a specific Internal Register.**

Command	job=get_ir_val& ir_no=*val*
Parameters	Name: ir_no Description: The index number of the Internal Register Value: Integer; start from 1.
Response	The Internal Register is enabled.

	{
	  "status": "OK",
	  "result": {
	  "value": 12.5
	  }
	}

	The Internal Register is disabled.

	{
	  "status": "INTERNAL_REGISTER_NOT_EXIST"
	}

	Password error
	{ "status": "PASSWORD_INCORRECT"

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	}

- **Get the value of all Internal Registers which are enabled.**

Command	job=get_irs_val
Parameters	None
Response	Normal Status
	{ "status": "OK", "result": [{ "no": 1, "value": 100 }, …] }
	Password error
	{ "status": "PASSWORD_INCORRECT" }

- **Get the system time.**

Command	job=get_system_time
Parameters	None
Response	Normal Status
	{ "status": "OK", "result": { "time": "2014/07/24 14:11:28" } }
	Password error
	{ "status": "PASSWORD_INCORRECT" }

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- **Get the current free space of the micro SD card.**

Command	job=get_sdcard_space
Parameters	None
Response	Normal Status

	{
	"status": "OK",
	"result": {
	"free_space": 1560 **//Free space. Unit is MB.**
	}
	}

	No microSD card detected.

	{
	"status": "SDCARD_NOT_EXIST"
	}

	Password error

	{
	"status": "PASSWORD_INCORRECT"
	}

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Appendix VII：Change the value of output channel of module or Internal Register by MQTT protocol

PMC/PMD supports the MQTT protocol. User can use it to change the value of the Internal Register of PMC/PMD or the value of the output channel of I/O module or power meter module which connect to PMC/PMD. Based on MQTT, user just needs to publish the specific topics to Broker, and PMC/PMD will automatically subscribe and receive the specific topics to complete the action. Following will list the format of Public topic to the related output channel of module and Internal Register.

- **DO channel of ICP DAS XV-Board**

Topic	*Prefix*/SET/xvboard/do/*channel_no* Prefix: Please refer to 9.3 MQTT Setting channel_no: 0~15
Message	0 or 1

- **AO channel of ICP DAS XV-Board**

Topic	*Prefix*/SET/xvboard/ao/*channel_no* Prefix: Please refer to 9.3 MQTT Setting channel_no: 0~15
Message	Floating value

- **The DO channel of ICP DAS I/O module or power meter module**

Topic	*Prefix*/SET/*interface*/*module_no*/do/*channel_no* Prefix: Please refer to 9.3 MQTT Setting interface: com3, com4 or lan module_no: 1~16 channel_no: 0~15
Message	0 or 1

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- **The AO channel of ICP DAS I/O module**

Topic	*Prefix*/SET/*interface*/*module_no*/ao/*channel_no* Prefix: Please refer to 9.3 MQTT Setting interface: com3, com4 or lan module_no: 1~16 channel_no: 0~15
Message	Floating value

- **The Coil Output channel of others I/O module**

Topic	*Prefix*/SET/*interface*/*module_no*/coil_output/*channel_address* Prefix: Please refer to 9.3 MQTT Setting interface: com3、com4 or lan module_no: 1~16 channel_address: 0~99999
Message	0 or 1

- **The Holding Register channel of others I/O module**

Topic	*Prefix*/SET/*interface*/*module_no*/holding_register/*channel_address* Prefix: Please refer to 9.3 MQTT Setting interface: com3、com4 or lan module_no: 1~16 channel_address: 0~99999
Message	Floating value

- **The Internal Register**

Topic	*Prefix*/SET/ir/*ir_no* Prefix: Please refer to 9.3 MQTT Setting ir_no: 1~70
Message	Floating value

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Appendix VIII：The JSON format for the communication with IoT Platform

PMC/PMD supports the functions to publish the JSON format messages to Microsoft Azure and IBM Bluemix IoT Cloud platforms, and also subscribe/receive the JSON format messages from IoT Cloud platform to change the value of the output channel of I/O modules or power meter modules that are connected to PMC/PMD. The following lists the detailed information of JSON format message with PMC/PMD.

- **Message format**

{

"msg_type" :

"CHANNEL_UPDATE"	The "CHANNEL_UPDATE" type of message indicates the message published by PMC/PMD to inform IoT Cloud platform the update of the power data or I/O channel data.
"CHANNEL_OUTPUT"	If PMC/PMD receives the message in the type of "CHANNEL_OUTPUT", then PMC/PMD will perform the task to change the value of the output channel.

"if_type" : It indicates the connection interface between PMC/PMD and the power meter or I/O module where the channel resides. The following table shows the code and the interface it represents.

0	XV-Board
1	COM Port
2	Ethernet

"com_port" : "3" indicates the connection interface between PMC/PMD and the power meter or I/O module is COM port 3. "4" indicates the connection interface between PMC/PMD and the power meter or I/O module is COM port 4. If the connection interface is XV-Board or Ethernet, please ignore this field.

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"module_no"	:	The number indicates the order that the data of the power module or I/O module being stored in the PMC/PMD Modbus Table. The range is 1~16. If the connection interface is XV-Board, please ignore this field.
"ch_type"	:	It indicates the type of the power data or I/O data. The following table shows the code and the power data type or I/O channel type it represents.

v	Voltage
i	Current
kw	kW
kvar	kvar
kva	kVA
pf	PF
kwh	kWh
kvarh	kvarh
kvah	kVAh
kw_now	Actual Demand
kw_predict	Forecast Demand
maxkw_hour	Max. Demand (Hourly)
maxkw_day	Max. Demand (Daily)
maxkw_month	Max. Demand (Monthly)
mwh_day	Daily Accumulated Electricity
mwh_month	Monthly Accumulated Electricity
mwh_year	Yearly Accumulated Electricity
harmonic_vthd	Total Harmonic Distortion vthd
harmonic_ithd	Total Harmonic Distortion ithd
frequency	Frequency
di	DI Channel
di_counter	The counter of the DI Channel
do	DO Channel
do_counter	The counter of the DO Channel
ai	AI Channel
ao	AO Channel
discrete_input	The data type of the Modbus module
coil_output	
input_register	

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	holding_register	
	ir	Internal Register
"ch_addr" :	It indicates the channel/loop/phase index, Modbus address or Internal Register number.	
"nickname" :	It indicates the nickname of the channel/loop/phase.	
"value" :	It indicates the real-time value of the channel/loop/phase.	

}

- **Example**

  The following is the format to publish a message with the kwh value of Loop 2 which resides at the PM-3114 power meter with module number 5 to IoT Cloud platform. The power module is connected to the COM3 of PMC-5231.

```
{
    "msg_type":"CHANNEL_UPDATE",
    "if_type":1,
    "com_port":3,
    "module_no":5,
    "ch_type":"kwh",
    "ch_addr":2,
    "nickname":"kwh power data",
    "value":"101.33"
}
```

  The following is a format to publish the message with the value of Internal Register 13 to IoT Cloud platform.

```
{
    "msg_type":"CHANNEL_UPDATE",
    "ch_type":"ir",
    "ch_addr":13,
    "nickname":"function result 1",
    "value":"63.87"
}
```


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The following is a format of the received message from IoT Cloud platform, it is used to change the value of DO channel 1 which resides at the PM-3112 power meter with module number 6 to ON. The power meter module is connected to the COM4 of PMC-5231.

```
{
    "msg_type":" CHANNEL_OUTPUT ",
    "if_type":1,
    "com_port":4,
    "module_no":6,
    "ch_type":"do",
    "ch_addr":1,
    "value":"1"
}
```

The following is a format of the received message from IoT Cloud platform, it is used to change the value of AO channel 1 of XV-Board of PMC-5231 to 3.6.

```
{
    "msg_type":"CHANNEL_OUTPUT",
    "if_type":0,
    "ch_type":"ao",
    "ch_addr":1,
    "value":"3.6"
}
```

The following is a format of the received message from IoT Cloud platform, it is used to change the value of AO channel 2 which resides at the I/O module with module number 3 to 5.0. The I/O module is connected to the COM4 of PMC-5231.

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```
{
    "msg_type":" CHANNEL_OUTPUT ",
    "if_type":1,
    "com_port":4,
    "module_no":3,
    "ch_type":"ao",
    "ch_addr":2,
    "nickname":"fan speed",
    "value":"5.0"
}
```


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Appendix IX：PMC-523x / PMC-224x LED Indicators



LED	LED Status	Modules Status
PWR(Green)	ON	The module is powered on.
RUN (Red)	ON	The module is functioning normally.
3G / 4G	OFF and one flash per 2 seconds	The modem is not functioning, or no SIM card inside.
	ON and one flash per 2 seconds	The modem is functioning normally.
	Flashing	Data Transferring
L1	ON	The mobile network is connected.
L2	Flashing	Data Log Transferring by FTP Upload Function

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Appendix X：ICP DAS “IoTstar Trial” account application

IoTstar is a software developed by ICP DAS for WISE/PMC/PMD controllers in a variety of Industrial IoT applications. Using IoTstar to build the IoT Cloud system, it can provide the following major services:

- Controller Remote Access Service: Status Monitoring, System Setting, and Firmware Update for WISE/PMC/PMD controllers.
- Sensor Data Collection Service: Sensor data collected and imported into Database at cloud.
- Sensor Data Visualization Service: Review sensor data through Dashboard interface.
- Sensor Data Report Service: Review sensor data through statistical report.
- Bot Service with Mobile Phone: Query and monitor sensor data by mobile phone Bot service.

During the IoT Cloud system development, there is no-programming-required, and the system setting can be completed only through the web interface operation. In addition, through the SQL command, IoTstar can be quickly integrated with the Cloud platforms, data analysis tools (Power BI, Google Data Studio or SCADA system etc.) to help users quickly build the “IoT + Big Data” Cloud application.

WISE/PMC/PMD users are welcome to experience the benefits of building a cloud IoT system through the "IoTstar+WISE/PMC/PMD" solution-the “IoTstar Trial” provided by ICP DAS. Users only need to complete the account application for “IoTstar Trial”, and then can use the WISE/PMC/PMD controller at hand and the “IoTstar Trial” provided by ICP DAS to actually perform the IoT cloud-based operations for WISE/PMC/PMD controllers.

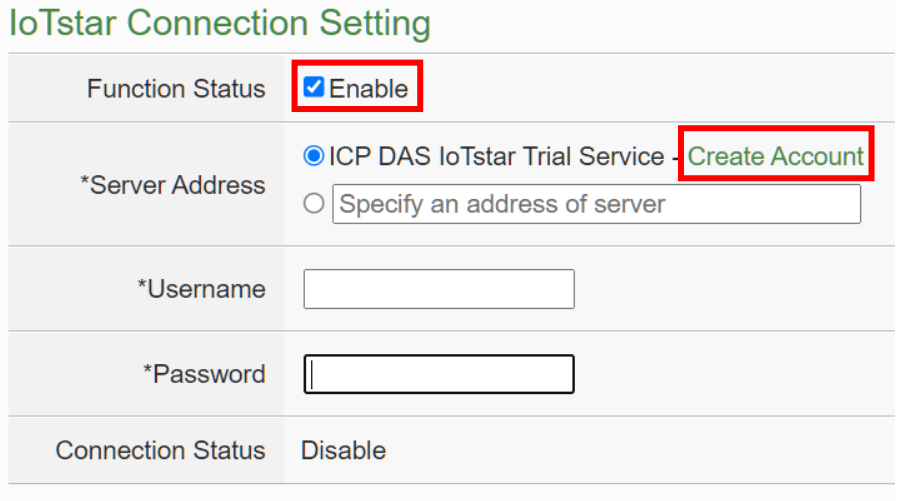
Please note:

1. Each “IoTstar Trial” account provides "3 months trial period, allowing up to 4 WISE/PMC/PMD controllers connected and 1G database storage space".
2. IoTstar supports WISE-523x/WISE-2x4x series (with v1.6.0 or later version firmware) and PMC-523x/PMC-2x4x/PMD series (with v3.6.0 or later version firmware). If the WISE/PMC/PMD does not install with the right firmware version. Please update the firmware.
3. When the trial period of the “IoTstar Trial” account expires, the data of the trial account stored in the system will be deleted.

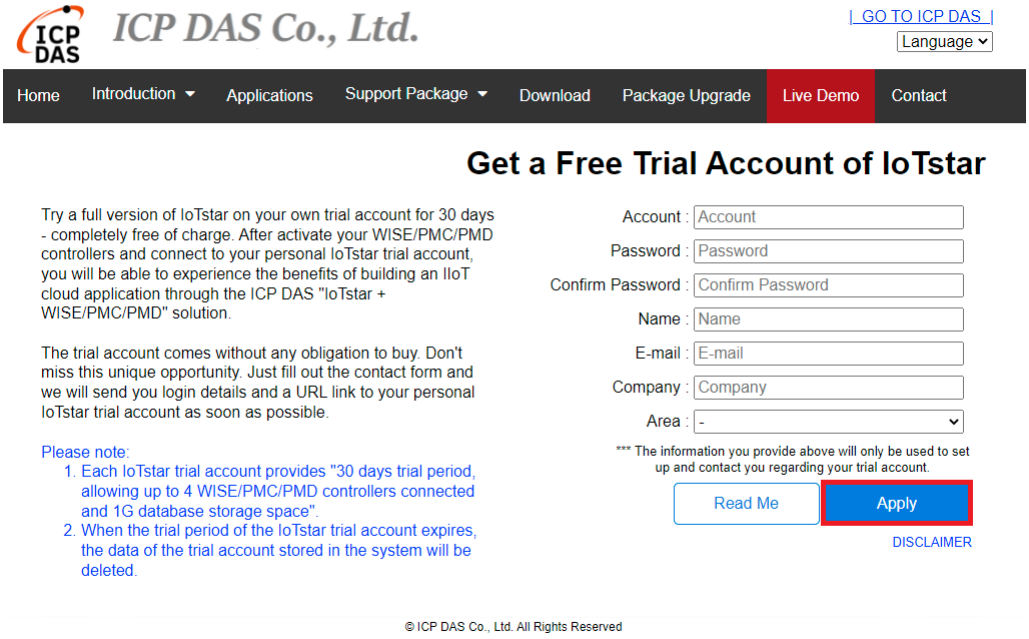
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For the account application of “IoTstar Trial”, please refer to the following steps:

i. Click “Enable” in the “Function Status” field of the “System Setting→Network Setting→IoTstar Connection Setting” on the PMC/PMD page to open the parameter setting page of “IoTstar Connection Setting”, then click the Create Account button next to “ICP DAS IoTstar Trial Service”.



ii. On the account application page of “IoTstar Trial”, enter the following information: “Account”, “Password”, “Name”, “Email”, “Company”, “Area”, and then click “Apply” button, the system will send an “Account Activation” email to the email address you entered.



iii. Check your mailbox and find the “Account Activation” email sent by “IoTstar

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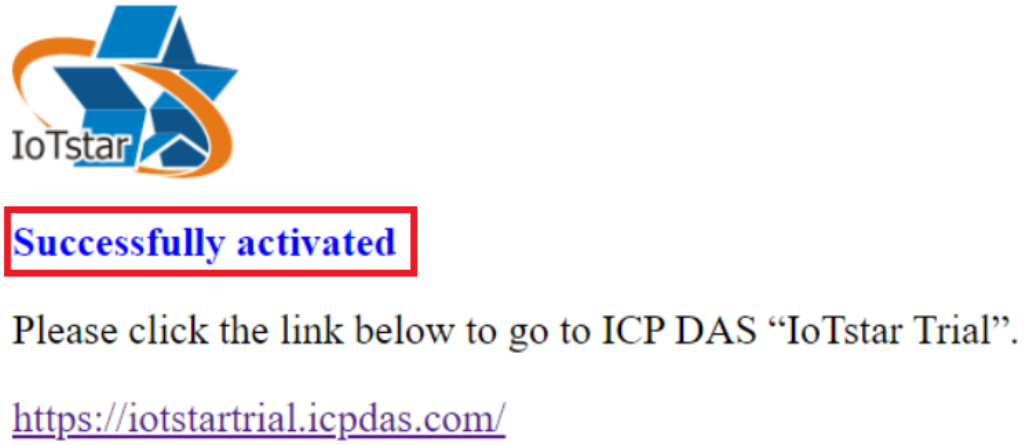
Trial", and then click the link of the account application of "IoTstar Trial" provided in the email to complete the activation process of the trial account


IoTstar account activation
ICP DAS IoTstar (iotstar@icpdas.com) 新增連絡人
收件者: [redacted]

Dear Sir,
Please click the link below to complete the account activation process.
==========
https://iotstar.icpdas.com/en/trial_active.php?code=bdSz4kfd8r
==========
Best Regards.

ICP DAS IoTstar Service team
Contact : http://iotstar.icpdas.com/en/contact.php

iv. When the trial account is successfully activated, the page will display the "Successfully activated" message as below.


IoTstar

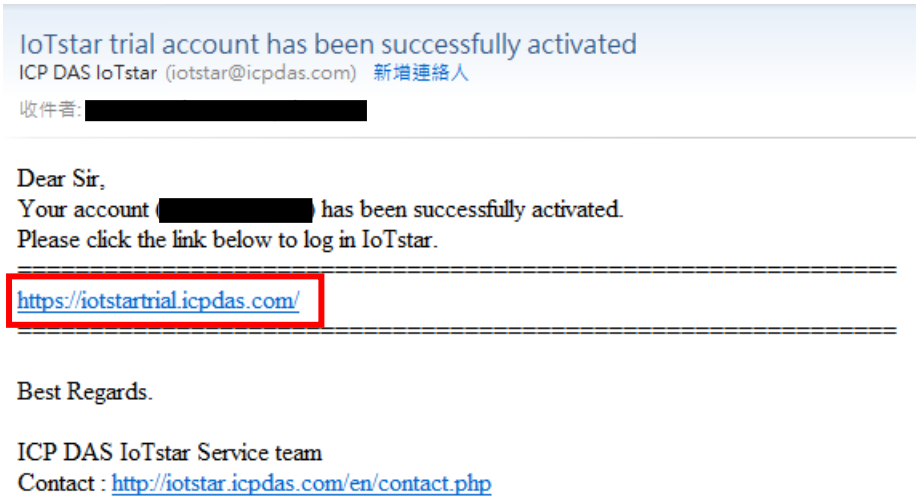
Successfully activated

Please click the link below to go to ICP DAS "IoTstar Trial".

https://iotstartrial.icpdas.com/

v. When the trial account is successfully activated, the "IoTstar Trial" will send a "Trial Account Activated" email to the email address you entered, click https://iotstartrial.icpdas.com to visit the login page of the "IoTstar Trial".

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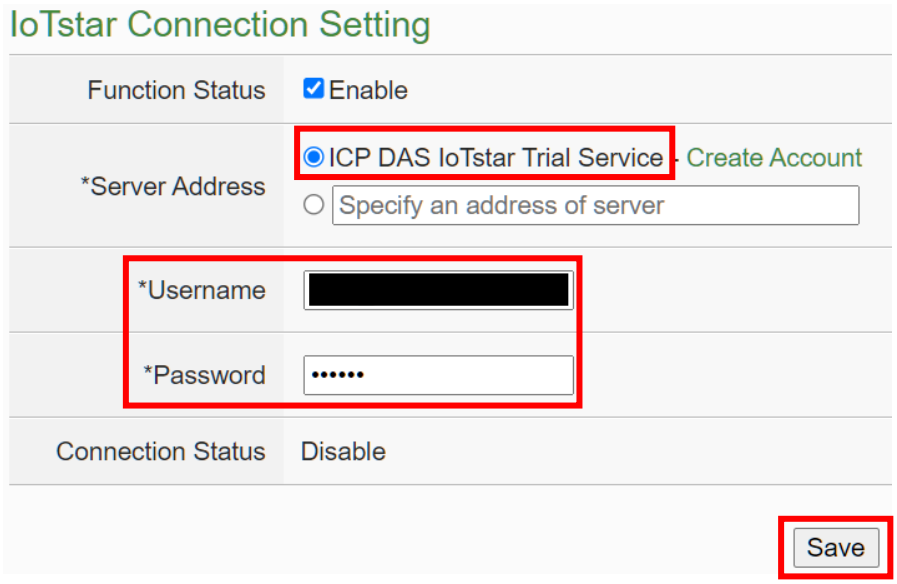

IoTstar trial account has been successfully activated
ICP DAS IoTstar (iotstar@icpdas.com) 新增連絡人
收件者: [redacted]

Dear Sir,
Your account ([redacted]) has been successfully activated.
Please click the link below to log in IoTstar.
==========
https://iotstartrial.icpdas.com/
==========

Best Regards.

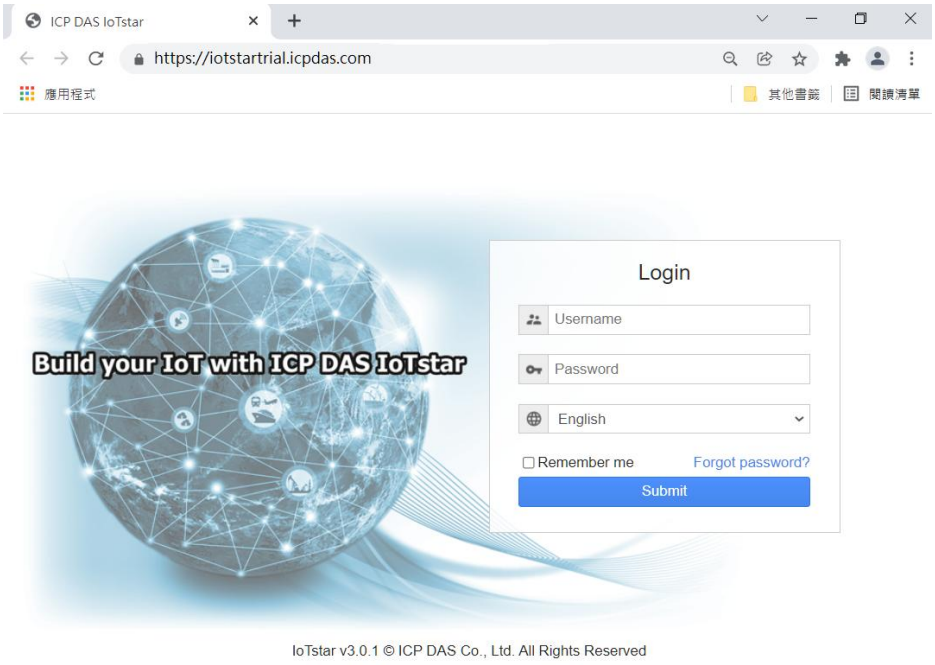
ICP DAS IoTstar Service team
Contact : http://iotstar.icpdas.com/en/contact.php

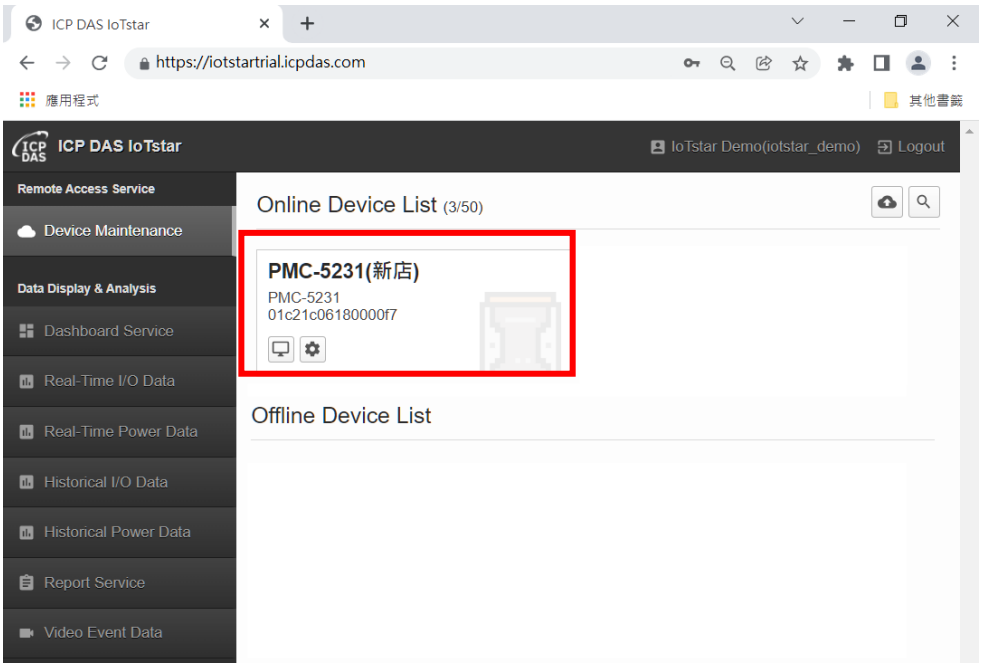
vi. Go back to the “IoTstar Connection Settings” page of PMC/PMD, and enter the “Username” and “Password” information you set in the step ii, click “Save” button to save the setting, then download the settings to PMC/PMD. After that, the PMC/PMD controller will connect to the “IoTstar Trial” account you applied.



vii. Go to https://iotstartrial.icpdas.com to visit the login page of the “IoTstar Trial”, enter the “Account” and “Password” information you set in the step ii, then you can log in to the “IoTstar Trial” through the account you applied.
Now you can manage and change the setting of the PMC/PMD controller set in step vi and use the functions provided by IoTstar.

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For more information about IoTstar IoT cloud management software, please refer to IoTstar official website.

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