

ICP DAS
PMC-523x/PMC-224x/PMD
(Power Meter Concentrator) Series
User Manual

[Version 3.4.7]



泓格科技
ICP DAS CO., LTD.

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Table of Contents

1	System Introduction	1
2	Before Installation	6
3	System Login.....	7
4	System Main Page.....	8
4.1	System function area.....	9
4.1.1	Rules management toolbar	9
4.1.2	Real-time information area.....	12
4.1.3	System function toolbar	12
4.2	Sub-function area	14
4.3	Data review/System setting area.....	14
5	Main Page	17
5.1	Power Meter Information	17
5.1.1	Power Meter Information Overview	17
5.1.2	Power Meter Statistics Information Overview	21
5.1.3	Other Information	22
5.1.4	I/O Information	22
5.2	Power Data Information	23
5.2.1	Overview	23
5.2.2	Group Overview	24
5.3	Realtime Chart	25
5.3.1	Power Meter Mode	25
5.3.2	Group Mode	27
5.4	Historical Chart.....	29
5.5	Historical Data Report.....	31
5.6	Historical Electricity Analysis.....	33
5.6.1	Energy Usage Analysis by Trend	33
5.6.2	Energy Usage Analysis by Time Period	36
5.6.3	Energy Usage Breakdown by Circuit/Group	38
5.7	PUE Information	41
5.7.1	Real-Time	41
5.7.2	History	41
5.8	I/O Information	43
5.9	I/O Realtime Chart	44
5.10	I/O Historical Chart	45
5.11	Event Log.....	47

5.12	Polling Time Information	48
5.13	Modbus Table Information	48
5.14	UID Information.....	49
5.15	Ping Status Page.....	50
6	System Setting.....	51
6.1	Time Setting	52
6.2	Network Setting	54
6.3	SNMP Setting	59
6.4	Security Setting.....	62
6.5	I/O Interface Setting	64
6.6	Other Setting.....	67
6.7	Power Meter Group Setting	69
6.7.1	Group and Subgroup Viewing	69
6.7.2	Group and Subgroup Setting	69
6.7.3	Group and Subgroup configuration	71
6.7.4	Setup the loops/phases of the subgroup	71
6.7.5	Loop/Phase of group configuration	73
6.8	Firmware Update.....	74
6.9	Rule File Import & Export.....	76
7	Power Meter & I/O Module Setting.....	79
7.1	Power Meter Setting	80
7.1.1	Scan to add Modbus RTU Power Meters	81
7.1.2	Add Modbus RTU Power Meter Manually.....	82
7.1.3	Add Modbus TCP Power Meter Manually	84
7.1.4	Power Meter List Interface.....	85
7.1.5	Modbus RTU Power Meter Setting	86
7.1.6	Modbus TCP Power Meter Setting.....	89
7.2	XV-Board Setting (PMD series does not support this function.).....	92
7.2.1	XV-Board DI Channel Settings.....	92
7.2.2	XV-Board DO Channel Settings	93
7.2.3	XV-Board AI Channel Settings.....	95
7.2.4	XV-Board AO Channel Settings	98
7.3	I/O Module Setting	99
7.3.1	Scan to Add ICP DAS M-7000/DL Modules	100
7.3.2	Add Modbus RTU Module (or M-7000/DL/IR Module) Manually 102	
7.3.3	Add Modbus TCP Module Manually.....	103
7.3.4	I/O Module List Interface	104

7.3.5	M-7000/DL/IR Module Setting	105
7.3.6	Modbus RTU Module Setting.....	110
7.3.7	Modbus TCP Module Setting	122
8	Logger Setting	125
8.1	Data Logger Setting	126
8.2	Event Logger Setting	129
8.3	FTP Upload Setting	130
8.4	Report Sending Setting Page.....	132
8.4.1	Sending Setting	132
8.4.2	Re-send Function	132
8.5	The Path of Data Log File	134
8.6	The format of the Power Data Logger file	136
8.7	The format of the Power Report file	137
8.8	The Format of I/O Data File	141
8.9	The Format of User-Defined Data File.....	141
9	IoT Platform Setting	142
9.1	Microsoft Azure Setting	143
9.2	IBM Bluemix Setting	147
9.3	MQTT Setting.....	149
9.3.1	Broker Setting	149
9.3.2	Topic Import/Export Setting.....	155
9.4	IoTstar Real-Time Data Sending Setting	157
9.5	IoTstar Historical Data Sending Setting.....	158
9.6	IoTstar Bot Service Setting	159
10	Advanced Setting	161
10.1	Email Setting	161
10.2	SMS Setting.....	165
10.2.1	SMS Alarm Setting	165
10.2.2	SMS Command Setting	167
10.3	SNMP Trap Setting.....	171
10.4	LINE Notify Setting	176
10.4.1	Message Setting.....	176
10.4.2	Chat Room Setting	178
10.5	Timer Setting	181
10.6	Schedule Setting.....	183
10.7	PUE Setting	187
10.8	Internal Register Setting.....	189
10.9	Ping Setting	191

11	Rules Setting	193
11.1	IF Condition Setting	195
11.1.1	ICP DAS Module	196
11.1.2	Modbus Module	201
11.1.3	Power Meter	204
11.1.4	Microsoft Azure	205
11.1.5	IBM Bluemix	206
11.1.6	MQTT	207
11.1.7	Connection Status	209
11.1.8	Timer	209
11.1.9	Schedule	210
11.1.10	Mobile Network Signal Strength	210
11.1.11	FTP Upload Status	211
11.1.12	SD Card Status	211
11.1.13	Rule Status	212
11.1.14	Internal Register	212
11.1.15	PUE	213
11.1.16	Ping	214
11.2	THEN/ELSE Action Setting	215
11.2.1	ICP DAS Module	216
11.2.2	Modbus Module	221
11.2.3	Power Meter	222
11.2.4	Microsoft Azure	223
11.2.5	IBM Bluemix	225
11.2.6	MQTT	226
11.2.7	Timer	228
11.2.8	Email	229
11.2.9	SMS Alarm	230
11.2.10	SNMP Trap	230
11.2.11	LINE Notify	231
11.2.12	Bot Service	232
11.2.13	Re-boot System	232
11.2.14	Reset Modem	232
11.2.15	Data Logger	233
11.2.16	Rule Status	233
11.2.17	Internal Register	234
	Appendix I : Modbus Address Table	236
	Appendix II : Reset to Factory Default Setting and Send Password to Administrator	

.....	310
Appendix III : Setup the GTM-203M-3GWA with PMD	313
Appendix IV : The configuration setting of M-7000/DL module	314
Appendix V : The SNMP Variables for PMC/PMD	318
Appendix VI : Change the value of output channel of module or Internal Register by MQTT protocol	326
Appendix VII : The JSON format for the communication with IoT Platform	328
Appendix VIII : PMC-523x / PMC-224x LED Indicators.....	333

List of Figures

Figure1-1 :	System Architecture.....	2
Figure3-1 :	PMC/PMD Login page	7
Figure4-1 :	Main Page	8
Figure4-2 :	System Function Area (login as a Administrator)	9
Figure4-3 :	System Function Area(login as a General user).....	9
Figure4-4 :	Rules management toolbar (login as a Administrator).....	9
Figure4-5 :	Rules management toolbar (login as a General user)	10
Figure4-6 :	Confirm to clear settings	10
Figure4-7 :	Confirm to load settings	10
Figure4-8 :	Confirm to save settings	11
Figure4-9 :	Confirm to logout (The settings are saved)	11
Figure4-10 :	Confirm to logout (The settings are not saved)	11
Figure4-11 :	Real-time information area	12
Figure4-12 :	Real-time information list.....	12
Figure4-13 :	Current function path	14
Figure4-14 :	Power data Overview page	15
Figure4-15 :	Select the classification of Power data	15
Figure4-16 :	Display power data of the selected classification.....	16
Figure5-1 :	Information display options on Main Page	17
Figure5-2 :	Power Meter Information Overview	18
Figure5-3 :	The attribute of PM-3133 Power Meter.....	19
Figure5-4 :	The attribute of PM-3133-MTCP Power Meter	19
Figure5-5 :	Real Time Power Information of PM-3133.....	19
Figure5-6 :	Real Time Power Information of PM-3114.....	20
Figure5-7 :	Real Time Power Information of PM-3112.....	20
Figure5-8 :	Power Meter Statistics Information	21
Figure5-9 :	Power Meter Other Information Page	22
Figure5-10 :	Power Meter I/O Information Page.....	22
Figure5-11 :	Power Data Overview Mode.....	23
Figure5-12 :	Change Display List Button.....	24
Figure5-13 :	The Power Meter List	24
Figure5-14 :	Power Data Group Overview Mode.....	24
Figure5-15 :	Realtime Chart (Power Meter Mode)	26
Figure5-16 :	Realtime Chart (Group Mode)	28
Figure5-17 :	Historical Chart Inquiry	29

Figure5-18 : Historical Data Chart for power data	30
Figure5-19 : Historical Data Table for power data.....	31
Figure5-20 : Historical Data Report inquiry	31
Figure5-21 : Daily Report for PM-3133.....	32
Figure5-22 : Daily Report for PM-3114.....	33
Figure5-23 : "Total Accu. Electricity" report for Power Meters Group	33
Figure5-24 : Energy Usage Analysis by Trend.....	34
Figure5-25 : Inquiry by Group Mode	34
Figure5-26 : Inquiry by User-defined Mode	35
Figure5-27 : PM-3114 Energy Usage Analysis Trend Chart	36
Figure5-28 : Energy Usage Analysis by Time Period	37
Figure5-29 : Time Histogram Chart for PM-3114 Loop 1	38
Figure5-30 : Energy Usage breakdown by Circuit/Group	38
Figure5-31 : Inquiry by Group Mode	39
Figure5-32 : Energy Usage Breakdown by Circuit/Group Chart	40
Figure5-33 : PUE information - Realtime	41
Figure5-34 : PUE information - History(1)	42
Figure5-35 : PUE information - History(2)	42
Figure5-36 : I/O Information(login as Administrator).....	43
Figure5-37 : I/O Information(login as General User).....	43
Figure5-38 : I/O Realtime Chart	44
Figure5-39 : I/O Channel Historical Chart	45
Figure5-40 : User-Defined Historical Chart	45
Figure5-41 : I/O Historical Data Chart	46
Figure5-42 : Event Log information display.....	47
Figure5-43 : Polling Time Information	48
Figure5-44 : The Interface of Modbus Table Information	48
Figure5-45 : Inquiry result of Modbus Table Information	49
Figure5-46 : Power Meter UID Information Page	50
Figure5-47 : Ping Status page.....	50
Figure6-1 : System Setting Overview Page	51
Figure6-2 : Time Setting Page	52
Figure6-3 : Time Synchronization Setting.....	53
Figure6-4 : Network Setting Page	54
Figure6-5 : Signal Strength level and IP address for Mobile Network.....	56
Figure6-6 : DDNS Setting Page	56
Figure6-7 : IoTstar connection setting page.....	58
Figure6-8 : SNMP Setting Page	60

Figure6-9 :	SNMP Manager List	60
Figure6-10 :	The Address Setting for SNMP Manager.....	61
Figure6-11 :	The Working Model Setting for SNMP Manager	61
Figure6-12 :	Save the SNMP Manager Setting	61
Figure6-13 :	Security Setting Page	62
Figure6-14 :	Password Setting Page	63
Figure6-15 :	Local FTP Server Setting Page.....	63
Figure6-16 :	Idle Time Setting Page	64
Figure6-17 :	I/O Interface Setting Page	64
Figure6-18 :	Function setting to connect to HMI or SCADA	65
Figure6-19 :	Function setting to connect to Modbus RTU slave device	66
Figure6-20 :	I/O Function setting about LAN.....	67
Figure6-21 :	Other setting page	67
Figure6-22 :	Power Meter Group Setting	69
Figure6-23 :	Group and Subgroup Viewing.....	69
Figure6-24 :	Group Setting.....	70
Figure6-25 :	Subgroup Setting.....	70
Figure6-26 :	Subgroup Setting Window.....	70
Figure6-27 :	Configurations for Subgroup	71
Figure6-28 :	Loops/Phases of subgroup Setting	72
Figure6-29 :	Choose Loops/Phased of Subgroup	72
Figure6-30 :	Add Loops/Phases for Subgroup	73
Figure6-31 :	Configurations for Loops/Phased of Subgroup.....	73
Figure6-32 :	Firmware Update(1)	74
Figure6-33 :	Firmware Update(2)	75
Figure6-34 :	Firmware Update(3)	75
Figure6-35 :	Firmware Update(4)	75
Figure6-36 :	Firmware Update(5)	76
Figure6-37 :	Firmware Update(6)	76
Figure6-38 :	Export / Import Setting page and the settings to be backed up	77
Figure7-1 :	Meter / Module Setting Page	79
Figure7-2 :	Power Meter Setting Page	80
Figure7-3 :	The “Scan” button to search Power Meter	81
Figure7-4 :	Set up the Scanning Range for the Power Meters	81
Figure7-5 :	Scanning the Power Meters	82
Figure7-6 :	The Power Meter List after Scan operation.....	82
Figure7-7 :	Select the actual Power Meter connected to PMC/PMD.....	82
Figure7-8 :	Set up the No and Address of the power meter.....	83

Figure7-9 :	Select Modbus RTU Power Meter model	83
Figure7-10 :	Add the Modbus RTU Power Meter manually	84
Figure7-11 :	Add Modbus TCP Power Meter	84
Figure7-12 :	Select Modbus TCP Power Meter model	84
Figure7-13 :	Add the Modbus TCP Power Meter manually	85
Figure7-14 :	Power Meter List Interface	85
Figure7-15 :	PM-3133 Setting Page	87
Figure7-16 :	PM-3114 Setting Page	88
Figure7-17 :	PM-3114-MTCP Setting Page.....	89
Figure7-18 :	XV-Board Setting Page	92
Figure7-19 :	XV-Board DI attribute setting page	93
Figure7-20 :	XV-Board DO attribute setting page	94
Figure7-21 :	XV-Board AI attribute setting page.....	95
Figure7-22 :	AI Deadband Operation(> or >= a numerical value)	96
Figure7-23 :	AI Deadband Operation(< or <= a numerical value)	97
Figure7-24 :	AI Deadband Operation(= a numerical value).....	97
Figure7-25 :	XV-Board AO attribute setting page	98
Figure7-26 :	I/O Module Setting Page	99
Figure7-27 :	The “Scan” button to search M-7000/DL module.....	100
Figure7-28 :	Set up the Scanning Range for the M-7000/DL module	100
Figure7-29 :	Scanning the M-7000/DL modules	101
Figure7-30 :	The M-7000/DL List after Scan operation	101
Figure7-31 :	Select the actual M-7000/DL modules connected to PMC/PMD	101
Figure7-32 :	Set up the No and Address of the Modbus RTU module.....	102
Figure7-33 :	Select the model of the Modbus RTU Module	102
Figure7-34 :	Add the Modbus RTU Module manually.....	103
Figure7-35 :	Add Modbus TCP Module.....	103
Figure7-36 :	Add the Modbus RTU Power Meter manually	104
Figure7-37 :	Modbus module List Interface	104
Figure7-38 :	M-7000 DI Channel Setting Page	106
Figure7-39 :	M-7000/DL DO Channel Setting Page.....	107
Figure7-40 :	M-7000/DL AI Channel Setting Page	109
Figure7-41 :	M-7000 AO Channel Setting Page.....	110
Figure7-42 :	Modbus RTU Slave Module Setting Page	111
Figure7-43 :	Coil Output Setting Page.....	112
Figure7-44 :	Coil Output Setting Example for Modbus RTU Module.....	113
Figure7-45 :	Discrete Input Setting Page	114
Figure7-46 :	Discrete Input Setting Example for Modbus RTU Module	115

Figure7-47 : Input Register Setting Page	117
Figure7-48 : Input Register Setting Example for Modbus RTU Module	118
Figure7-49 : Holding Register Setting Page	120
Figure7-50 : Input Register Setting Example for Modbus RTU Module	122
Figure7-51 : Modbus TCP Slave Module Setting Page(1)	123
Figure7-52 : Modbus TCP Slave Module Setting Page(2)	124
Figure8-1 : Data Logger Setting Page	125
Figure8-2 : Data Logger Setting Page	126
Figure8-3 : Event Logger Setting Page	129
Figure8-4 : FTP Upload Setting Page	130
Figure8-5 : Report Sending Setting page – Sending Setting	132
Figure8-6 : Report Sending Setting page – Sending Setting	133
Figure9-1 : Microsoft Azure Setting Page	143
Figure9-2 : Microsoft Azure Publish Message setting page	144
Figure9-3 : “User-Defined Data” Setting Interface of IoT Platform	145
Figure9-4 : Microsoft Azure Subscribe Topic setting page	146
Figure9-5 : IBM Bluemix Setting page	147
Figure9-6 : IBM Bluemix Subscribe Message setting page	148
Figure9-7 : MQTT Setting Page (Broker)	150
Figure9-8 : MQTT Broker Parameter setting page	150
Figure9-9 : Publish Message and Subscribe Topic setting page	152
Figure9-10 : Publish Message Setting Page	153
Figure9-11 : Subscribe Topic Setting Page	155
Figure9-12 : MQTT Topic Import/Export setting page	156
Figure9-13 : The Export of MQTT Topic	156
Figure9-14 : The Import of MQTT Topic	157
Figure9-15 : IoTstar Real-Time Data Sending Setting page	157
Figure10-1 : Email setting page	162
Figure10-2 : Email setting page(Name & Description)	162
Figure10-3 : Email setting page(SMTP Server)	163
Figure10-4 : Email setting page(Email Address)	163
Figure10-5 : Email setting page(Email Content)	164
Figure10-6 : SMS Setting Page (1)	165
Figure10-7 : SMS Setting Page (2)	166
Figure10-8 : SMS Command Setting Page (1)	167
Figure10-9 : SMS Command Setting for GET Command	169
Figure10-10 : SMS Command Setting for SET Command	169
Figure10-11 : SMS Command list	169

Figure10-12 : SNMP Trap Setting Page	171
Figure10-13 : SNMP Trap Parameter Setting Page	171
Figure10-14 : “Channel Data”Type Setting Page	172
Figure10-15 : Example of “Channel Data” Type Variable Binding List	173
Figure10-16 : “User-Defined Data” Type Setting Page.....	173
Figure10-17 : “User-Defined Data” Interface in Edit Mode	174
Figure10-18 : “User-Defined Data” Interface in View Mode.....	175
Figure10-19 : SNMP Trap setting with variable bindings list	175
Figure10-20 : LINE Notify Message Setting page (1)	176
Figure10-21 : LINE Notify Message Setting page (2)	177
Figure10-22 : LINE Notify Message Setting page (3)	177
Figure10-23 : LINE Notify Message Setting page (4)	178
Figure10-24 : LINE Notify Chat Room Setting page (1)	179
Figure10-25 : LINE Notify Chat Room Setting page (2)	179
Figure10-26 : LINE Notify Chat Room Setting page (3)	180
Figure10-27 : LINE Notify Chat Room Setting page (4)	180
Figure10-28 : LINE Notify Chat Room Setting page (5)	180
Figure10-29 : Timer creating Page.....	182
Figure10-30 : Timer setting Page(Assign Period)	182
Figure10-31 : Timer setting page(Internal Register).....	183
Figure10-32 : Schedule setting page.....	183
Figure10-33 : Calendar mode of Schedule setting.....	184
Figure10-34 : Repeat mode of Schedule setting.....	185
Figure10-35 : PUE Setting Page(1).....	187
Figure10-36 : PUE Setting Page(2).....	188
Figure10-37 : Internal Register setting page(1).....	189
Figure10-38 : Internal Register setting page(2).....	190
Figure10-39 : Ping List Page	191
Figure10-40 : Ping List Page	192
Figure11-1 : Rules overview page.....	193
Figure11-2 : Rules setting page	194
Figure11-3 : DI condition setting page	196
Figure11-4 : DI Counter condition setting page	197
Figure11-5 : AI condition setting page	200
Figure11-6 : Discrete Input condition setting page	201
Figure11-7 : Coil Output condition setting page	202
Figure11-8 : Input Register condition setting page	202
Figure11-9 : Holding Register condition setting page.....	203

Figure11-10 : Power Meter condition setting page.....	204
Figure11-11 : Microsoft Azure Connection Status condition setting	205
Figure11-12 : Microsoft Azure Subscribe Message condition setting	205
Figure11-13 : IBM Bluemix Connection Status condition setting	206
Figure11-14 : IBM Bluemix Subscribe Message condition setting.....	207
Figure11-15 : Broker Connection Status condition setting	208
Figure11-16 : Subscribe Topic condition setting	208
Figure11-17 : Connection Status condition setting page	209
Figure11-18 : Timer condition setting page.....	209
Figure11-19 : Schedule condition setting page	210
Figure11-20 : Mobile Network Signal Strength condition setting page.....	211
Figure11-21 : FTP Upload Status condition setting page	211
Figure11-22 : SD Card Status condition setting page	212
Figure11-23 : Rule Status condition setting page	212
Figure11-24 : Internal register condition setting page.....	213
Figure11-25 : PUE condition setting page	213
Figure11-26 : Ping condition setting page.....	214
Figure11-27 : DI Counter action setting page.....	216
Figure11-28 : DO action setting page.....	217
Figure11-29 : AO action setting page.....	217
Figure11-30 : Coil Output action setting page	221
Figure11-31 : Holding Register action setting page	222
Figure11-32 : Power Meter Relay Action setting page	223
Figure11-33 : Microsoft Azure Function Status action setting	223
Figure11-34 : Microsoft Azure Publish Message action setting	224
Figure11-35 : Microsoft Azure Reset Variable action setting page	224
Figure11-36 : IBM Bluemix Function Status action setting.....	225
Figure11-37 : IBM Bluemix Publish Message action setting	226
Figure11-38 : IBM Bluemix Reset Variable action setting page.....	226
Figure11-39 : Broker Function action setting page	227
Figure11-40 : Publish Message action setting page.....	227
Figure11-41 : MQTT Reset Topic action setting page	228
Figure11-42 : Timer action setting page	229
Figure11-43 : Email action setting page	229
Figure11-44 : SMS Alarm action setting page	230
Figure11-45 : SNMP Trap Action Setting Page	231
Figure11-46 : LINE Notify action setting page.....	231
Figure11-47 : Bot Service action setting page	232

Figure11-48 : Re-boot system Action setting page	232
Figure11-49 : Reset modem action setting page	233
Figure11-50 : Data Logger action setting page	233
Figure11-51 : Rule Status action setting page.....	234
Figure11-52 : Internal Register action setting page	234

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-3 GWA		-	
Support Ethernet / 4G : FDD LTE: B1/B3/B5/B7/B8/B20 MHz		PMC-5231M-4 GE	PMC-5236M-4 GE		
Support Ethernet / 4G : FDD LTE: B1/B3/B8 MHz TDD LTE: B38/B39/B40/B41 MHz		PMC-5231M-4 GC	PMC-5236M-4 GC		

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;

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

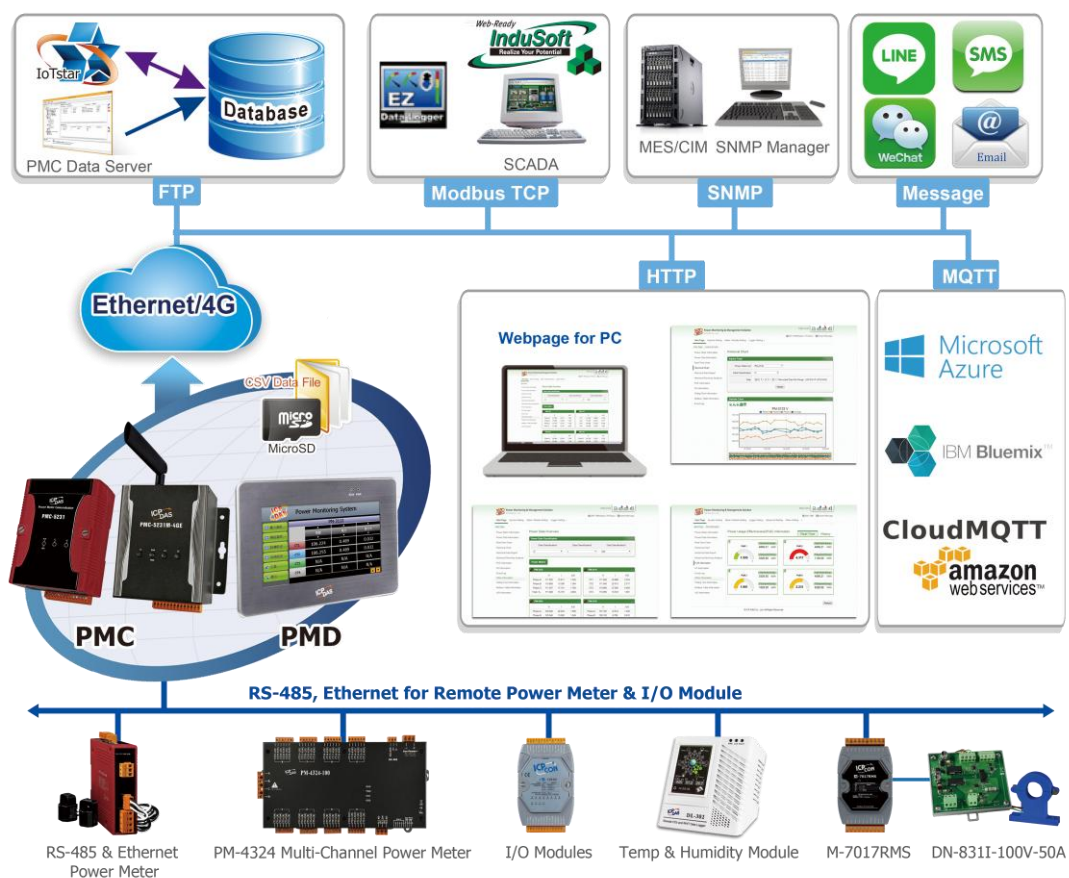


Figure1-1 : System Architecture

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 LINE Notify/Email/SMS 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 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 via Email/SMS message/LINE Notify.
- Local Display for On-Site operations (PMD only)
 - ◆ PMD is equipped with local side TFT LCD (with Touch Panel). It provides an 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 phone 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 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".

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).

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:

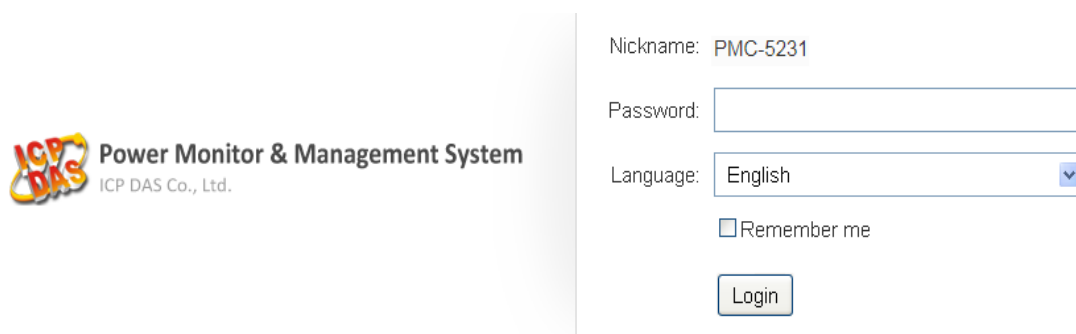


Figure3-1 : PMC/PMD Login page

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.

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.

Power Monitoring & Management Solution
ICP DAS Co., Ltd.

PMC-5231(新店)

OK 2165.6MB(Approx. 348 Days) Remote FTP upload failed.

Main Page System Setting Meter / Module Setting Logger Setting IoT Platform Setting Advanced Setting Rules Setting

Power Data Overview

Power Data Classification

Data Classification1	Data Classification2	Data Classification3
V	I	kW

Power Meters

PM-3033

	V	I	kW
Phase A	110.141	15.266	1.647
Phase B	110.312	13.529	1.432
Phase C	113.586	17.021	1.889
Total / Av...	111.346	15.272	4.959

PM-3133

	V	I	kW
Phase A	111.482	30.086	3.119
Phase B	108.507	26.104	2.758
Phase C	112.742	36.325	3.859
Total / Av...	110.910	30.838	9.733

PM-3112

	V	I	kW
CT1	107.478	18.828	1.937
CT2	106.756	12.445	1.283

PM-3114

	V	I	kW
CT1	107.755	10.754	1.045
CT2	107.755	8.606	0.842
CT3	107.250	12.902	1.317
CT4	107.250	6.807	0.666

PM-4324

	V	I	kW
Test1	106.981	41.962	4.372
Test2	104.392	34.429	3.435
Test3	114.675	52.032	5.718
Total / Av...	108.683	42.808	13.436

Single Phase #1

Refresh

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.

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:

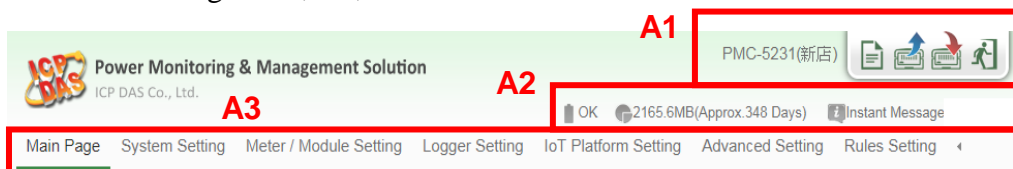


Figure4-2 : System Function Area (login as a Administrator)

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:

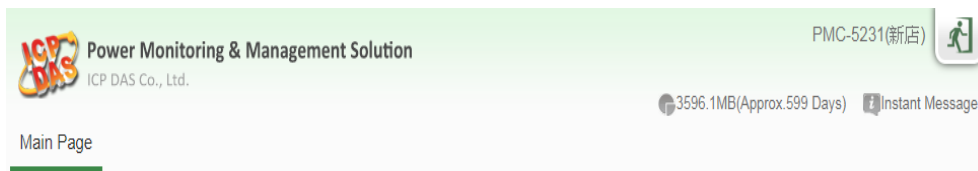


Figure4-3 : System Function Area(login as a General user)

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

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.

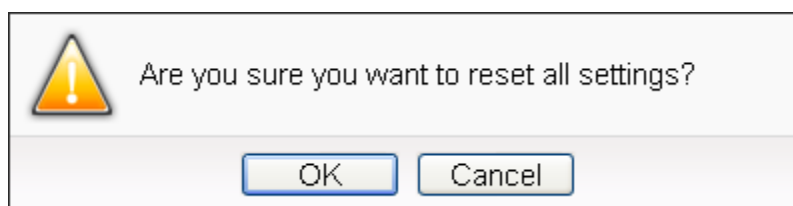




Figure4-6 : Confirm to clear settings

-  “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.

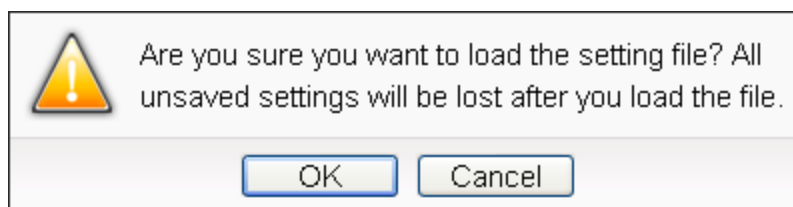




Figure4-7 : Confirm to load settings

-  “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

PMC/PMD to the PMC/PMD.

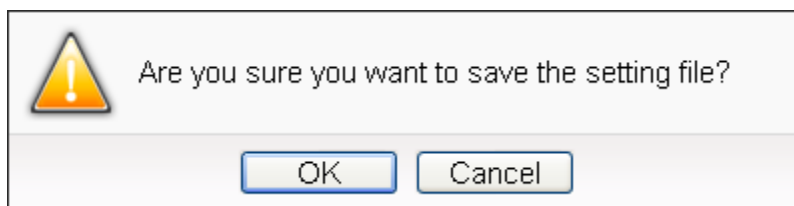




Figure4-8 : Confirm to save settings

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

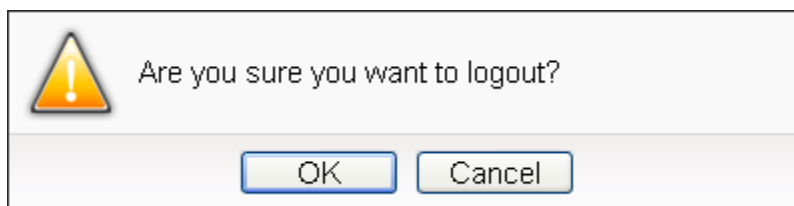


Figure4-9 : Confirm to logout (The settings are saved)

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

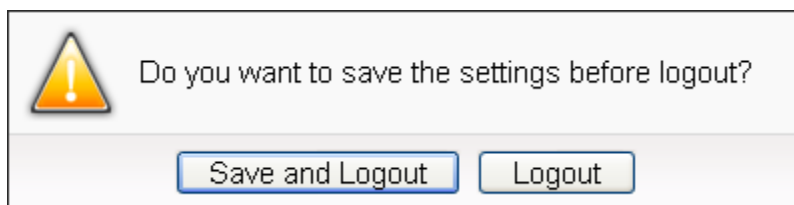



Figure4-10 : Confirm to logout (The settings are not saved)

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

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 approximate 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.

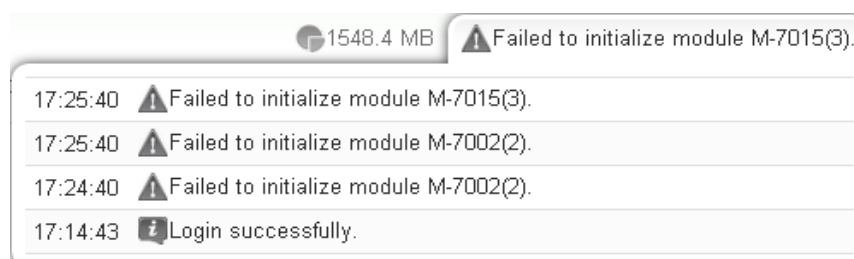


Figure4-12 : Real-time information list

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](#)

- 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.

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.

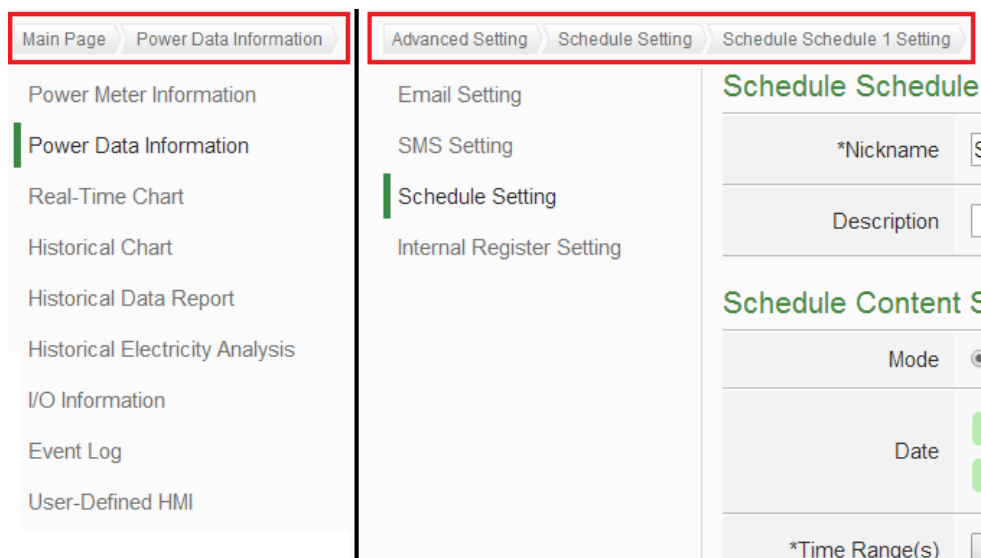


Figure4-13 : Current function path

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:

Power Data Overview

The screenshot shows the 'Power Data Overview' interface. At the top, there is a 'Power Data Classification' section with three dropdown menus labeled 'Data Classification1', 'Data Classification2', and 'Data Classification3'. The first dropdown is set to 'V', the second to 'I', and the third to 'kW'. Below this is a 'Power Meters' section containing two data tables for meters PM-3114 and PM-3112. Each table has columns for 'Loop', 'V', 'I', and 'kW'. The PM-3114 table shows data for four loops, while the PM-3112 table shows data for two loops. A 'Refresh' button is located at the bottom right of the interface.

Figure4-14 : Power data Overview page

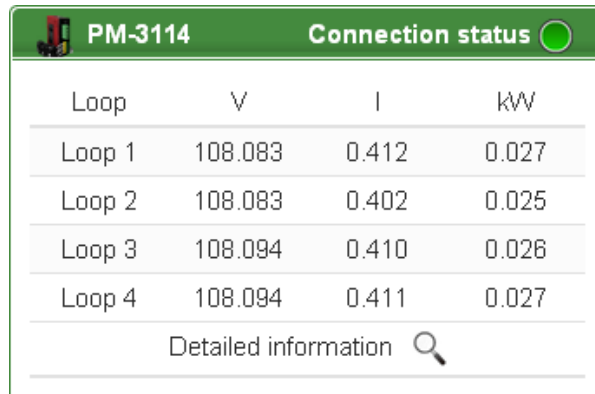
Power data overview page display the power data of the power meters that connected to the PMC/PMD. Depend on the requirement to select the desired classification of the power data to display the desired power data. The page refreshes every 20 sec, the user could also click “Refresh” button to refresh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

This is a close-up view of the 'Power Data Classification' section. It shows three dropdown menus: 'Data Classification1' with 'V' selected, 'Data Classification2' with 'I' selected, and 'Data Classification3' with 'kW' selected.

Figure4-15 : Select the classification of Power data



The screenshot shows a software interface for a power meter model PM-3114. At the top, there is a green header bar with the model name 'PM-3114' and a 'Connection status' indicator, which is a green circle. Below the header is a table with four columns: 'Loop', 'V', 'I', and 'kW'. The table contains four rows of data for Loop 1 through Loop 4. At the bottom of the table area, there is a link labeled 'Detailed information' with a magnifying glass icon.

Loop	V	I	kW
Loop 1	108.083	0.412	0.027
Loop 2	108.083	0.402	0.025
Loop 3	108.094	0.410	0.026
Loop 4	108.094	0.411	0.027





Detailed information 

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

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:

The screenshot displays the main interface of the ICP DAS Power Monitoring & Management Solution. The top navigation bar includes 'Main Page', 'System Setting', 'Meter / Module Setting', 'Logger Setting', 'IoT Platform Setting', 'Advanced Setting', and 'Rules Setting'. The left sidebar lists 10 information display options, with 'Other Information' highlighted. The main content area features a 'Power Data Overview' section with 'Power Data Classification' filters (Data Classification1: V, Data Classification2: I, Data Classification3: kW) and a 'Power Meters' section showing four meters: PM-3033, PM-3133, PM-3112, and PM-3114. Each meter displays a table of real-time data for Phase A, Phase B, Phase C, and Total / Average values for Voltage (V), Current (I), and Power (kW).

	V	I	kW
Phase A	112.114	15.340	1.599
Phase B	109.026	13.579	1.409
Phase C	113.671	17.068	1.898
Total / Av...	111.604	15.329	4.892

	V	I	kW
Phase A	112.748	31.561	3.270
Phase B	106.490	25.322	2.572
Phase C	113.328	38.909	4.101
Total / Av...	110.855	31.930	9.921

	V	I	kW
CT1	105.136	19.028	1.879

	V	I	kW
CT1	107.585	10.135	1.046

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

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) 				
	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.

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)				
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


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)				
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)		
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.

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.

Power Meter Information

Power Meter List:

Demand Information				
	Loop 1	Loop 2	Loop 3	Loop 4
15Minutes Actual Demand(kW)	0.00	0.00	0.00	0.03
15Minutes Forecast Demand(kW)	0.00	0.00	0.00	0.03
Contract Capacity(kW)	N/A	N/A	N/A	N/A
Hourly Maximum Demand(kW)	0.00	0.00	0.00	0.03
Daily Maximum Demand(kW)	0.00	0.00	0.00	0.03
Monthly Maximum Demand(kW)	0.00	0.00	0.00	0.03

Statistics Information <input type="button" value="Reset"/>				
	Loop 1	Loop 2	Loop 3	Loop 4
Daily Cumulative Electricity(kWh)	0.00	0.00	0.00	0.12
Monthly Cumulative Electricity(kWh)	0.00	0.00	0.00	0.32
Yearly Cumulative Electricity(kWh)	0.00	0.00	0.00	0.32
Daily Carbon Emissions(KG)	0.00	0.00	0.00	0.07
Monthly Carbon Emissions(KG)	0.00	0.00	0.00	0.20
Yearly Carbon Emissions(KG)	0.00	0.00	0.00	0.20

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.

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.

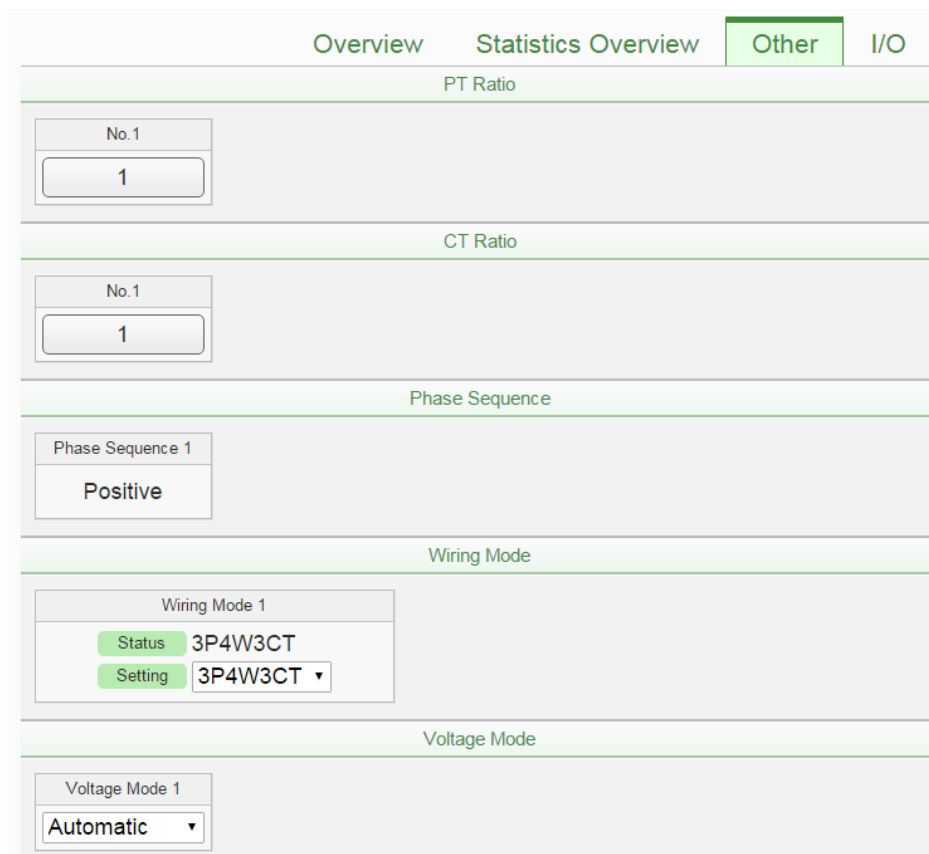


Figure5-9 : Power Meter Other Information Page

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.

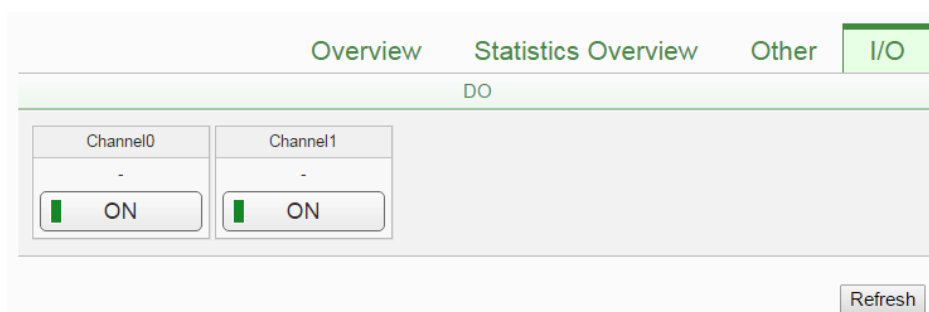


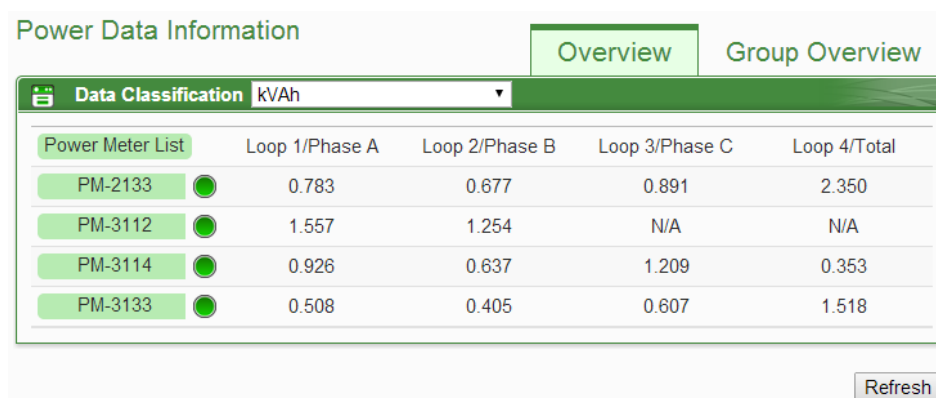
Figure5-10 : Power Meter I/O Information Page

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.




Power Meter List	Loop 1/Phase A	Loop 2/Phase B	Loop 3/Phase C	Loop 4/Total
PM-2133	0.783	0.677	0.891	2.350
PM-3112	1.557	1.254	N/A	N/A
PM-3114	0.926	0.637	1.209	0.353
PM-3133	0.508	0.405	0.607	1.518

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.

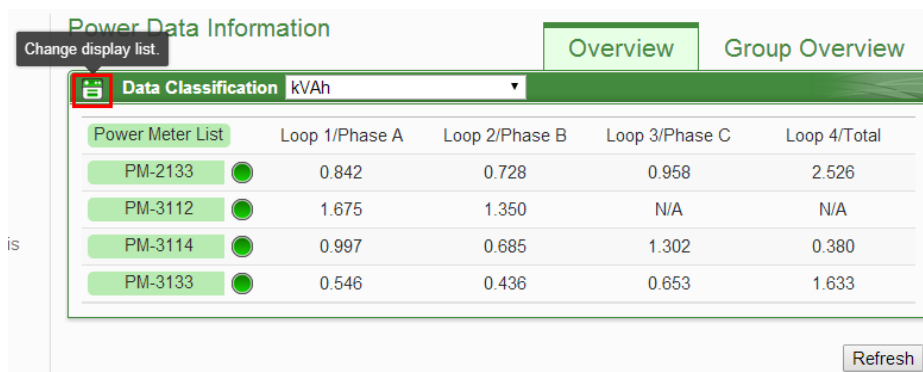


Figure5-12 : Change Display List Button

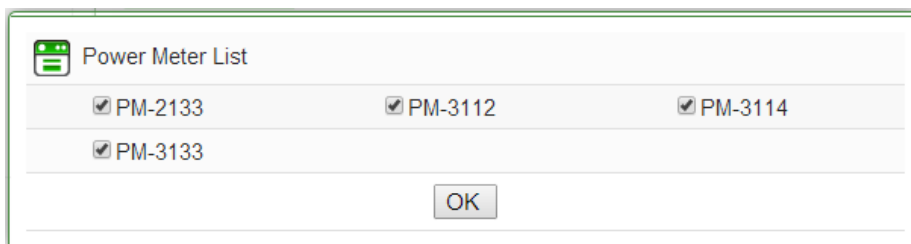


Figure5-13 : The Power Meter List

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.

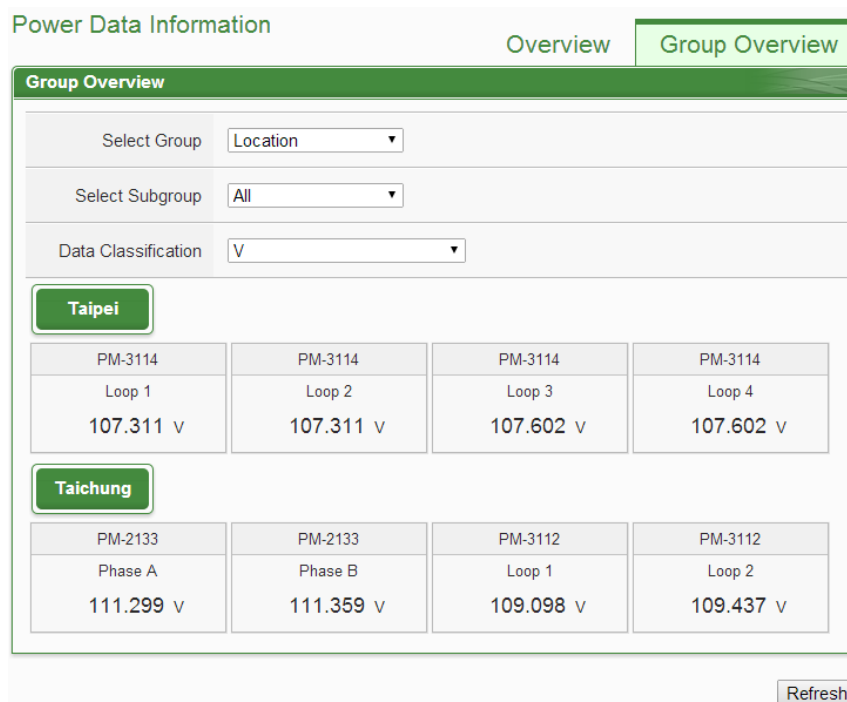


Figure5-14 : Power Data Group Overview Mode

- ◆ **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,

Daily Accumulated Electricity, 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.

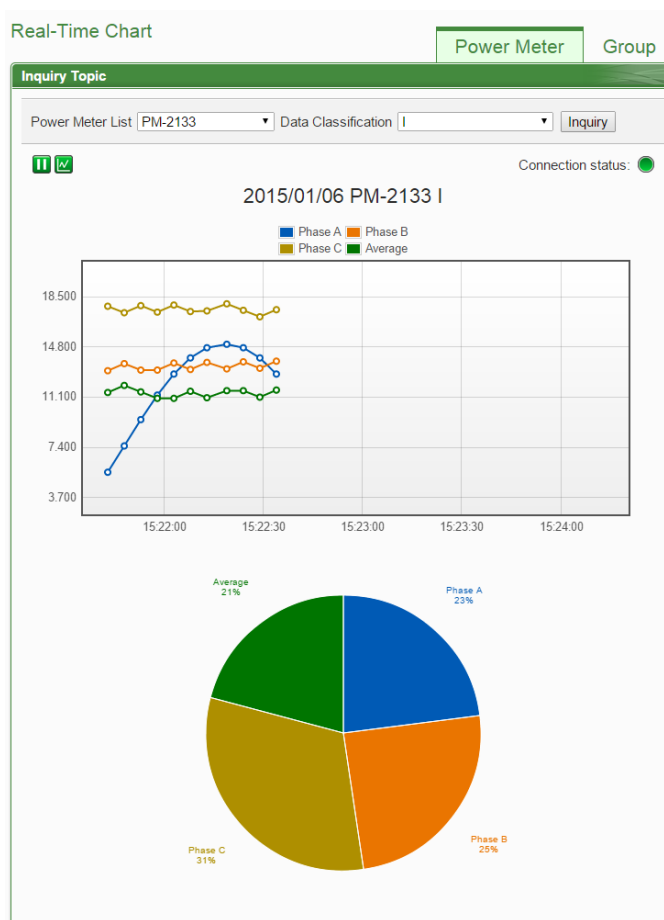









Figure5-15 : Realtime Chart (Power Meter Mode)

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 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, 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.

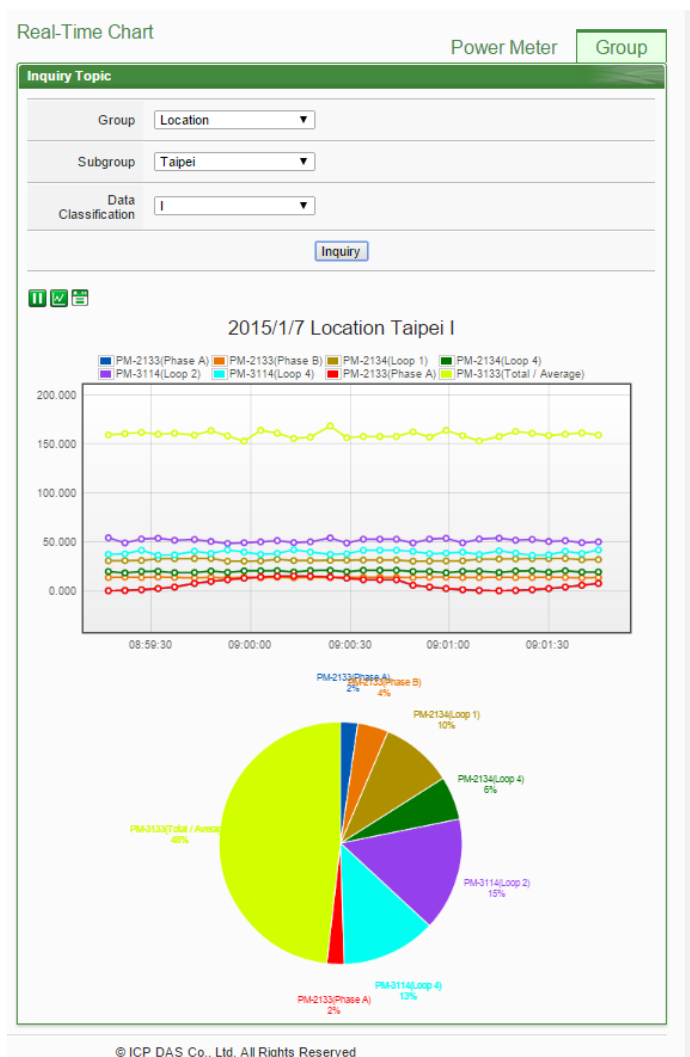


Figure5-16 : Realtime Chart (Group Mode)

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

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, 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 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.

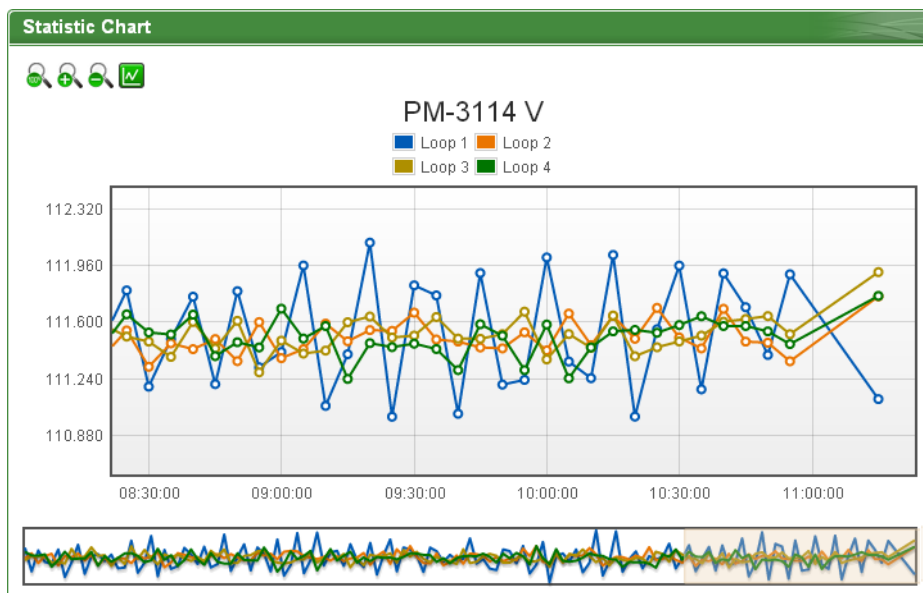







Figure5-18 : Historical Data Chart for power data

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.

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:

Inquiry Topic

Power Meter List	<input type="text" value="PM-3114"/>
Report Type	<input type="text" value="Daily Report"/>
Report Date	<input type="text" value="2014"/> / <input type="text" value="1"/> / <input type="text" value="27"/> Recorded Data File Range : (2013/12/24~2014/1/27)

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.

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. (kVAr)
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	222.369	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

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.

Historical Energy Analysis

Inquiry Topic	
Option Settings	
Function Type	Energy Usage Analysis by Trend ▾
Data Classification	V ▾
Chart Type	Yearly Chart ▾
Date	2014 ▾ ~ 2014 ▾ Recorded Data File Range : (2014/9/26~2014/10/21)
Inquiry Mode	Group ▾
Group	Location ▾
Subgroup	Taipei ▾
Inquiry	

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), 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.

Inquiry Mode	Group ▾
Group	Location ▾
Subgroup	Taipei ▾
Inquiry	

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.

Inquiry Mode User-defined ▼

Power Meter Setting 0 loops are selected.

Select Loop/Phase

<input type="checkbox"/> PM-2133	<input type="checkbox"/> Phase A	<input type="checkbox"/> Phase B	<input type="checkbox"/> Phase C	<input type="checkbox"/> Average
<input type="checkbox"/> PM-3112	<input type="checkbox"/> Loop 1	<input type="checkbox"/> Loop 2		
<input type="checkbox"/> PM-3114	<input type="checkbox"/> Loop 1	<input type="checkbox"/> Loop 2	<input type="checkbox"/> Loop 3	<input type="checkbox"/> Loop 4
<input type="checkbox"/> PM-3133	<input type="checkbox"/> Phase A	<input type="checkbox"/> Phase B	<input type="checkbox"/> Phase C	<input type="checkbox"/> Average

Inquiry

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.

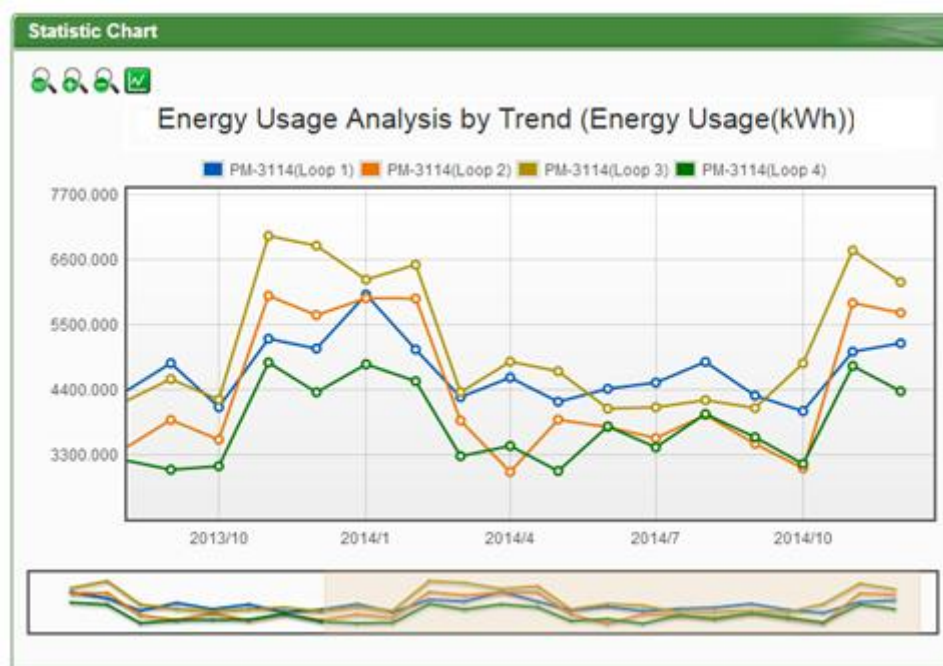


Figure5-27 : PM-3114 Energy Usage Analysis Trend Chart

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.

Historical Energy Analysis

Inquiry Topic

Option Settings

Function Type	Energy Usage Analysis by Time Period ▾	
Channel Selector	PM-3133 ▾	Phase A ▾
Data Classification	Energy Usage(kWh) ▾	
Chart Type	Yearly Chart ▾	
Date	2014 ▾ ~ 2014 ▾ Recorded Data File Range : (2014/7/17~2014/8/20)	

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), 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.

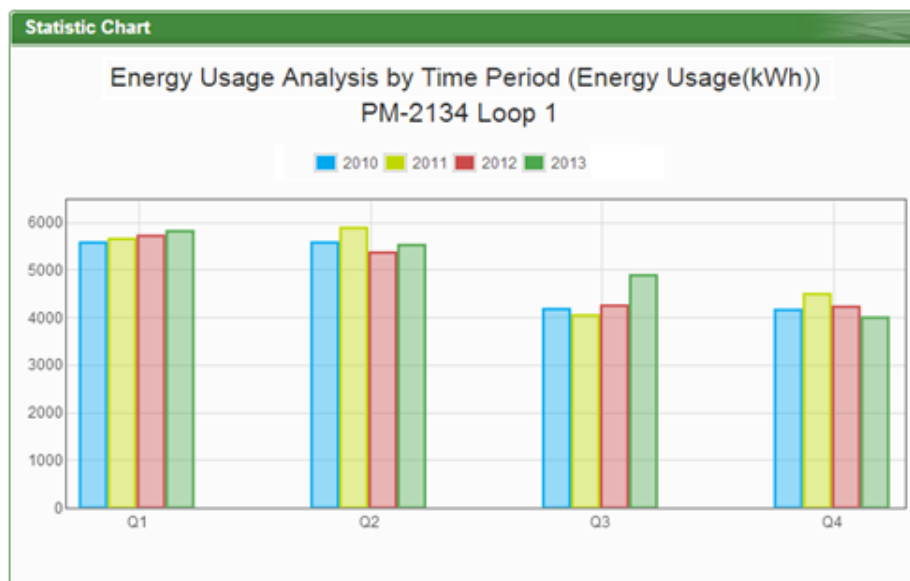


Figure5-29 : Time Histogram Chart for PM-3114 Loop 1

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.

Historical Energy Analysis

Inquiry Topic

Option Settings

Function Type	Energy Usage Breakdown by Circuit/Group ▼
Data Classification	V ▼
Chart Type	Yearly Chart ▼
Date	2014 ▼ <small>Recorded Data File Range : (2014/9/26~2014/10/21)</small>
Inquiry Mode	Group ▼
Group	Location ▼
Subgroup	Taipei ▼

Figure5-30 : Energy Usage breakdown by Circuit/Group

◆ 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.

- ◆ Data Classification: includes V (voltage), I (current), PF (power factor), Energy Usage (KWh), 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.

Inquiry Mode	Group ▾
Group	Location ▾
Subgroup	Taipei ▾
<input type="button" value="Inquiry"/>	

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 the table.

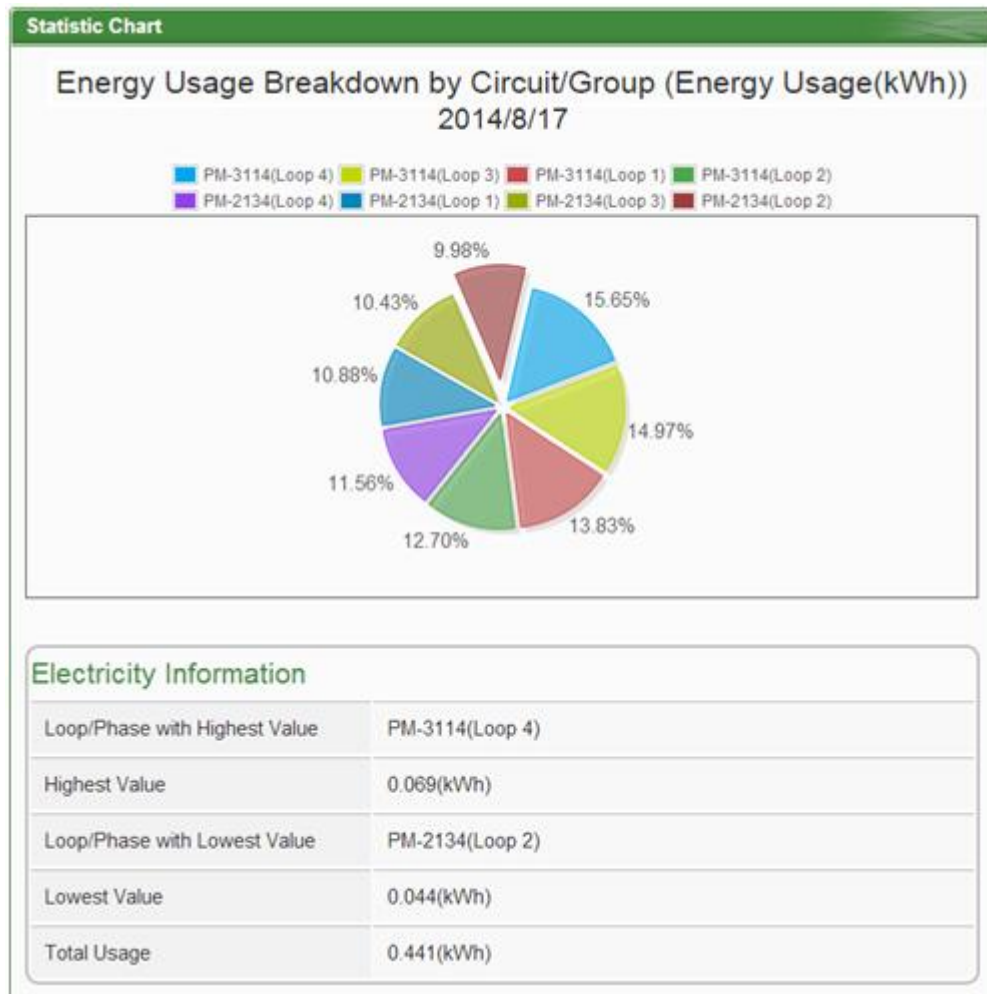


Figure5-32 : Energy Usage Breakdown by Circuit/Group Chart

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.

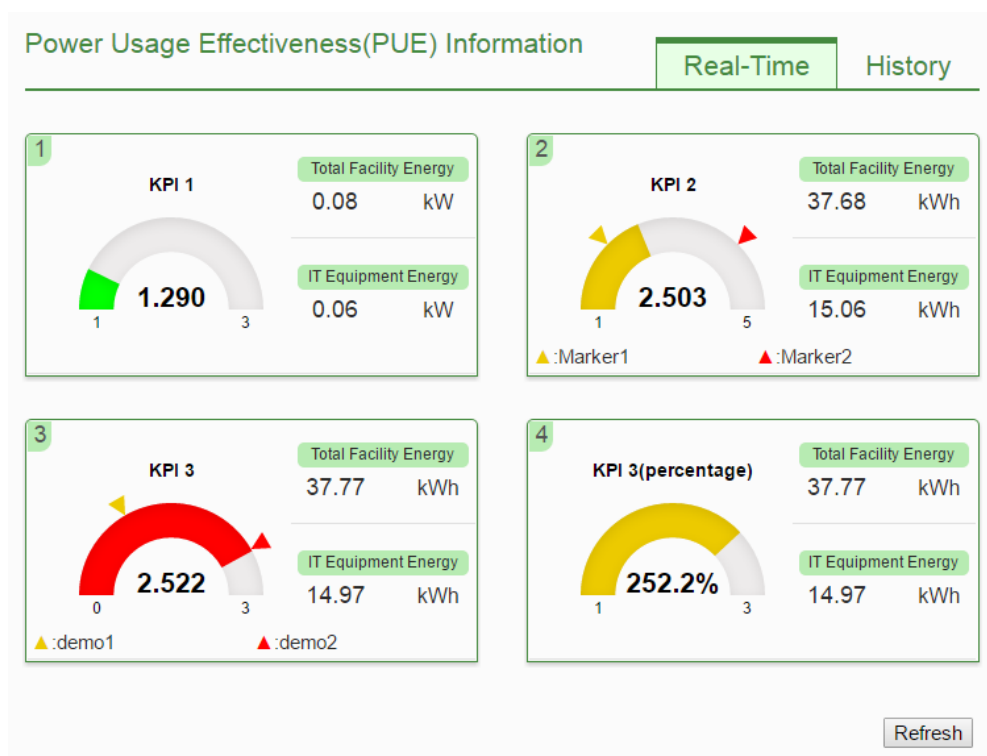


Figure5-33 : PUE information - Realtime

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:

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.

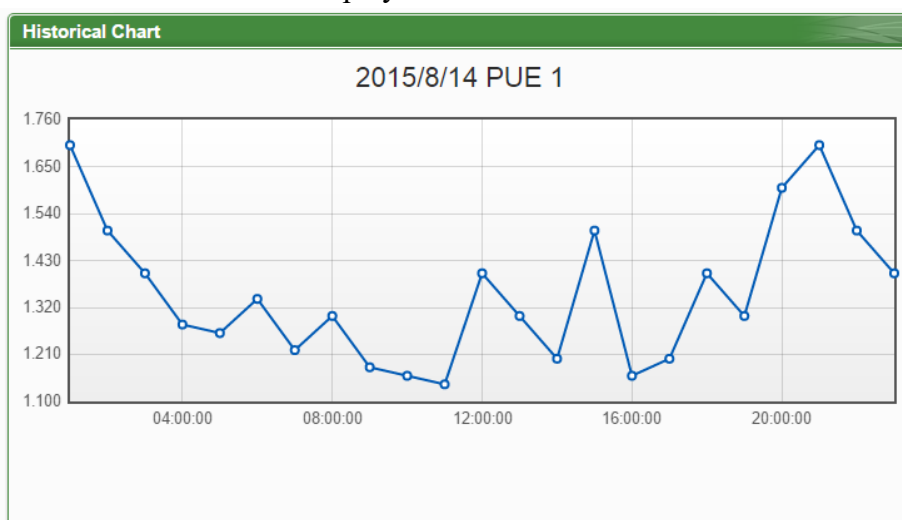


Figure5-35 : PUE information - History(2)

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.

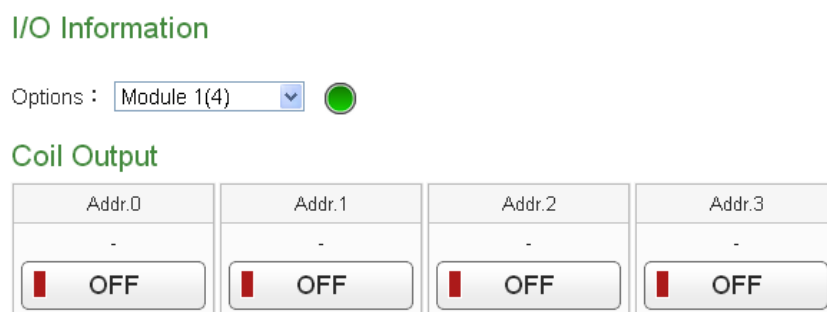


Figure5-36 : I/O Information(login as Administrator)

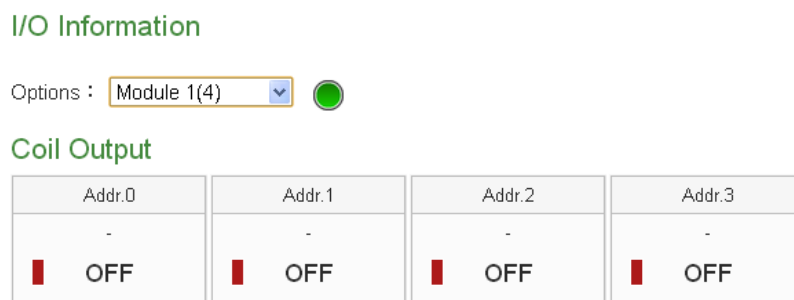


Figure5-37 : I/O Information(login as General User)

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

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:

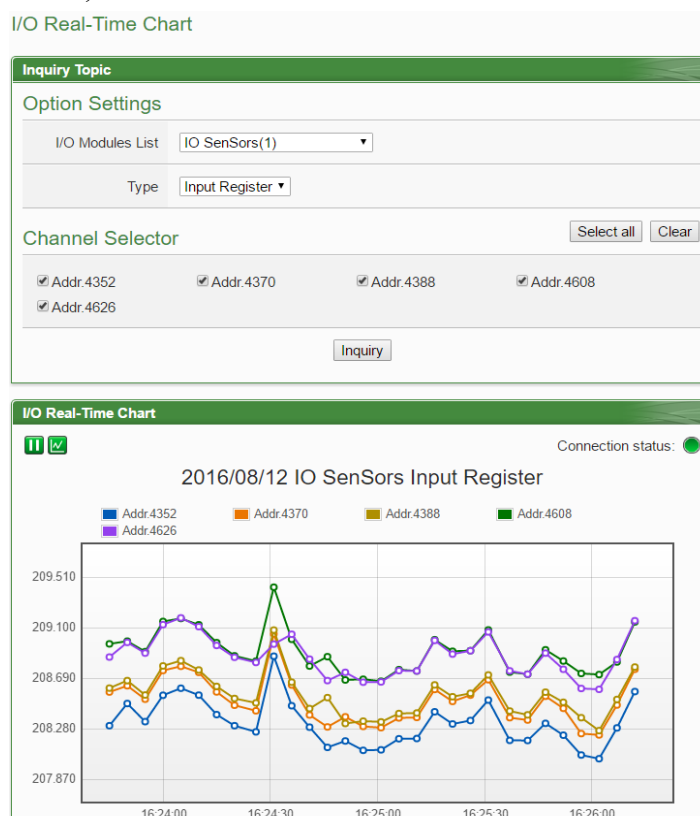









Figure5-38 : I/O Realtime Chart

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

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.

Inquiry Topic

I/O channel historical chart User-Defined historical chart

I/O Modules List: M-7002(2)

Type: DO

Date: 2017 / 9 / 15 Recorded Data File Range : (2017/6/27~2017/9/15)

Channel Selector Select all Clear

ch.0 ch.1 ch.2 ch.3

Inquiry Download CSV

Figure5-39 : I/O Channel Historical Chart

Inquiry Topic

I/O channel historical chart User-Defined historical chart

Date: 2017 / 9 / 15 Recorded Data File Range : (2017/6/26~2017/9/15)

Channel Selector Select all Clear

M-7002 DI0 M-7002 DO0

Inquiry Download CSV

Figure5-40 : User-Defined Historical Chart

- **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:

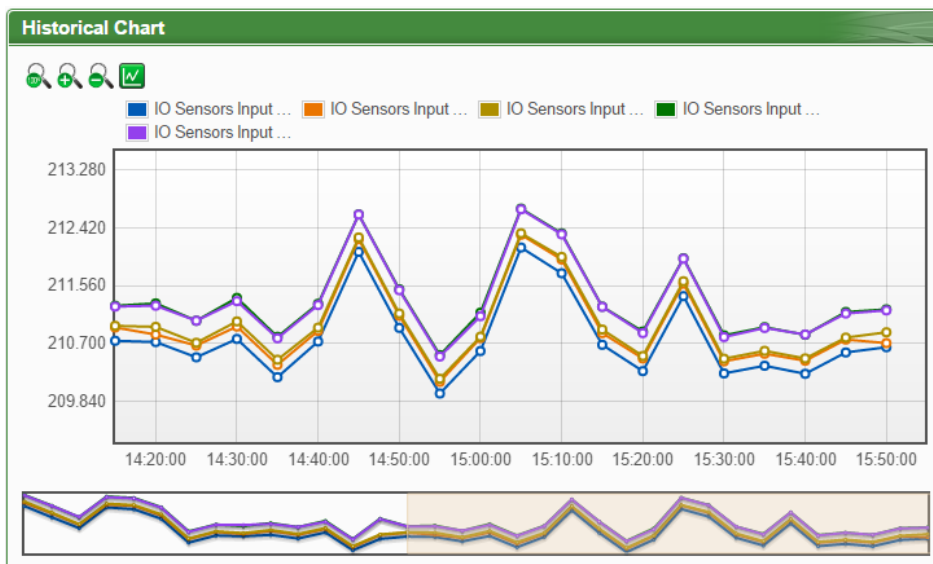


Figure5-41 : I/O Historical Data Chart

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

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.

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:

Polling Time Information Page

COM2 Modbus RTU Master			
No.	Module Name / Nickname	Address	Polling Time
1	 ICP DAS PM-3112(PM-3112)	1	81ms
2	 ICP DAS PM-3112(PM-3112)	2	81ms
3	 ICP DAS PM-3114(PM-3114)	3	90ms
4	 ICP DAS PM-3112(PM-3112)	5	81ms
Total			333ms

COM3 Modbus RTU Master			
No.	Module Name / Nickname	Address	Polling Time
3	 ICP DAS PM-3133(PM-3133)	4	159ms
Total			159ms


LAN Modbus TCP Master			
No.	Module Name / Nickname	Address	Polling Time
1	 ICP DAS PM-3114-MTCP(PM-3114-MTCP)	192.168.100.128:502/1	33ms

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.

Inquiry Topic

Module Type	Module Name		
Power Meter	PM-2133	<input type="button" value="Inquiry"/>	<input type="button" value="Print"/>

Figure5-44 : The Interface of Modbus Table Information

- ◆ **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.

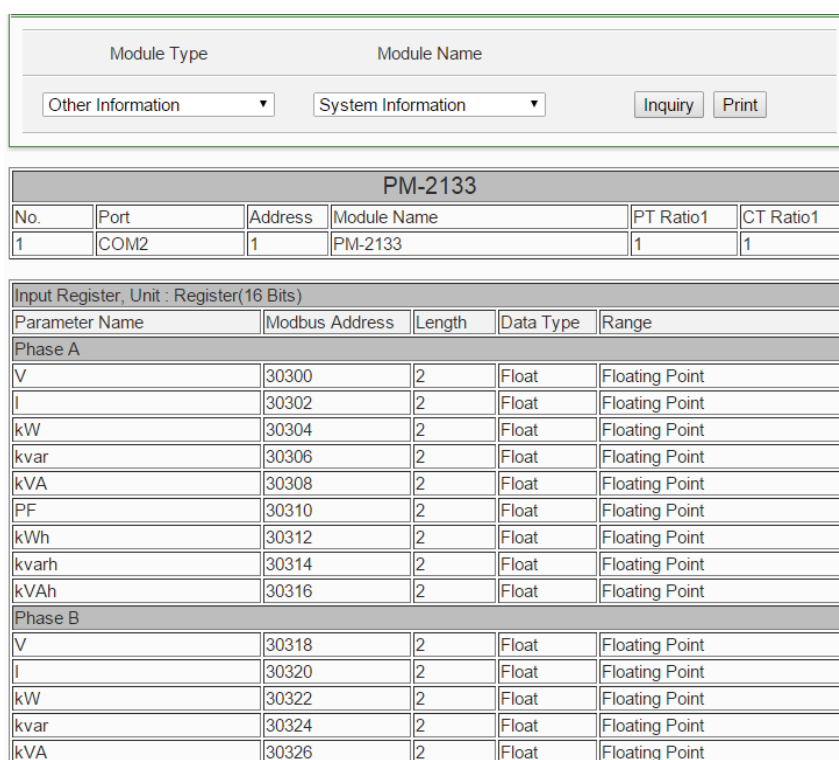


Figure5-45 : Inquiry result of Modbus Table Information

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:

UID Information Page Export

COM2 Modbus RTU Master			
No.	Module Name / Nickname	Address	UID
1	ICP DAS PM-4324(PM-4324)	1	01A1BC1F1400004E_2[4324]1
2	ICP DAS PM-3133(PM-3133)	2	01A1BC1F1400004E_2[3133]2
3	ICP DAS PM-3112(PM-3112)	3	01A1BC1F1400004E_2[3112]3
4	ICP DAS PM-3114(PM-3114)	4	01A1BC1F1400004E_2[3114]4

COM3 Modbus RTU Master
None

LAN Modbus TCP Master
None

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.

Ping Status Page

Nickname	Target	Result	Response Time	Failed Times / Ratio	Last Success Time
Ping 1	iotstardemo.icpdas.com	Success	15 ms	0 Times	2019/06/27 09:46:57
Ping 2	192.168.100.222	Success	1 ms	0 Times	2019/06/27 09:46:56

Figure5-47 : Ping Status page

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:

System Setting Page

Time Setting

Date & Time

Date: 2016/06/23

Time: 17:33:37

Time Synchronization

Function Status: Enable

Sync Interval: 6 hours

Time Zone: UTC+08:00

Daylight Saving Time: Enable

I/O Interface Setting

COM2

Function: Disable

COM3

Function: Modbus RTU Master

Baudrate: 19200 bps

Parity: None

Stop bits: 1

Silent Interval: 100 millisecond(s)

COM4

Function: Modbus RTU Master

Baudrate: 19200 bps

Parity: None

Stop bits: 1

Silent Interval: 100 millisecond(s)

LAN

Function: Modbus TCP Master
Modbus TCP Slave

Network Setting

LAN1

IP: 192.168.100.95

Mask: 255.255.255.0

Gateway: 192.168.100.254

DNS: 8.8.8.8

MAC Address: 00:12:34:56:78:9A

Mobile Network

Connection Status: Connected

Signal Strength: -85 dBm

IP: 192.168.100.1

Port

Web Server Port: 80

Modbus TCP Port: 502

Modbus NetID: 1

Cloud Manager System

Function Status: Enable

Other Setting

Contract Capacity

Function Status: Disable

Demand Interval

Calculation Interval: Every 15 minutes

Carbon Footprint

Factor: 0.612

SNMP Setting

Version: V2c

Read Community Name: public

Write Community Name: private

Trap Community Name: public

Firmware Update Setting

Firmware Information

Current Version: 3.1.6

Available Version:

Firmware Update

Firmware:

Security Setting

Local FTP Server: Enable

Idle Time: 60 minute(s)

Figure6-1 : System Setting Overview Page

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:

Time Setting Page

		2016 / 8						
		Sun	Mon	Tue	Wed	Thu	Fri	Sat
Date			1	2	3	4	5	6
		7	8	9	10	11	12	13
		14	15	16	17	18	19	20
		21	22	23	24	25	26	27
		28	29	30	31			

Time: 11 : 25 : 17

Time Duplication: (Load current time of this computer.)

Time Synchronization Setting

Function Status: Enable

Time Zone Setting

Time Zone: (UTC-08:00) Pacific Time (US & Canada)

Daylight Saving Time: Enable

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:

Time Synchronization Setting	
Function Status	<input checked="" type="checkbox"/> Enable
*SNTP Time Server	<input type="text" value="pool.ntp.org"/> <input type="text" value="time.windows.com"/> <input type="text" value="time.nist.gov"/> <input type="button" value="Use Default SNTP Time Servers"/>
Port	123
Sync Interval	6 <input type="button" value="v"/> hours

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.

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 setting 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.**

The screenshot shows the 'Network Setting' page for a device (PMC-5236M-4GE). The interface includes a navigation menu on the left and a main content area with several configuration sections:

- Network Setting(LAN1):** Includes fields for IP (192.168.100.95), Mask (255.255.255.0), Gateway (192.168.100.254), and DNS (8.8.8.8). It has radio buttons for 'Specify an IP address' and 'Obtain an IP address automatically(DHCP)'. A 'Save' button is at the bottom.
- Network Setting(Mobile Network):** Includes fields for *Dial-up Number (*99#), *APN (Internet), Authentication (Username: guest, Password: ****), and Mobile Code (*MCC: 466, *MNC: 92). It has checkboxes for 'Enable' and 'Automatic Connection When Power On'. A 'Testing' button is present. A red warning box says 'Please disable the PIN code first'. 'Save' and 'Save and Connect' buttons are at the bottom.
- Port Setting:** Includes fields for Web Server Port (80), Modbus TCP Port (502), and Modbus NetID (1). A 'Save' button is at the bottom.
- Dynamic DNS Setting:** Includes a dropdown for Service Provider (Disable). 'Service 1' and 'Service 2' tabs are visible. A 'Save' button is at the bottom.
- IoTstar Connection Setting:** Includes a checkbox for 'Function Status' (checked), radio buttons for '*Server Address' (ICP DAS Trial Service - Create Account selected), and fields for *Username (alan_jhu) and *Password (****). A 'Save' button is at the bottom.

Figure6-4 : Network Setting Page

- 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

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.

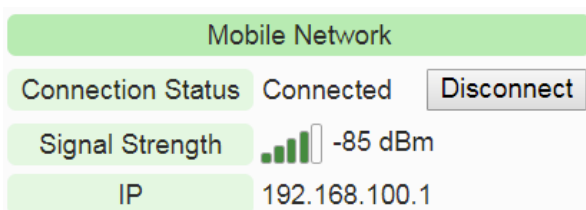


Figure6-5 : Signal Strength level and IP address for Mobile Network

- 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:

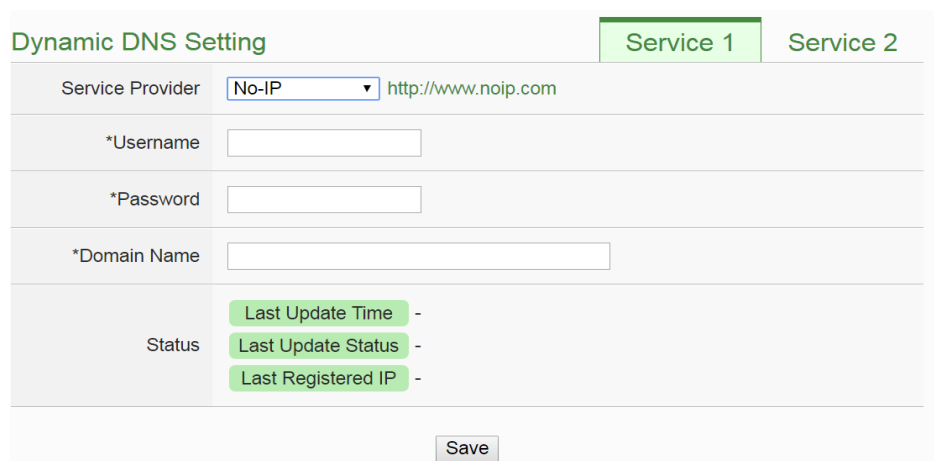


Figure6-6 : DDNS Setting Page

Follow the steps below to set up Dynamic DNS service:

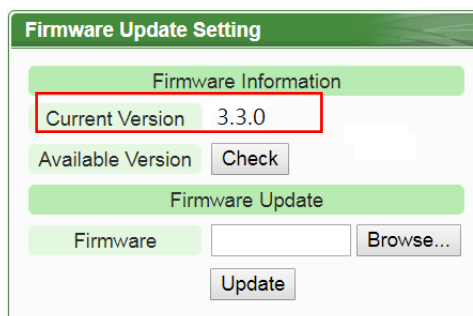
- i. Click the services tabs on the right-top corner of “Dynamic DNS service”. System provides two items for selection as “Service 1” and “Service 2”. User can enable one Dynamic DNS service for normal status, or enable two Dynamic DNS services for the redundant service.
- ii. In the “Service Provider”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

PMC/PMD provide the connection ability to the ICP DAS IoTstar Cloud Manager Software. 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 V3.3.0 or later version. If the PMC/PMD does not install with the right firmware version, please update the firmware before taking the next step.



- ii. Click “Enable” of the “Function Status” to enable the network

connection to the ICP DAS IoTstar.

The screenshot shows the 'IoTstar Connection Setting' interface. At the top, the title 'IoTstar Connection Setting' is displayed in green. Below it, there is a 'Function Status' section with a checkbox labeled 'Enable' which is currently unchecked. At the bottom of this section, there is a 'Save' button.

- iii. Select "User-defined IP address" and in the "Server Address" field, input the IP address or Domain Name of the PC or Platform (with IoTstar installed). Enter the username and password of the account applied from the user's IoTstar in the "Username" and "Password" fields. PMC/PMD will login into the IoTstar by the information provided.

Please Note : The ICP DAS Trial Service - Create Account is currently disabled and the function is reserved. Please do not click on this option.

This screenshot provides a more detailed view of the 'IoTstar Connection Setting' page. The 'Function Status' is now checked 'Enable'. The '*Server Address' section contains two radio buttons: 'ICP DAS Trial Service - Create Account' (which is selected) and 'Specify an address of server'. Below this, the '*Username' field contains the text 'alan_jhu' and the '*Password' field contains a series of dots '.....'. At the bottom, there is a 'Connection Status' field showing a hyphen '-' and a 'Save' button.

Figure6-7 : IoTstar connection setting page

- 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.

IoTstar Connection Setting

Function Status	<input checked="" type="checkbox"/> Enable
*Server Address	<input type="radio"/> ICP DAS Trial Service - Create Account <input checked="" type="radio"/> <input type="text" value="192.168.100.10"/>
*Username	<input type="text" value="alan_jhu"/>
*Password	<input type="password" value="....."/>
Connection Status	Connected

- 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.

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:

SNMP Setting Page

Version	<input checked="" type="radio"/> V2c <input type="radio"/> V1
*Read Community Name	<input type="text" value="public"/>
*Write Community Name	<input type="text" value="private"/>
*Trap Community Name	<input type="text" value="public"/>
Contact	<input type="text" value="Your System Contact Here"/>
Location	<input type="text" value="Your Location Here"/>

SNMP Manager List

*Address	Read/Write	Trap
<input type="text" value=""/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="radio"/> 192.168.100.95	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Figure6-8 : 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”.
- 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.

*Address	Read/Write	Trap
<input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>
192.168.100.95	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Remove Save

Figure6-9 : 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.

*Address	Read/Write	Trap
192.168.100.100	<input type="checkbox"/>	<input type="checkbox"/>
192.168.100.95	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Remove Save

Figure6-10 : 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.

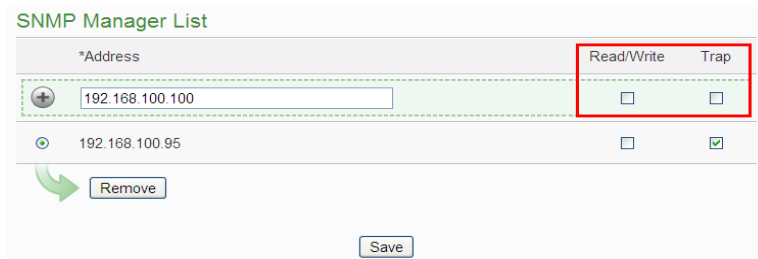



Figure6-11 : The Working Model Setting for SNMP Manager

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.

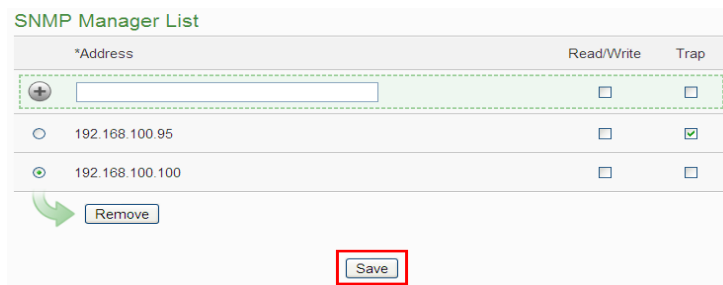


Figure6-12 : Save the SNMP Manager Setting

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:

Administrator Password Setting

*Current Password	<input type="text"/>
*New Password	<input type="text"/>
*Retype New Password	<input type="text"/>

Save

Administrator Profile Setting

*Email Address	<input type="text"/>
----------------	----------------------

Save

Guest Password Setting

*Current Password	<input type="text"/>
*New Password	<input type="text"/>
*Retype New Password	<input type="text"/>

Save

Local FTP Server Setting

Server Status	<input checked="" type="checkbox"/> Enable
ID	admin
Password	<input type="checkbox"/> Change password

Save

Idle Time Setting

Idle Time	<input type="text" value="60"/> minute(s)
-----------	---

Save

Figure6-13 : 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**

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](#).

Administrator Password Setting

*Current Password	<input type="text"/>
*New Password	<input type="text"/>
*Retype New Password	<input type="text"/>

Administrator Profile Setting

*Email Address	<input type="text"/>
----------------	----------------------

Guest Password Setting

*Current Password	<input type="text"/>
*New Password	<input type="text"/>
*Retype New Password	<input type="text"/>

Figure6-14 : 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.

Local FTP Server Setting

Server Status	<input checked="" type="checkbox"/> Enable
ID	admin
Password	<input checked="" type="checkbox"/> Change password
	*New Password <input type="text"/>
	*Retype New Password <input type="text"/>

Figure6-15 : Local FTP Server Setting Page

● 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.

Idle Time Setting

Figure6-16 : 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:

Figure6-17 : 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	<ul style="list-style-type: none"> ● 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	<ul style="list-style-type: none"> ● 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.

	<ul style="list-style-type: none"> ● 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	<ul style="list-style-type: none"> ● 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

The screenshot shows the 'I/O Interface Setting Page' with tabs for COM2, COM3, COM4, and LAN. The 'COM2' tab is active. The settings are as follows:

Function	Modbus RTU Slave ▾
Baudrate	9600 ▾ bps
Parity	<input checked="" type="radio"/> None <input type="radio"/> Odd <input type="radio"/> Even
Stop bits	<input checked="" type="radio"/> 1 <input type="radio"/> 2

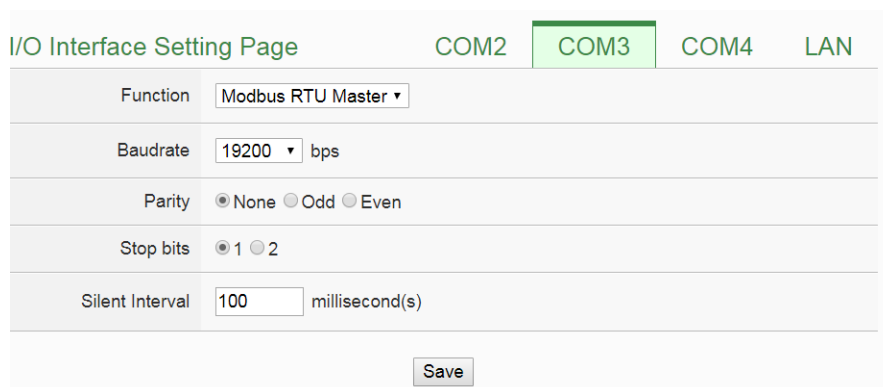
At the bottom right, there is a 'Save' button.

Figure6-18 : 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.

- Connect to Modbus RTU slave device via COM Port.



The screenshot shows the 'I/O Interface Setting Page' with tabs for COM2, COM3 (selected), COM4, and LAN. The settings are as follows:

Field	Value
Function	Modbus RTU Master
Baudrate	19200 bps
Parity	None
Stop bits	1
Silent Interval	100 millisecond(s)

A 'Save' button is located at the bottom right of the settings area.

Figure6-19 : Function setting to connect to Modbus RTU slave device

The settings steps are as below:

- 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.
- 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.
- 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.

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

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

Figure6-20 : 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 Footprint Setting. The setting interface is shown as below:

Contract Capacity Setting

Function Status	<input checked="" type="checkbox"/> Enable
Contract Capacity	<input type="text" value="1"/> kW

Demand Interval Setting

Calculation Interval	Every <input type="text" value="15"/> minutes
----------------------	---

Carbon Footprint Setting

Factor	<input type="text" value="0.612"/>
--------	------------------------------------

Save

Figure6-21 : 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 Footprint Setting

In this section, it allows to set Carbon Footprint Setting. Please input the Carbon Footprint factor based on the Carbon Footprint factors for countries worldwide that the International Energy Agency (IEA) published.

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:

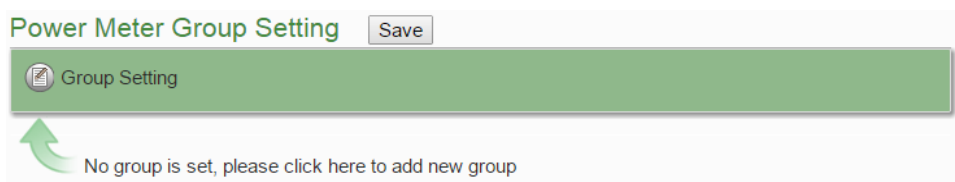


Figure6-22 : Power Meter Group Setting

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.

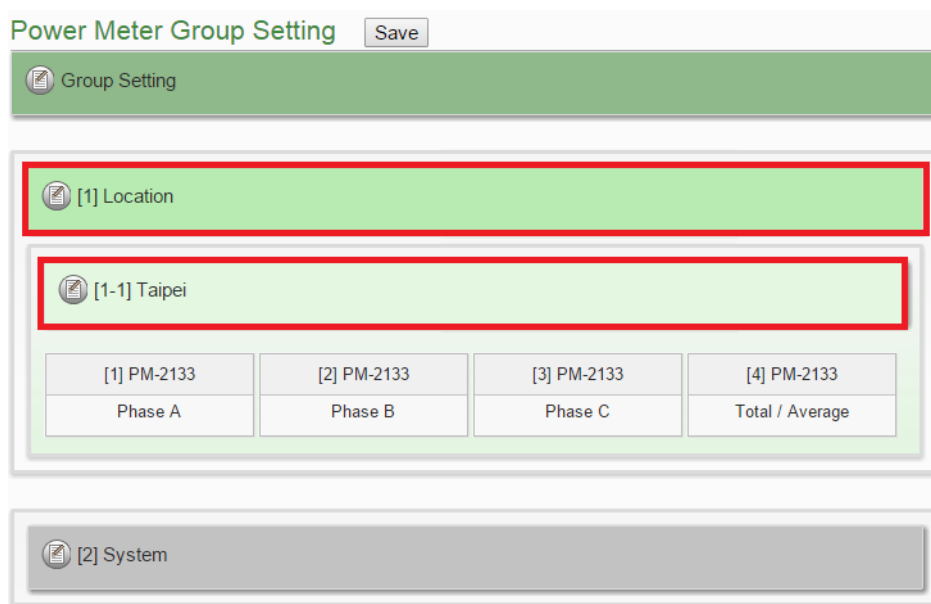


Figure6-23 : Group and Subgroup Viewing

6.7.2 Group and Subgroup Setting

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

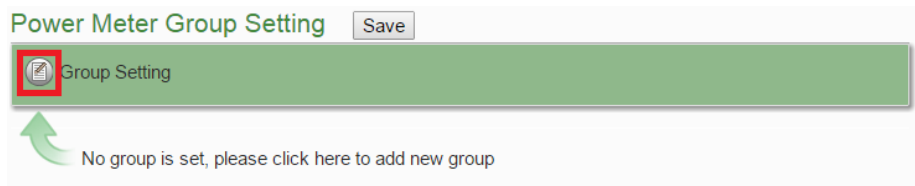


Figure6-24 : Group Setting

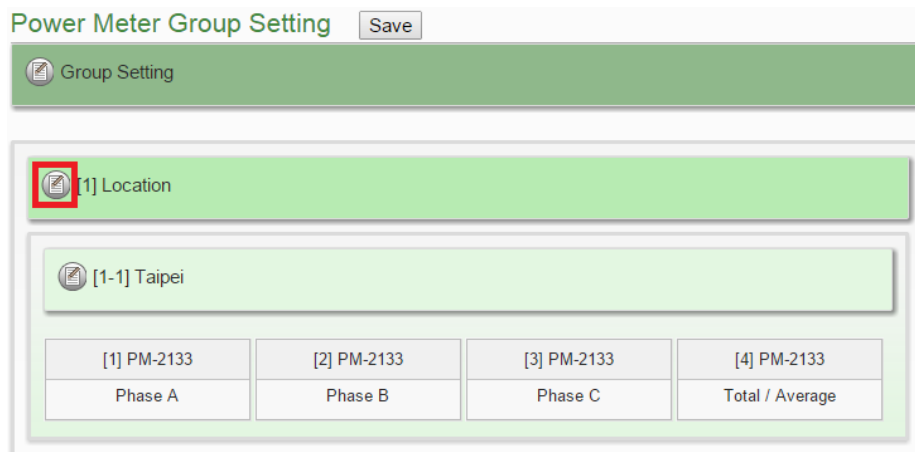



Figure6-25 : Subgroup Setting

- 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.

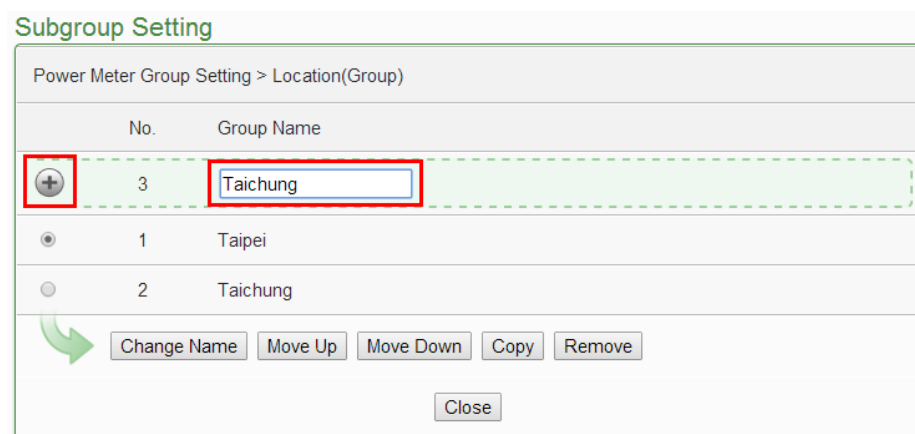


Figure6-26 : Subgroup Setting Window

6.7.3 Group and Subgroup configuration

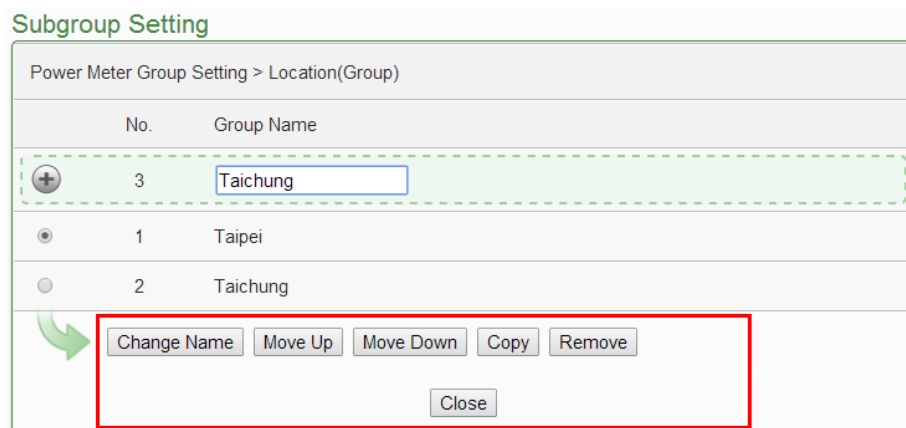


Figure6-27 : Configurations for Subgroup

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.

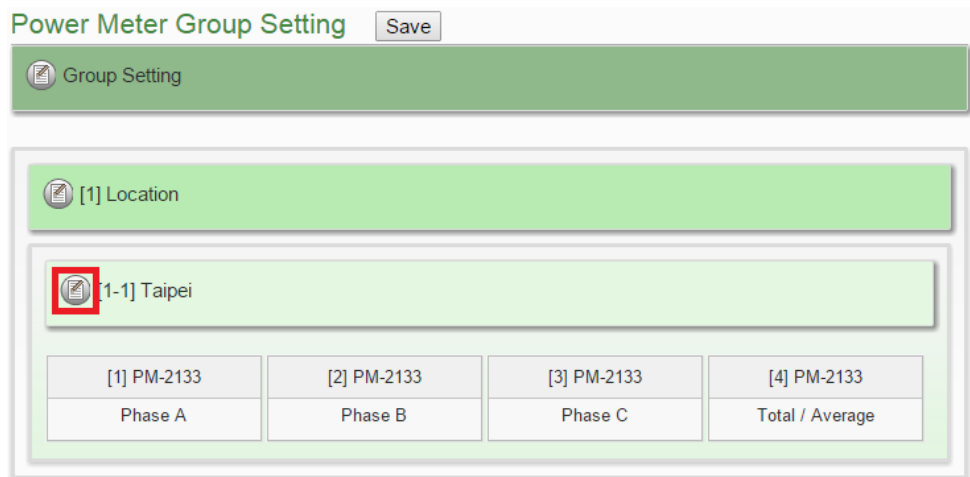



Figure6-28 : Loops/Phases of subgroup Setting

- 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.

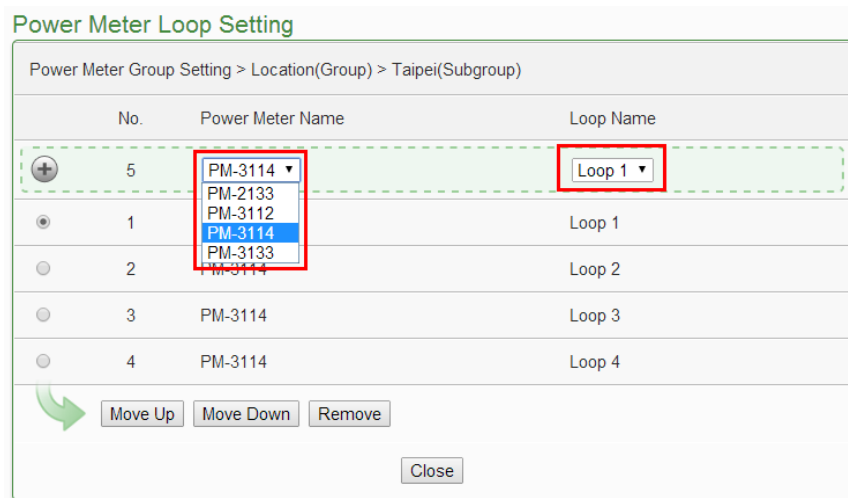


Figure6-29 : Choose Loops/Phased of Subgroup

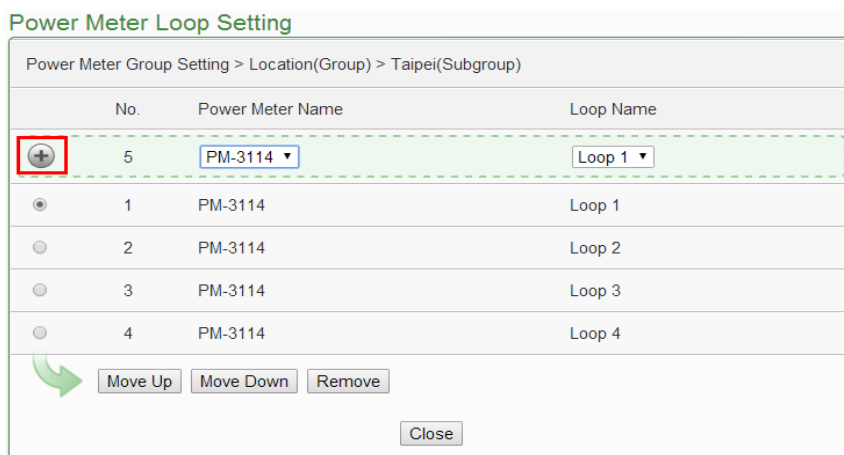


Figure6-30 : Add Loops/Phases for Subgroup

6.7.5 Loop/Phase of group configuration

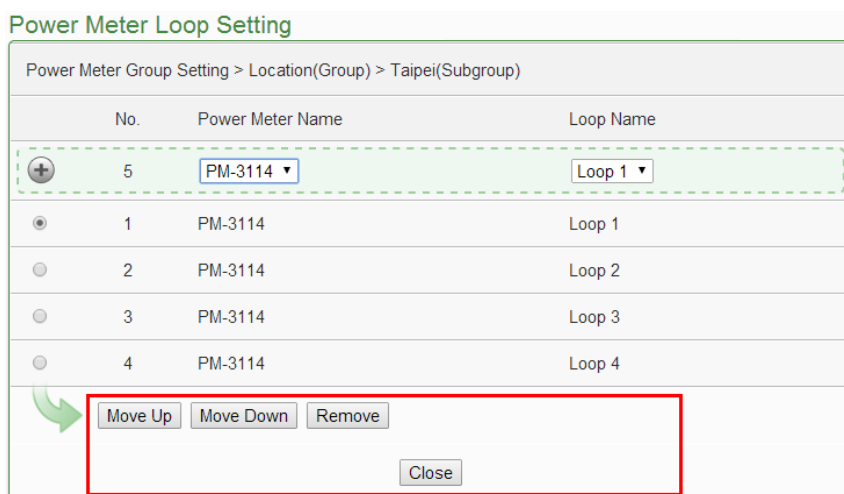


Figure6-31 : Configurations for Loops/Phased of Subgroup

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.

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".

System Setting Page

<div style="border: 1px solid black; padding: 5px;"> <p>Time Setting</p> <p>Date & Time</p> <p>Date: 2014/11/07</p> <p>Time: 10:42:38</p> <p>Time Synchronization</p> <p>Function Status: Enable</p> <p>Sync Interval: 6 hours</p> <p>Time Zone: GMT+08:00</p> <p>Daylight Saving Time: Disable</p> </div> <div style="border: 1px solid black; padding: 5px; margin-top: 5px;"> <p>Network Setting</p> <p>LAN1</p> <p>IP: 192.168.100.38</p> <p>Mask: 255.255.255.0</p> <p>Gateway: 192.168.100.254</p> <p>DNS: 8.8.8.8</p> <p>LAN2</p> <p>IP: 192.168.255.2</p> <p>Mask: 255.255.0.0</p> <p>Gateway: 192.168.0.1</p> <p>DNS: 8.8.8.8</p> <p>Port</p> <p>Web Server Port: 80</p> <p>Modbus TCP Port: 502</p> <p>Modbus NetID: 1</p> </div> <div style="border: 1px solid black; padding: 5px; margin-top: 5px;"> <p>SNMP Setting</p> <p>Version: V2c</p> <p>Read Community Name: public</p> <p>Write Community Name: private</p> <p>Trap Community Name: public</p> </div> <div style="border: 1px solid black; padding: 5px; margin-top: 5px;"> <p>Security Setting</p> <p>Local FTP Server: Enable</p> <p>Idle Time: 10 minute(s)</p> </div>	<div style="border: 1px solid black; padding: 5px;"> <p>I/O Interface Setting</p> <p>COM1</p> <p>Function: Disable</p> <p>COM2</p> <p>Function: Modbus RTU Master</p> <p>Baudrate: 19200 bps</p> <p>Parity: None</p> <p>Stop bits: 1</p> <p>Silent Interval: 100 millisecond(s)</p> <p>COM3</p> <p>Function: Modbus RTU Master</p> <p>Baudrate: 19200 bps</p> <p>Parity: None</p> <p>Stop bits: 1</p> <p>Silent Interval: 100 millisecond(s)</p> <p>LAN</p> <p>Function: Modbus TCP Master Modbus TCP Slave</p> </div> <div style="border: 1px solid black; padding: 5px; margin-top: 5px;"> <p>Other Setting</p> <p>Contract Capacity</p> <p>Function Status: Disable</p> <p>Demand Interval</p> <p>Calculation Interval: Every 15 minutes</p> <p>Carbon Footprint</p> <p>Factor: 0.612</p> </div> <div style="border: 1px solid black; padding: 5px; margin-top: 5px;"> <p>Firmware Update Setting</p> <p>Firmware Information</p> <p>Current Version: 2.1.2</p> <p>Available Version: <input type="button" value="Check"/></p> <p>Firmware Update</p> <p>Firmware: <input type="text"/> <input type="button" value="Browse..."/></p> <p><input type="button" value="Update"/></p> </div>
---	--

Figure6-32 : Firmware Update(1)

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

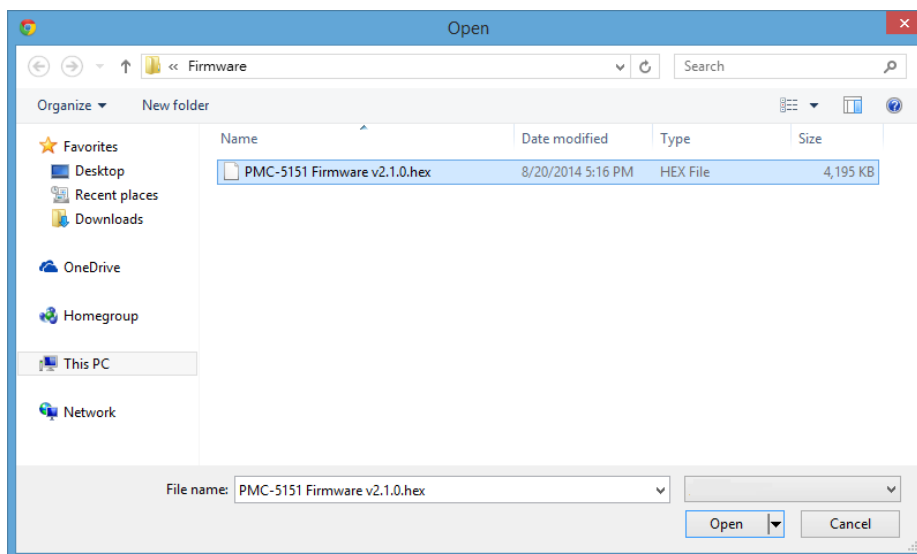


Figure6-33 : Firmware Update(2)

- iv. Click “Update” to update the firmware.

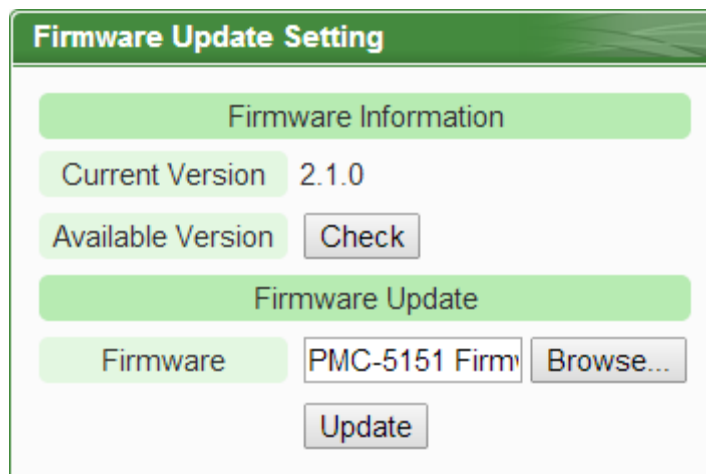


Figure6-34 : Firmware Update(3)

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

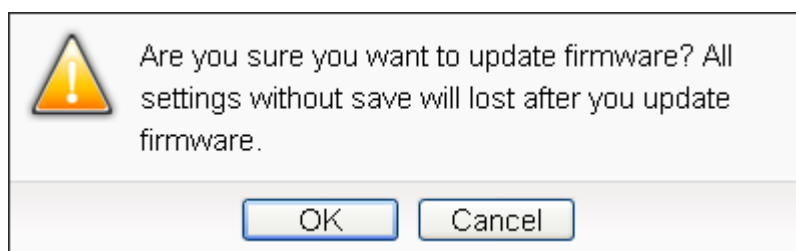


Figure6-35 : Firmware Update(4)

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.

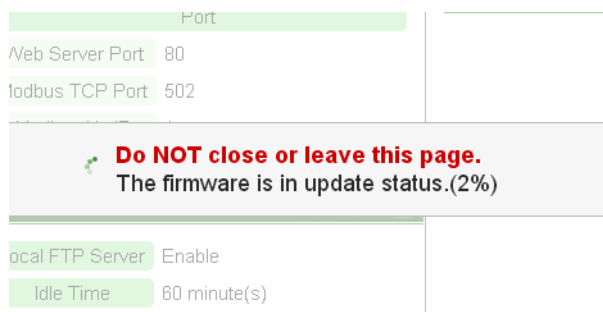


Figure6-36 : Firmware Update(5)

- 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.

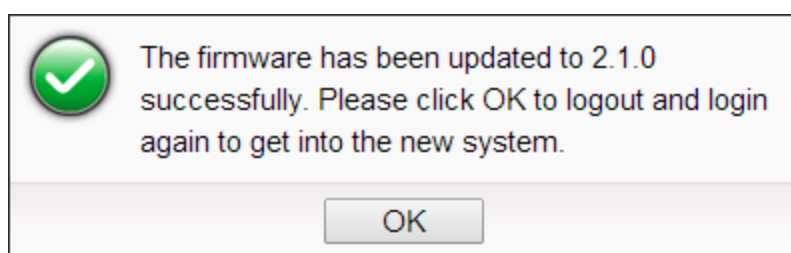


Figure6-37 : Firmware Update(6)

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.

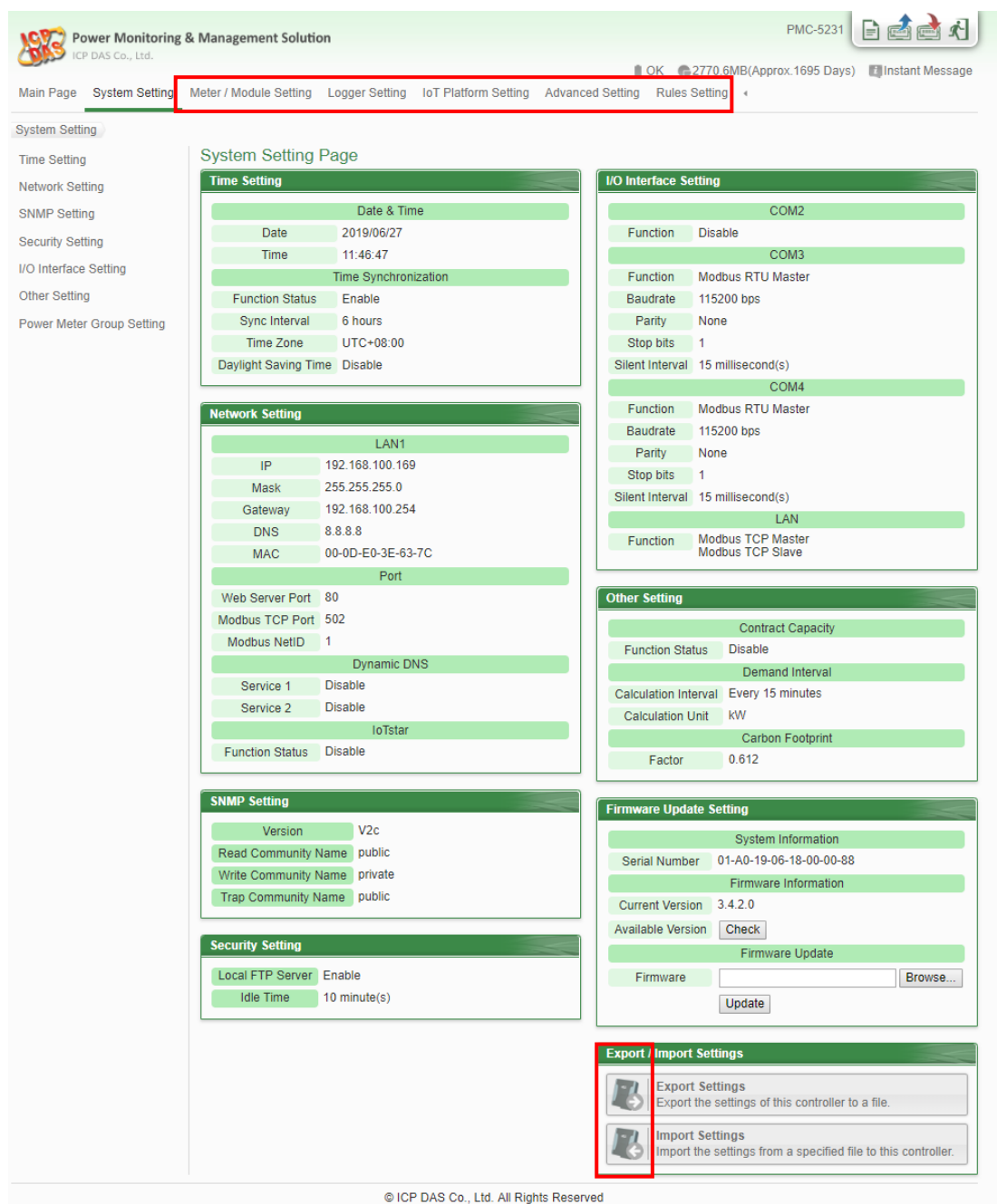


Figure6-38 : Export / Import Setting page and the settings to be backed up

- 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:

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.

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:

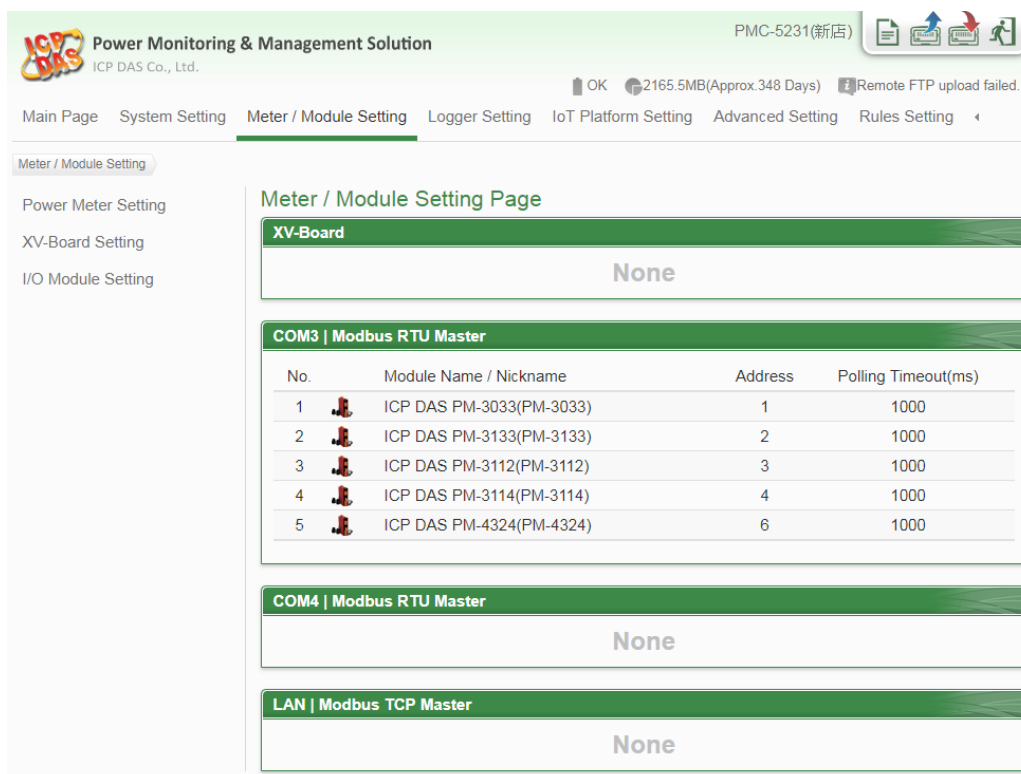


Figure7-1 : Meter / Module Setting Page

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

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:

No.	Address	*Power Meter	Nickname
1	1	ICP DAS PM-3033	PM-3033
2	2	ICP DAS PM-3133	PM-3133
3	3	ICP DAS PM-3112	PM-3112
4	4	ICP DAS PM-3114	PM-3114
5	6	ICP DAS PM-4324	PM-4324

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.

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.

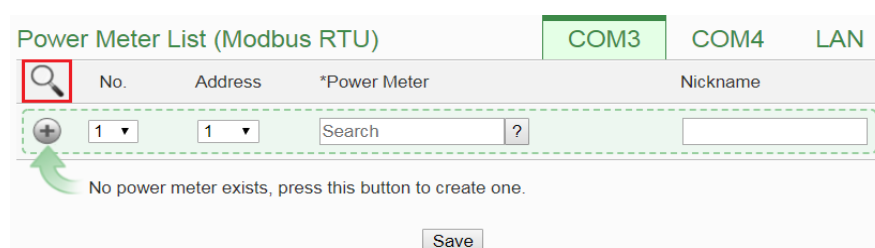


Figure7-3 : The “Scan” button to search Power Meter

- 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”.

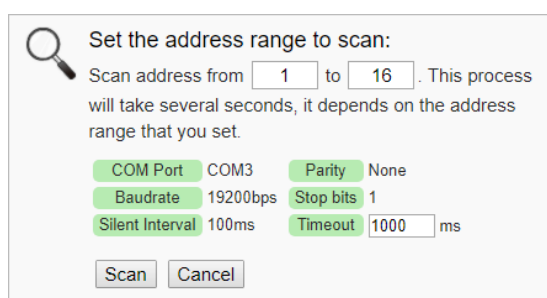


Figure7-4 : Set up the Scanning Range for the Power Meters

- 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.

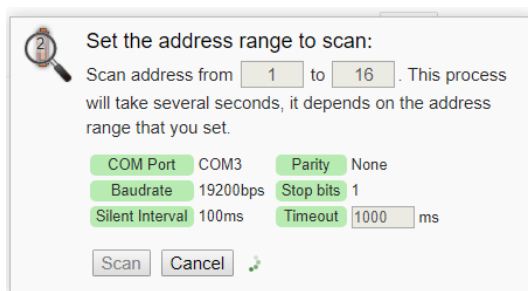


Figure7-5 : Scanning the Power Meters

v After the Scan operation is completed, a Power Meter List will appear (Figure 7-6). If the newly scanned 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.

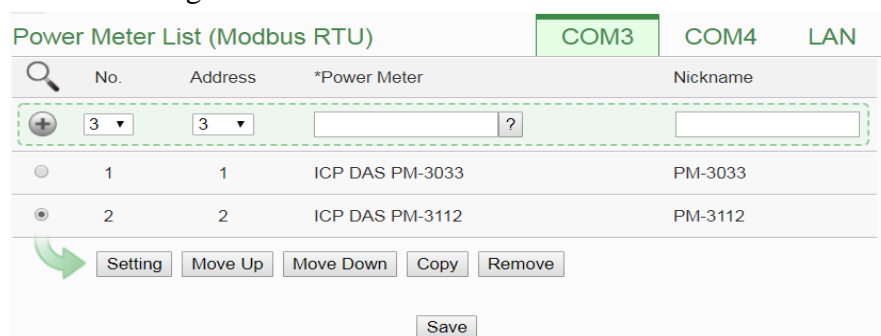


Figure7-6 : The Power Meter List after Scan operation

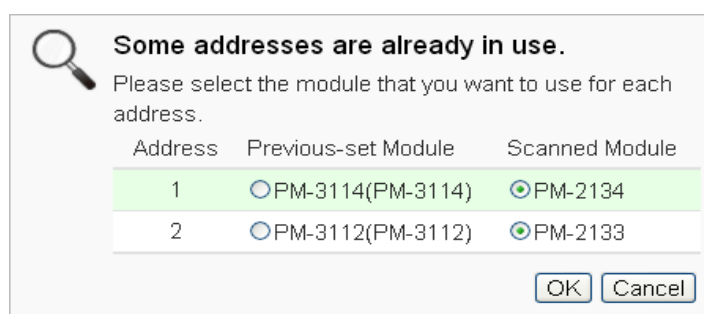


Figure7-7 : Select the actual Power Meter connected to PMC/PMD

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:

- 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.

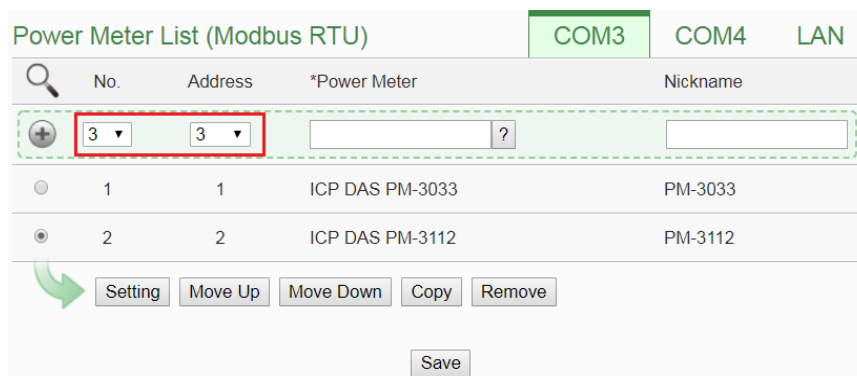


Figure7-8 : Set up the No and Address of the power meter

- iii Select the Power meter model:

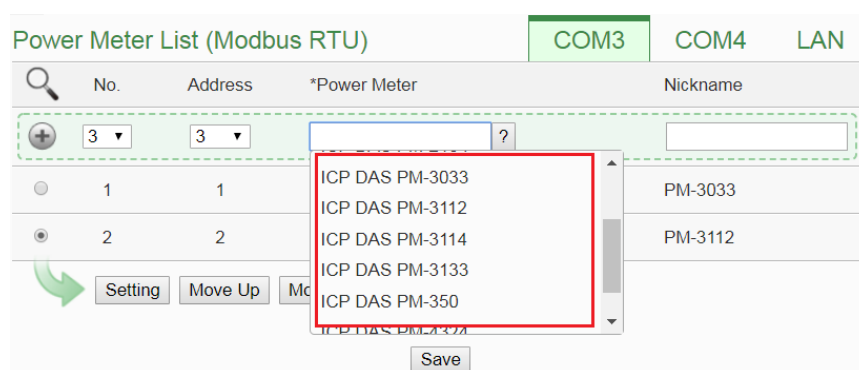



Figure7-9 : Select Modbus RTU Power Meter model

- 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.

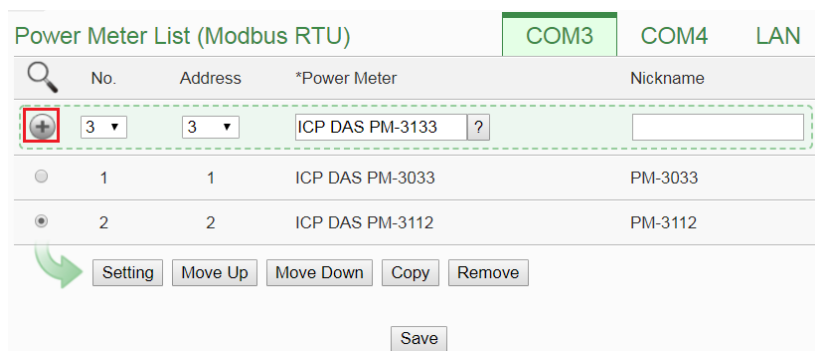


Figure7-10 : Add the Modbus RTU Power Meter manually

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.

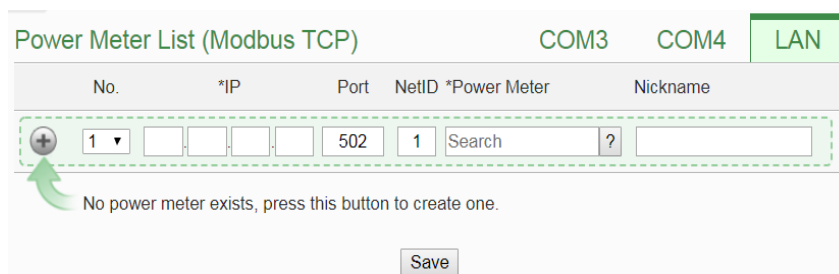


Figure7-11 : Add Modbus TCP Power Meter

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

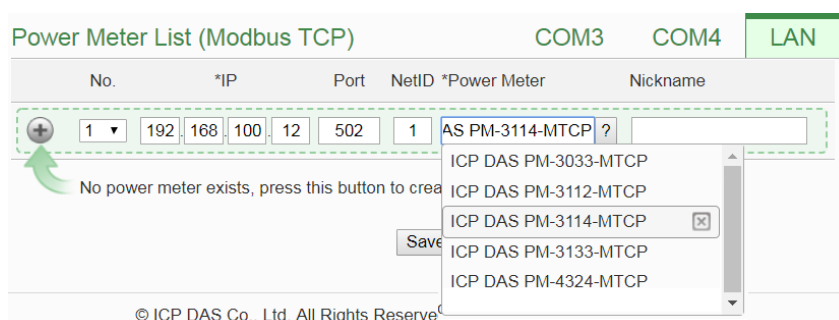



Figure7-12 : Select Modbus TCP Power Meter model

- 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.

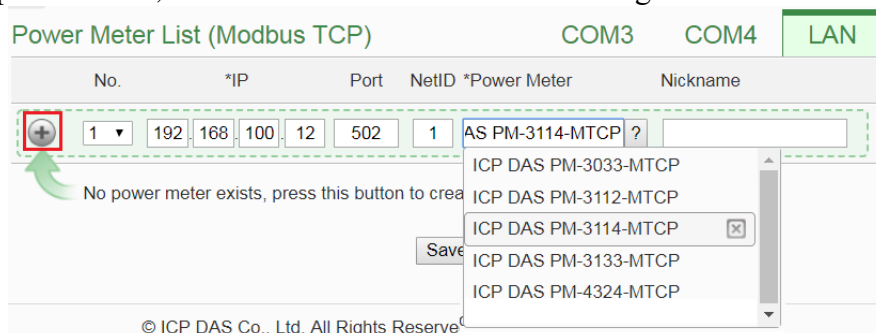


Figure7-13 : Add the Modbus TCP Power Meter manually

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:

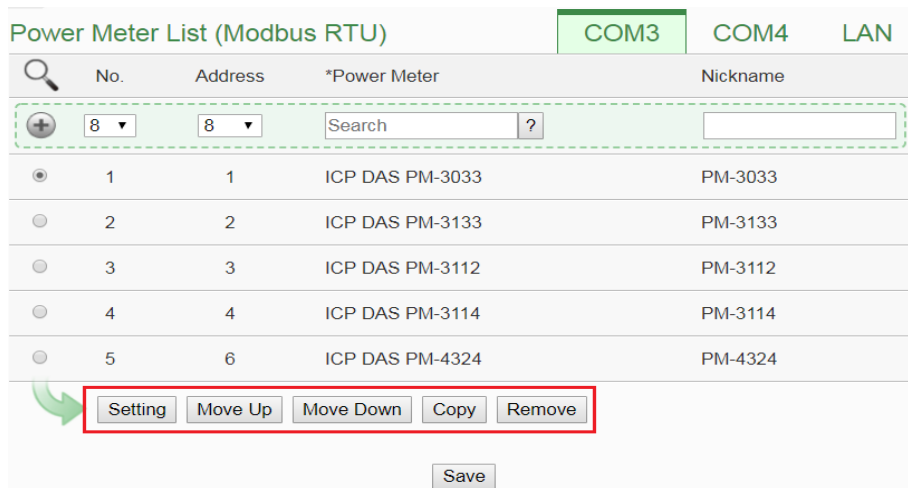


Figure7-14 : Power Meter List Interface

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

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):

Power Meter PM-3133 Setting

*Nickname	PM-3133
Description	
Address	2
Scan Rate	5 second(s)
Polling Timeout	1000 millisecond(s)
Retry Interval	5 second(s)

Power Meter Setting

Main Power Meter Set as main power meter

Nickname

Phase A	
Phase B	
Phase C	

DO Attribute Other Attribute

Channel	Nickname	Power On Value
Ch.0		OFF
Ch.1		OFF

OK Cancel

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

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):

Power Meter PM-3114 Setting

*Nickname	<input type="text" value="PM-3114"/>
Description	<input type="text"/>
Address	<input type="text" value="1"/>
Scan Rate	<input type="text" value="5"/> second(s)
Polling Timeout	<input type="text" value="1000"/> millisecond(s)
Retry Interval	<input type="text" value="5"/> second(s)

Power Meter Setting

Main Power Meter Set as main power meter

Nickname

CT1	<input type="text"/>
CT2	<input type="text"/>
CT3	<input type="text"/>
CT4	<input type="text"/>

DO Attribute

Channel	Nickname	Power On Value
Ch.0	<input type="text"/>	<input type="text" value="OFF"/>
Ch.1	<input type="text"/>	<input type="text" value="OFF"/>

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.

- ◆ **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):

Power Meter PM-3114-MTCP Setting

*Nickname	PM-3114-MTCP		
Description			
IP	192	168	100 . 55
Port	502		
NetID	1		
Scan Rate	5	second(s)	
Polling Timeout	1000	millisecond(s)	
Retry Interval	5	second(s)	

Power Meter Setting

Main Power Meter Set as main power meter

Nickname	CT1	
	CT2	
	CT3	
	CT4	

DO Attribute

Channel	Nickname	Power On Value
Ch.0		OFF ▾
Ch.1		OFF ▾

Figure7-17 : PM-3114-MTCP 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.
- **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/

CT3/ CT4.

● DO Attribute :

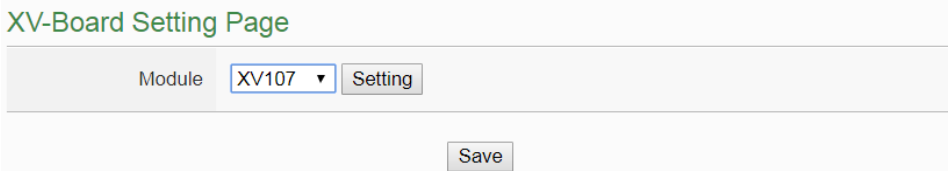
- ◆ Nickname : For user to define nicknames for each DO channel, this nickname will be displayed on the “Power Meter Information” and “Rule Setting” pages.
- ◆ Power On Value: Set up the initial value for the DO channels when the power meter is powered on.

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

7.2 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.



The screenshot shows a web interface for setting an XV-Board. At the top, the title 'XV-Board Setting Page' is displayed in green. Below the title, there is a horizontal bar containing a 'Module' dropdown menu with 'XV107' selected and a 'Setting' button. Below this bar, there is a 'Save' button centered on the page.

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):

Module XV107 Setting

Nickname

Description

DI Attribute DO Attribute

Channel	Nickname	Counter Type
Ch.0	<input type="text"/>	Falling ▾
Ch.1	<input type="text"/>	Falling ▾
Ch.2	<input type="text"/>	Falling ▾
Ch.3	<input type="text"/>	Falling ▾
Ch.4	<input type="text"/>	Falling ▾
Ch.5	<input type="text"/>	Falling ▾
Ch.6	<input type="text"/>	Falling ▾
Ch.7	<input type="text"/>	Falling ▾

OK Cancel

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):

Module XV107 Setting

Nickname

Description

DI Attribute DO Attribute

Channel	Nickname	Power On Value	Advanced Function
Ch.0	<input type="text"/>	OFF ▾	Disable ▾
Ch.1	<input type="text"/>	OFF ▾	Disable ▾
Ch.2	<input type="text"/>	OFF ▾	Disable ▾
Ch.3	<input type="text"/>	OFF ▾	Disable ▾
Ch.4	<input type="text"/>	OFF ▾	Disable ▾
Ch.5	<input type="text"/>	OFF ▾	Disable ▾
Ch.6	<input type="text"/>	OFF ▾	Disable ▾
Ch.7	<input type="text"/>	OFF ▾	Disable ▾

OK Cancel

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.

- ◆ **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):

Module XV310 Setting

Nickname

Description

DI Attribute DO Attribute **AI Attribute** AO Attribute

Channel	Nickname	Type	Deadband	Scale
Ch.0	<input type="text"/>	-1 V ~ 1 V	<input type="text" value="0"/> (0 ~ 2 V)	Minimum: <input type="text" value="0"/> Maximum: <input type="text" value="0"/> Unit: <input type="text"/>
Ch.1	<input type="text"/>	-1 V ~ 1 V	<input type="text" value="0"/> (0 ~ 2 V)	Minimum: <input type="text" value="0"/> Maximum: <input type="text" value="0"/> Unit: <input type="text"/>
Ch.2	<input type="text"/>	-1 V ~ 1 V	<input type="text" value="0"/> (0 ~ 2 V)	Minimum: <input type="text" value="0"/> Maximum: <input type="text" value="0"/> Unit: <input type="text"/>
Ch.3	<input type="text"/>	-1 V ~ 1 V	<input type="text" value="0"/> (0 ~ 2 V)	Minimum: <input type="text" value="0"/> Maximum: <input type="text" value="0"/> Unit: <input type="text"/>

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.

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.

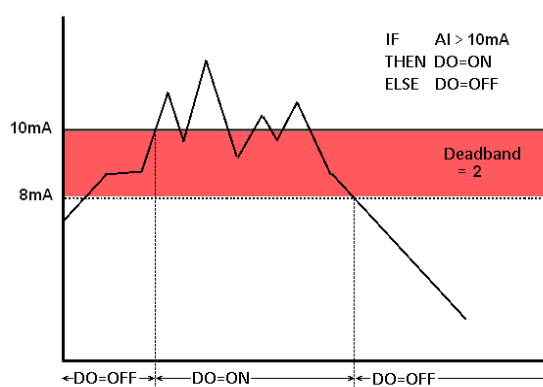


Figure7-22 : AI Deadband Operation(> or >= a numerical value)

(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

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.

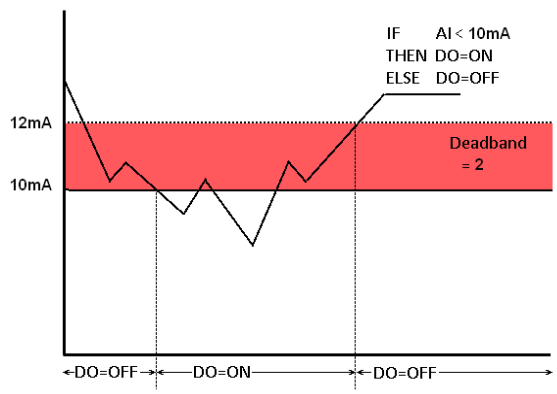


Figure7-23 : AI Deadband Operation(< or <= a numerical value)

(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.

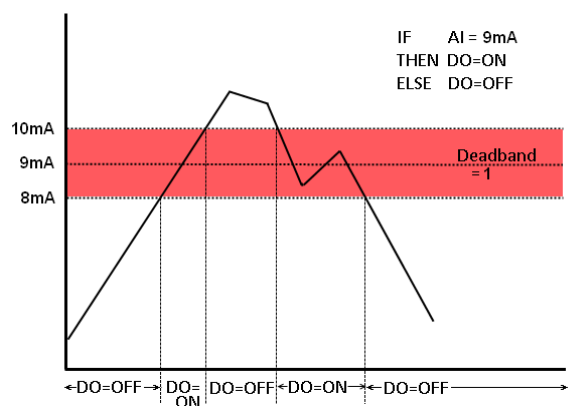


Figure7-24 : AI Deadband Operation(= a numerical value)

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):

Module XV310 Setting

Nickname

Description

DI Attribute DO Attribute AI Attribute **AO Attribute**

Channel	Nickname	Type	Power On Value
Ch.0	<input type="text"/>	0 V ~ 5 V ▾	<input type="text" value="0"/>
Ch.1	<input type="text"/>	0 V ~ 5 V ▾	<input type="text" value="0"/>

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.

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:

The screenshot shows the 'Modbus RTU Module List' configuration page. At the top, there are tabs for 'COM3', 'COM4', and 'LAN', with 'COM3' being the active tab. Below the tabs is a search bar and a table with the following columns: 'No.', 'Address', '*Module Name / Nickname', 'Polling Timeout(ms)', and 'Retry Interval(secs)'. The table contains two entries: one for 'M-7018R' at address 5 and one for 'User'defined' at address 7. Below the table are buttons for 'Setting', 'Move Up', 'Move Down', 'Copy', and 'Remove'. At the bottom center is a 'Save' button.

No.	Address	*Module Name / Nickname	Polling Timeout(ms)	Retry Interval(secs)
6	5	M-7018R	300	5
7	7	User'defined	300	5

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.

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.

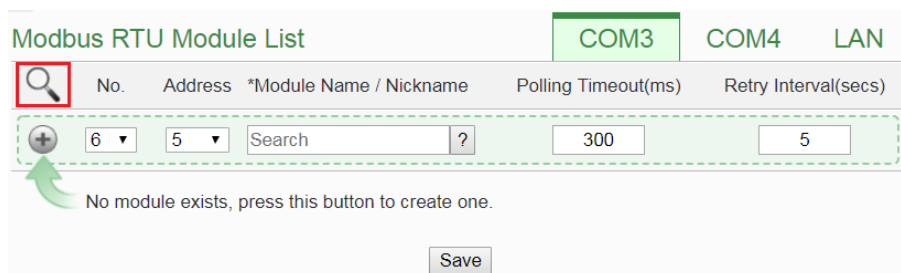


Figure7-27 : The “Scan” button to search M-7000/DL module

- 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”.

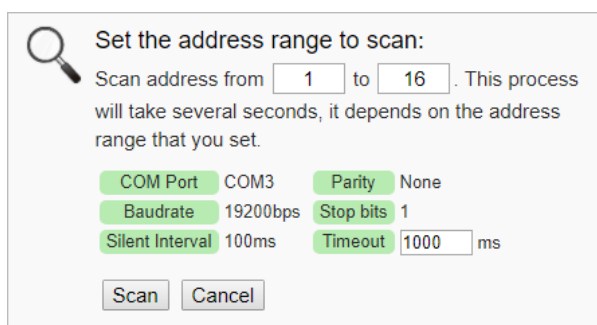


Figure7-28 : Set up the Scanning Range for the M-7000/DL module

- 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.

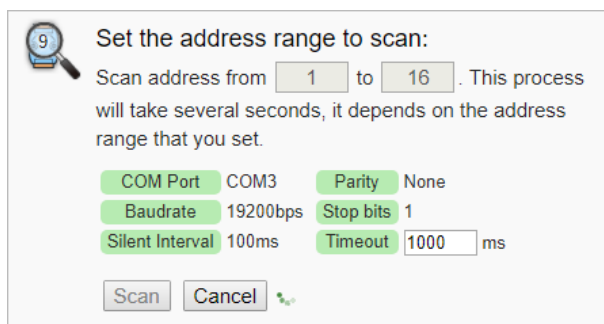


Figure7-29 : Scanning the M-7000/DL modules

iv After the Scan operation is completed, an M-7000/DL module list will appear (Figure 7-30). If the newly scanned 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.

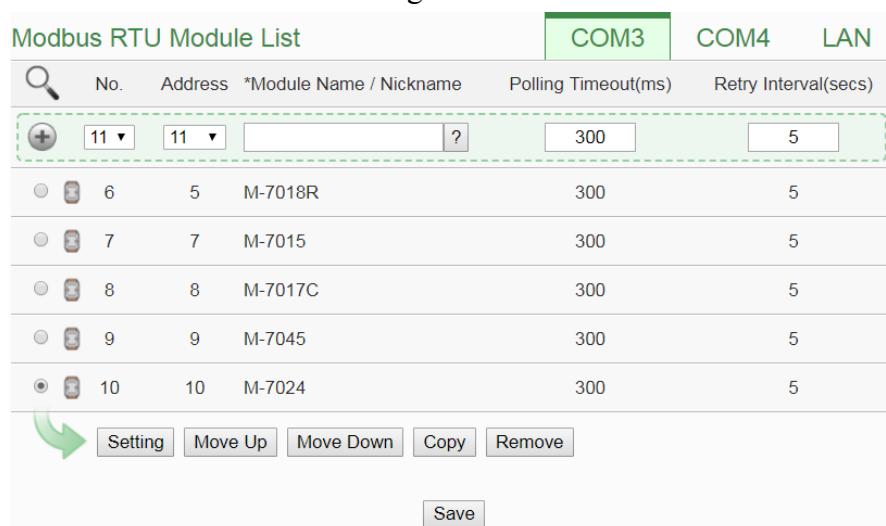


Figure7-30 : The M-7000/DL List after Scan operation

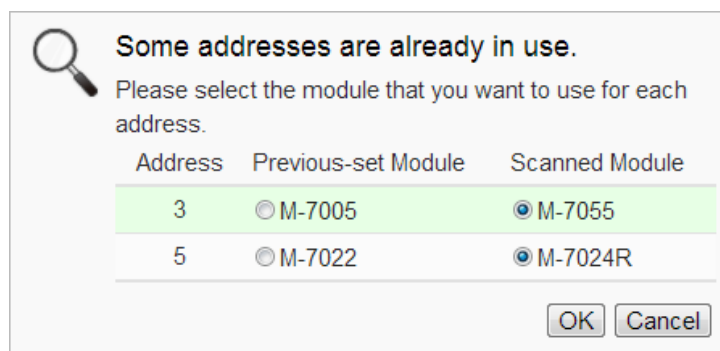


Figure7-31 : Select the actual M-7000/DL modules connected to PMC/PMD

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.

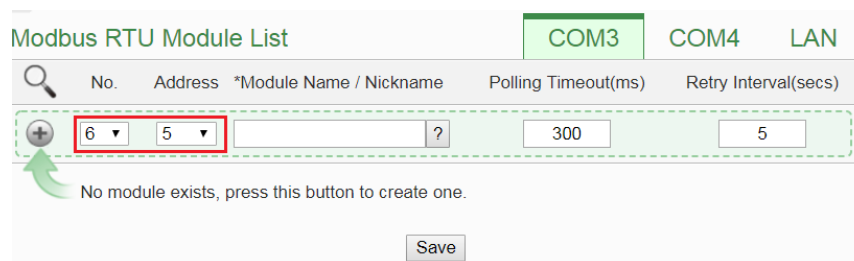


Figure7-32 : Set up the No and Address of the Modbus RTU module

- 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.

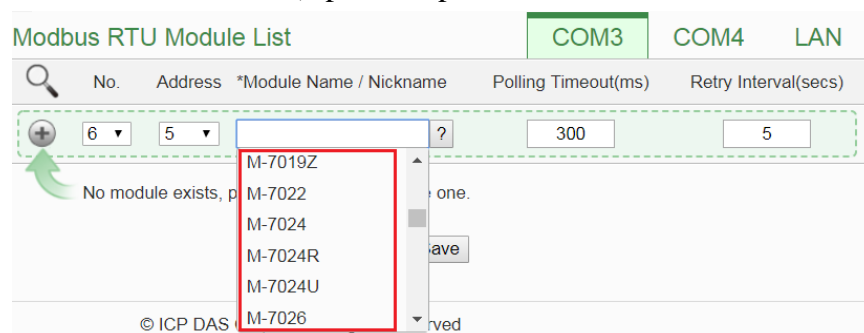



Figure7-33 : Select the model of the Modbus RTU Module

- 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.

- 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.

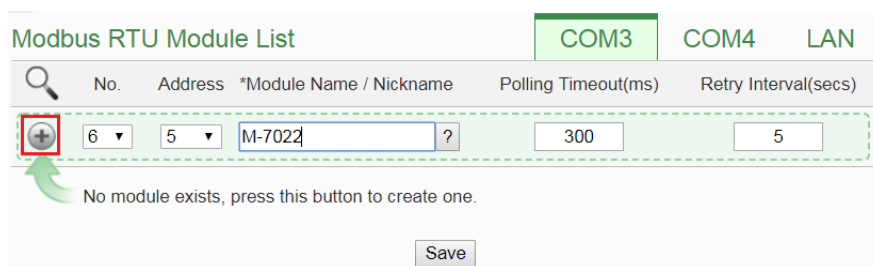


Figure7-34 : Add the Modbus RTU Module manually

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.

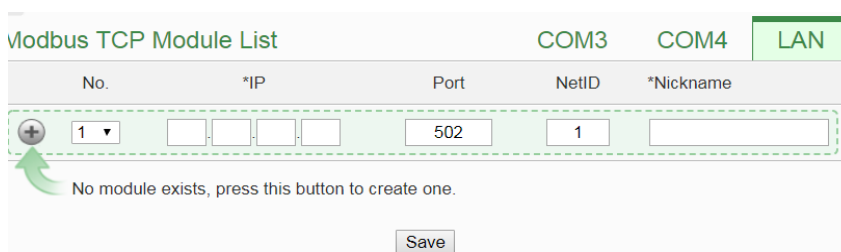



Figure7-35 : Add Modbus TCP Module

- 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.

No.	*IP	Port	NetID	*Nickname
1	192.168.100.11	502	1	TCP Device

No module exists, press this button to create one.

Save

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:

No.	Address	*Module Name / Nickname	Polling Timeout(ms)	Retry Interval(secs)
8	8	Search	300	5
6	5	M-7018R	300	5
7	7	User'defined	300	5

Setting Move Up Move Down Copy Remove

Save

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

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.

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)

Module M-7052 Setting

Nickname	<input type="text"/>
Description	<input type="text"/>
Address	1 <input type="button" value="v"/>
Scan Rate	0 second(s)
Polling Timeout	300 millisecond(s)
Retry Interval	5 second(s)

DI Attribute

Channel	Nickname	Reset counter when power on
Ch.0	<input type="text"/>	<input type="checkbox"/>
Ch.1	<input type="text"/>	<input type="checkbox"/>
Ch.2	<input type="text"/>	<input type="checkbox"/>
Ch.3	<input type="text"/>	<input type="checkbox"/>
Ch.4	<input type="text"/>	<input type="checkbox"/>
Ch.5	<input type="text"/>	<input type="checkbox"/>
Ch.6	<input type="text"/>	<input type="checkbox"/>
Ch.7	<input type="text"/>	<input type="checkbox"/>

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.

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)

Module M-7060 Setting

Nickname	<input type="text"/>
Description	<input type="text"/>
Address	1
Scan Rate	0 second(s)
Polling Timeout	300 millisecond(s)
Retry Interval	5 second(s)

DI Attribute **DO Attribute**

Channel	Nickname	Advanced Function
Ch.0	<input type="text"/>	Disable
Ch.1	<input type="text"/>	Disable
Ch.2	<input type="text"/>	Disable
Ch.3	<input type="text"/>	Disable

OK Cancel

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,

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)

Module M-7018 Setting

Nickname

Description

Address

Scan Rate second(s)

Polling Timeout millisecond(s)

Retry Interval second(s)

Temperature Unit Celsius(°C) Fahrenheit(°F)

AI Attribute

Channel	Nickname	Type	Deadband	Scale
Ch.0	<input type="text"/>	-15 mV ~ 15 mV	<input type="text" value="0"/> (0 ~ 30 mV)	Minimum: <input type="text" value="0"/> Maximum: <input type="text" value="0"/>
Ch.1	<input type="text"/>	-15 mV ~ 15 mV	<input type="text" value="0"/> (0 ~ 30 mV)	Minimum: <input type="text" value="0"/> Maximum: <input type="text" value="0"/>
Ch.2	<input type="text"/>	-15 mV ~ 15 mV	<input type="text" value="0"/> (0 ~ 30 mV)	Minimum: <input type="text" value="0"/> Maximum: <input type="text" value="0"/>
Ch.3	<input type="text"/>	-15 mV ~ 15 mV	<input type="text" value="0"/> (0 ~ 30 mV)	Minimum: <input type="text" value="0"/> Maximum: <input type="text" value="0"/>
Ch.4	<input type="text"/>	-15 mV ~ 15 mV	<input type="text" value="0"/> (0 ~ 30 mV)	Minimum: <input type="text" value="0"/> Maximum: <input type="text" value="0"/>
Ch.5	<input type="text"/>	-15 mV ~ 15 mV	<input type="text" value="0"/> (0 ~ 30 mV)	Minimum: <input type="text" value="0"/> Maximum: <input type="text" value="0"/>
Ch.6	<input type="text"/>	-15 mV ~ 15 mV	<input type="text" value="0"/> (0 ~ 30 mV)	Minimum: <input type="text" value="0"/> Maximum: <input type="text" value="0"/>
Ch.7	<input type="text"/>	-15 mV ~ 15 mV	<input type="text" value="0"/> (0 ~ 30 mV)	Minimum: <input type="text" value="0"/> Maximum: <input type="text" value="0"/>

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.

- 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)

Module M-7024 Setting

Nickname	<input type="text"/>
Description	<input type="text"/>
Address	1
Scan Rate	0 second(s)
Polling Timeout	300 millisecond(s)
Retry Interval	5 second(s)

AO Attribute

Channel	Nickname	Type
Ch.0	<input type="text"/>	0V ~ 5V
Ch.1	<input type="text"/>	0V ~ 5V
Ch.2	<input type="text"/>	0V ~ 5V
Ch.3	<input type="text"/>	0V ~ 5V

OK Cancel

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

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:

Module I/O Module Setting

*Nickname	I/O Module
Description	
Address	1
Scan Rate	0 second(s)
Polling Timeout	300 millisecond(s)
Retry Interval	5 second(s)

Modbus Mapping Table Setting

Data Model	Coil Output (0x)
Start Address	0
Data Number	1

Modbus Mapping Table **Address Setting** **Nickname Setting**

Local Address	Coil Output (0x)	Discrete Input (1x)	Input Register (3x)	Holding Register (4x)
No mapping table configuration				

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

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:

Modbus Mapping Table Setting

Data Model	Coil Output (0x)
Start Address	0
Data Number	1

Modbus Mapping Table

Local Address	Coil Output (0x)	Discrete Input (1x)	Input Register (3x)	Holding Register (4x)
No mapping table configuration				

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)".

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 starting 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.

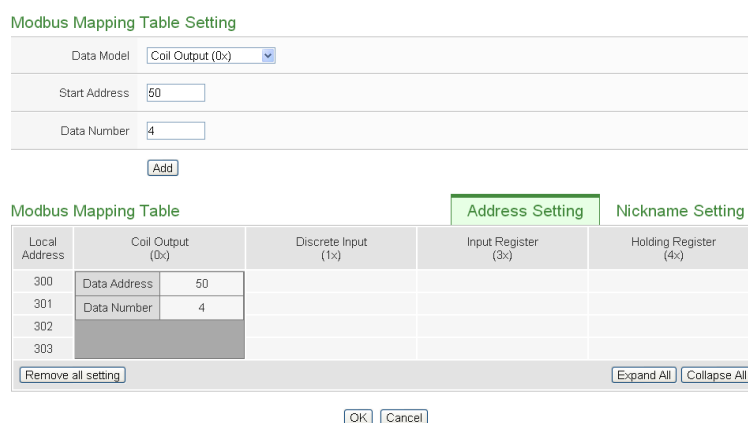


Figure7-44 : Coil Output Setting Example for Modbus RTU Module

- ◆ 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.

Modbus Mapping Table

Address Setting Nickname Setting

Local Address	Coil Output (0x)	Discrete Input (1x)	Input Register (3x)	Holding Register (4x)
300	<input type="button" value="OK"/> <input type="button" value="Remove"/> Data Address: <input type="text" value="50"/> Data Number: <input type="text" value="4"/>			
301				
302				
303				

- ◆ 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.

Modbus Mapping Table

Address Setting Nickname Setting

Local Address	Coil Output (0x)	Discrete Input (1x)	Input Register (3x)	Holding Register (4x)
300	<input type="button" value="OK"/> Data Address: 0050 Nickname: <input type="text"/>			
301	Data Address: 0051 Nickname:			
302	Data Address: 0052 Nickname:			
303	Data Address: 0053 Nickname:			

- ◆ 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:

Modbus Mapping Table Setting

Data Model:

Start Address:

Data Number:

Modbus Mapping Table

Address Setting Nickname Setting

Local Address	Coil Output (0x)	Discrete Input (1x)	Input Register (3x)	Holding Register (4x)
No mapping table configuration				

Figure7-45 : Discrete Input Setting Page

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 starting 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.

Modbus Mapping Table Setting

Data Model	Discrete Input (1x)
Start Address	20
Data Number	6

Add

Modbus Mapping Table

Local Address	Coil Output (0x)	Discrete Input (1x)		Input Register (3x)	Holding Register (4x)
		Data Address	Data Number		
300		20			
301		6			
302					
303					
304					
305					

Remove all setting Expand All Collapse All

OK Cancel

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

- ◆ 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.

Modbus Mapping Table Address Setting Nickname Setting

Local Address	Coil Output (0x)	Discrete Input		Input Register (3x)	Holding Register (4x)
		OK	Remove		
300		Data Address	20		
301		Data Number	6		
302					
303					
304					
305					

Remove all setting Expand All Collapse All

- ◆ 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.

Modbus Mapping Table Address Setting Nickname Setting

Local Address	Coil Output (0x)	Discrete Input (1x)		Input Register (3x)	Holding Register (4x)
		OK			
300		Data Address	0020		
		Nickname			
301		Data Address	0021		
		Nickname			
302		Data Address	0022		
		Nickname			
303		Data Address	0023		
		Nickname			
304		Data Address	0024		
		Nickname			
305		Data Address	0025		
		Nickname			

- ◆ 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:

Modbus Mapping Table Setting

Data Model	Input Register (3x)
Start Address	0
Data Number	1
Type	16-bit Signed Integer

Modbus Mapping Table **Address Setting** **Nickname Setting**

Local Address	Coil Output (0x)	Discrete Input (1x)	Input Register (3x)	Holding Register (4x)
No mapping table configuration				

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.

Modbus Mapping Table Setting

Data Model	Input Register (3x)
Start Address	0
Data Number	1
Type	16-bit HEX
HEX Type	HEX Minimum: 0000 ~ Maximum: 0000 Real Minimum: 0 ~ Maximum: 0

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.

Type Inverse(Big Endian)

- ◆ 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 starting 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.

Modbus Mapping Table

Local Address	Coil Output (0x)	Discrete Input (1x)	Input Register (3x)		Holding Register (4x)
			Data Address	Data Number	
300			10	3	
301					
302					
303					
304					
305					

Figure7-48 : 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. 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:

$$\textit{Transformed Value} = \textit{Scale Ratio} \times \textit{Input Register value} + \textit{Offset}$$

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.

The screenshot shows a 'Modbus Mapping Table' with two tabs: 'Address Setting' (selected) and 'Nickname Setting'. The table has columns for 'Local Address', 'Coil Output (0x)', 'Discrete Input (1x)', 'Input Register', and 'Holding Register (4x)'. The 'Input Register' column is expanded to show settings for address 300: Data Address (10), Data Number (3), Type (32-bit Floating Point), Inverse(Big Endian) (unchecked), Scale Ratio (1), Offset (0), and Deadband (0). At the bottom, there are buttons for 'Remove All Setting', 'Expand All', 'Collapse All', 'OK', and 'Cancel'.

- ◆ 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.

Modbus Mapping Table			Address Setting		Nickname Setting
Local Address	Coil Output (0x)	Discrete Input (1x)	Input Register (3x)		Holding Register (4x)
300			Data Address	0010	
301			Nickname		
			Unit		
302			Data Address	0012	
303			Nickname		
			Unit		
304			Data Address	0014	
305			Nickname		
			Unit		

◆ 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:

Modbus Mapping Table Setting

Data Model:

Start Address:

Data Number:

Type:

Modbus Mapping Table

Modbus Mapping Table			Address Setting		Nickname Setting
Local Address	Coil Output (0x)	Discrete Input (1x)	Input Register (3x)		Holding Register (4x)
No mapping table configuration					

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

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.

Modbus Mapping Table Setting

Data Model	Holding Register (4x)	
Start Address	0	
Data Number	1	
Type	16-bit HEX	
HEX Type	HEX	Minimum: 0000 ~ Maximum: 0000
	Real	Minimum: 0 ~ Maximum: 0
<input type="button" value="Add"/>		

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.

Type Inverse(Big Endian)

- ◆ 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 starting 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.

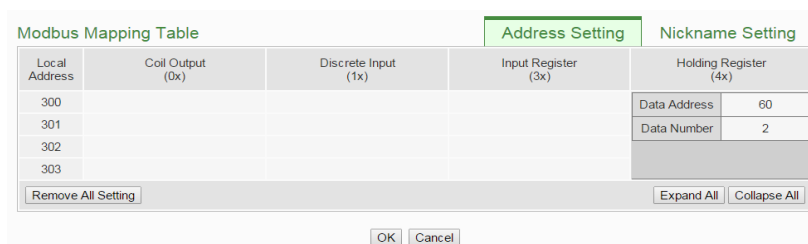
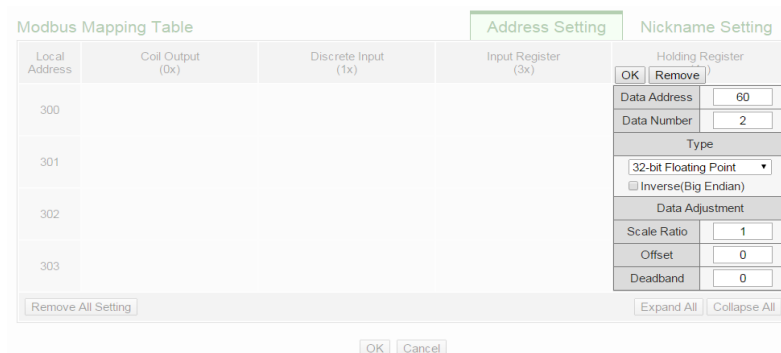


Figure7-50 : Input Register Setting Example for Modbus RTU Module

- ◆ 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

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:

Module Module-TCP Setting

*Nickname	<input type="text" value="Module-TCP"/>
Description	<input type="text"/>
*IP	<input type="text" value="192"/> <input type="text" value="168"/> <input type="text" value="100"/> <input type="text" value="51"/>
Port	<input type="text" value="502"/>
NetID	<input type="text" value="1"/>
Scan Rate	<input type="text" value="0"/> second(s)
Polling Timeout	<input type="text" value="300"/> millisecond(s)
Retry Interval	<input type="text" value="5"/> second(s)

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

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.

Modbus Mapping Table Setting

Data Model	Coil Output (0x) ▼
Start Address	0
Data Number	1
Add	

Modbus Mapping Table

Modbus Mapping Table		Address Setting	Nickname Setting
Local Address	Coil Output (0x)	Discrete Input (1x)	Input Register (3x)
No mapping table configuration			

OK Cancel

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.

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:

The screenshot displays the 'Logger Setting Page' with the following configuration details:

Data Logger Setting	
Power Data Logger	
Function Status	Enable
Log Mode	Average
Column Header	Disable
Reports	Disable
I/O Data Logger	
Function Status	Disable
User-Defined Data Logger	
Function Status	Disable
Log Attribute	
Log Interval	5 minutes
File Name Format	YYYY-MM-DD.csv
End of Line Character	CRLF(Windows)

Event Logger Setting	
Log File Retention Time	12 month(s)

FTP Upload Setting	
FTP Upload Function	
Function Status	Disable

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.

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:

Power Data Logger Setting	
Function Status	<input checked="" type="checkbox"/> Enable
Log Mode	Average
Column Header	<input checked="" type="checkbox"/> Add
Reports	Disable

I/O Data Logger Setting	
Function Status	<input checked="" type="checkbox"/> Enable

User-Defined Data Logger Setting	
Function Status	<input checked="" type="checkbox"/> Enable
*Data Format	<div style="border: 1px solid #ccc; padding: 5px;">View Edit PM-3114 CT4 kWh</div>

Log Attribute Setting	
Log Interval	1 minute
File Name Format	YYYY-MM-DD.csv
End of Line Character	CRLF(Windows)

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

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.

User-Defined Data Logger Setting

Function Status Enable

View Edit

\$C3M3ri4352.

*Data Format

Interface COM3

Module PM-3112(3)

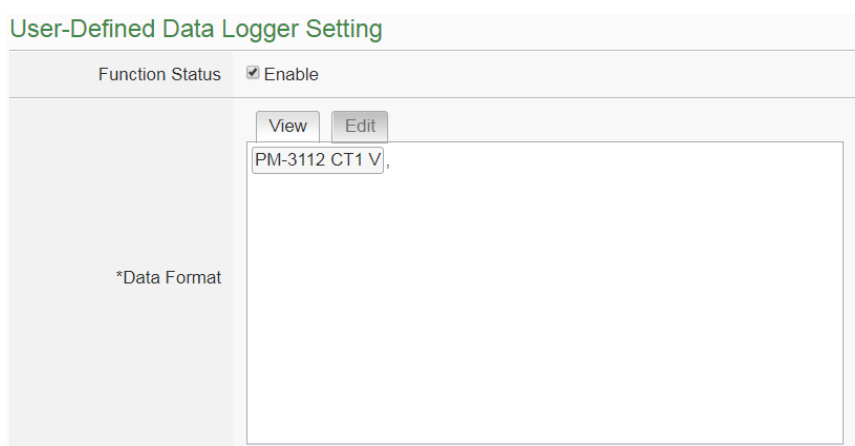
Channel CT1 Info.

V

Insert

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

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:

Event Logger Setting Page

Log File Retention Time	1	month(s)
-------------------------	---	----------

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 be 12 months.
- ii After all settings are completed, click “Save” button to save the changes.

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:

FTP Upload Setting Page

Function Status	<input checked="" type="checkbox"/> Enable
Remote FTP Server	*Address ftp:// <input type="text"/>
	Port <input type="text" value="21"/>
	*ID <input type="text"/>
	Password <input type="text"/>
	Path <input type="text"/>
Remote FTP Server Setting Test	<input type="button" value="Send"/>
Data Log Upload Function	<input type="checkbox"/> Upload Power Data Log <input type="checkbox"/> Upload I/O Data Log <input type="checkbox"/> Upload User-Defined Data Log
Event Log Upload Function	<input type="checkbox"/> Upload Event Log
<input type="button" value="Save"/>	

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

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.

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:

The screenshot shows the 'Report Sending Setting Page' with the 'Sending Settings' tab selected. The form contains the following fields and options:

- Select Email:** A dropdown menu showing 'Email 1'. Below it, a note states: 'You will need to set the "Advanced Setting > Email Setting" function to send the report by email.'
- Receiver Email Address:** A text input field that has been redacted with a black box.
- Compressed File:** A checkbox labeled 'Generate compressed file(.zip)' which is checked.
- Report Type:** Four checkboxes for 'Daily Report', 'Weekly Report', 'Monthly Report', and 'Annual Report', all of which are checked.
- Language:** A dropdown menu currently set to 'English'.
- Save:** A button located at the bottom center of the form.

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

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:

Report Sending Setting Page

Sending Settings Re-send Function

Select Email Email 1
You will need to set the "Advanced Setting > Email Setting" function to send the report by email.

Receiver Email Address [REDACTED]

Compressed File Generate compressed file(.zip)

Report Type Daily Report

Language English

Date 2019 / 12 / 31 Recorded Data File Range : (2019/2/12-2019/12/31)

Send

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.

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

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:

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**

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]**.

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

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]**].

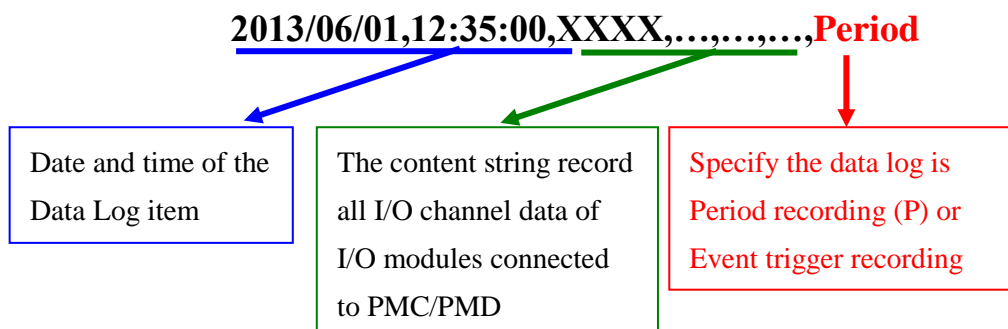
PM-4324(-MTCP)/PM-4324A(-MTCP) Monthly Report

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

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].

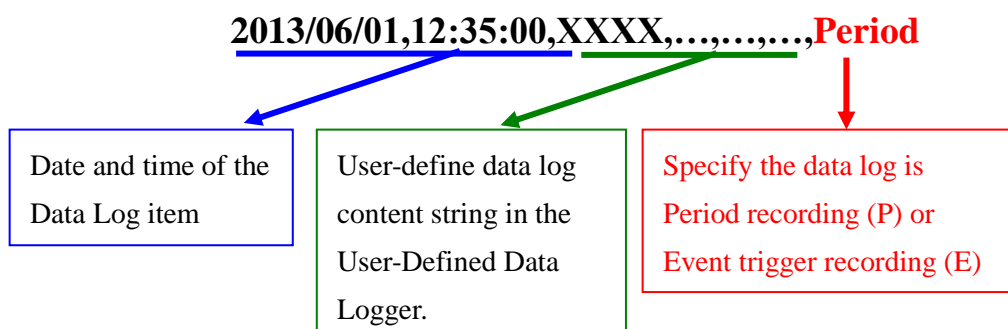
8.8 The Format of I/O Data File

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:



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 like Amazon CloudMQTT. 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, and Bot Service 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

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:

The screenshot shows the 'Microsoft Azure Setting Page' with the following details:

- Function Status:** Enable
- *SAS Token:** [Empty text box]
- Keep Alive Time:** 60 second(s)
- Periodical Publish Interval:** 5 second(s). Input 0 represent disable periodical publish.
- Connection Testing:**
- Publish & Subscribe Setting:**
- Message Table:**

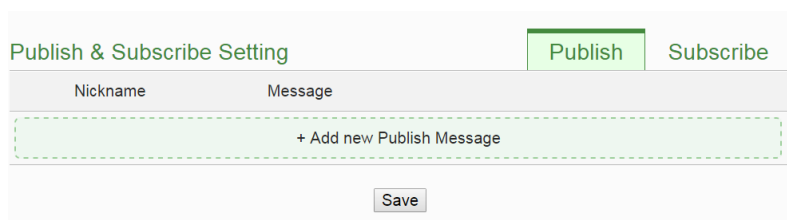
Nickname	Message
+ Add new Publish Message	
- Save:**

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.

- 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.

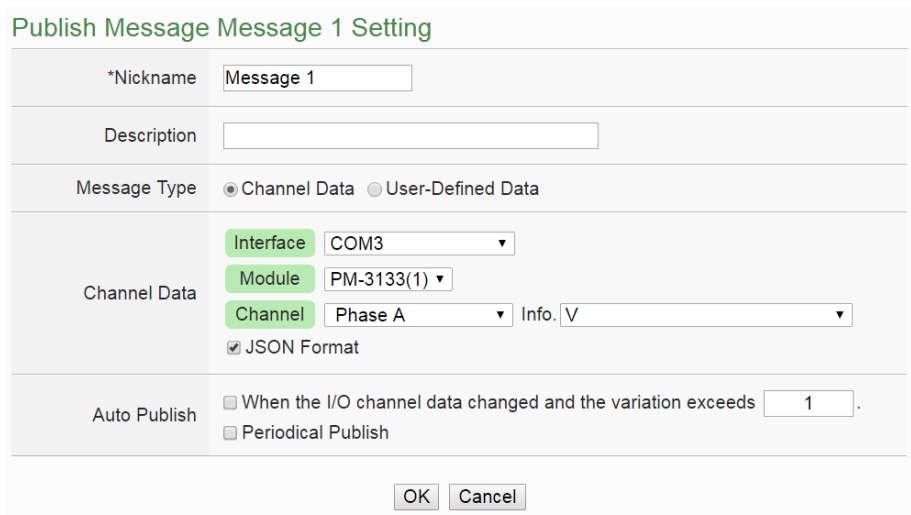


Figure9-2 : Microsoft Azure Publish Message setting page

- 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

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.

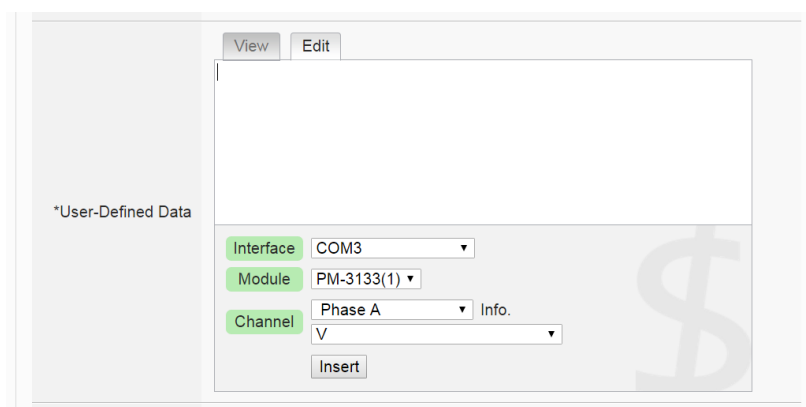


Figure9-3 : "User-Defined Data" Setting Interface of IoT Platform

- 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:

Publish & Subscribe Setting		Publish	Subscribe
Variable Name	Target	Remove	
	Action	Remove	
	Add		

Save

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.

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:

IBM Bluemix Setting Page

Function Status	<input checked="" type="checkbox"/> Enable
*Organization ID	<input type="text"/>
*Device Type	<input type="text"/>
*Device ID	<input type="text"/>
*Device Authentication Token	<input type="text"/>
Keep Alive Time	<input type="text" value="60"/> second(s)
Periodical Publish Interval	<input type="text" value="5"/> second(s) Input 0 represent disable periodical publish.
Connection Testing	<input type="text" value="Testing"/>

Publish & Subscribe Setting

Nickname	Message
+ Add new Publish Message	

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.

Organization ID	gnrqps
Device Type	pmc
Device ID	PMC1
Authentication Method	token
Authentication Token	3aloClw(M5f4eQg0hm

- 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

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.

- x 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:

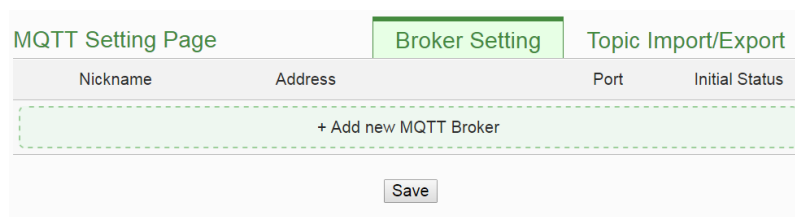


Figure9-7 : MQTT Setting Page (Broker)

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:

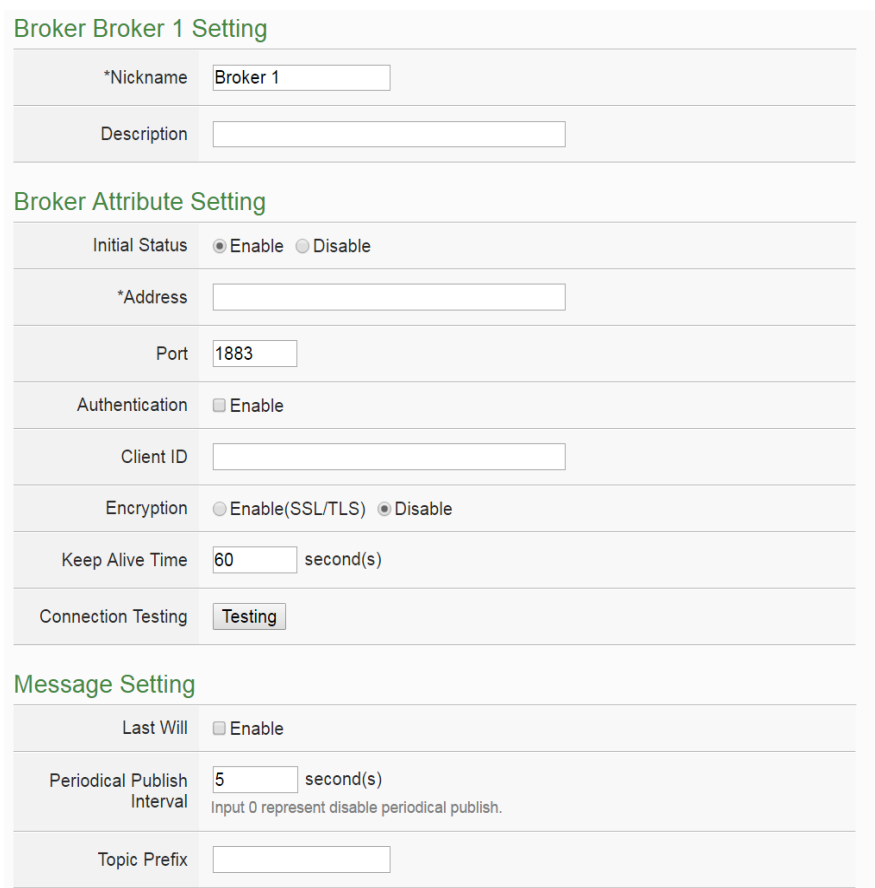


Figure9-8 : MQTT Broker Parameter setting page

- 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.

- 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.

- 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:

Publish Message Message 1 Setting

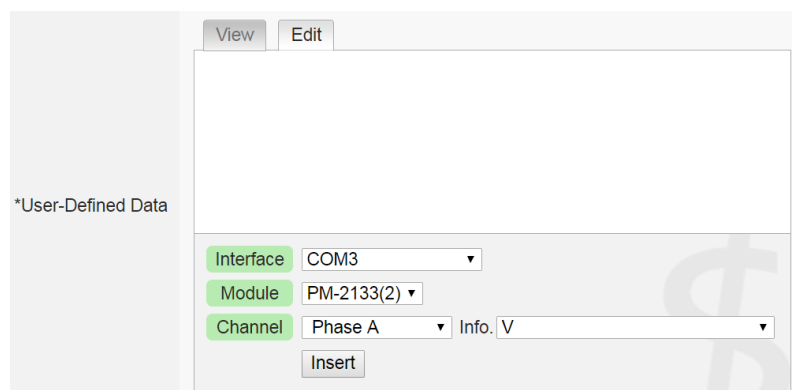
*Nickname	Message 1	
Description		
Message Type	<input checked="" type="radio"/> Channel Data <input type="radio"/> User-Defined Data	
Channel Data	Interface	COM3
	Module	PM-4324(4)
	Channel	Total / Average Info. kWh
	<input type="checkbox"/> JSON Format	
*Topic	com3/no4/submeter1/total_avg/kwh	<input type="checkbox"/> Use Prefix
QoS	<input checked="" type="radio"/> 0 <input type="radio"/> 1 <input type="radio"/> 2	
Retain	<input type="checkbox"/> Enable	
Auto Publish	<input type="checkbox"/> When the I/O channel data changed and the variation exceeds <input type="text" value="1"/>	
	<input type="checkbox"/> Periodical Publish	
<input type="button" value="OK"/> <input type="button" value="Cancel"/>		

Figure9-10 : Publish Message Setting Page

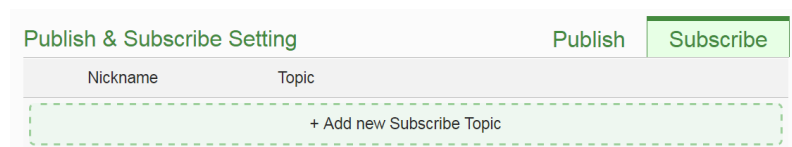
- xvii. Input a name in the “Nickname” field and you could also input the description of this Publish Message in the “Description” field.
- xviii. In the “Message Type” field, select the “Channel Data” to prepare a Publish Message with the power data or I/O channel value. Based on the “Channel Data” 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.



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.

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.

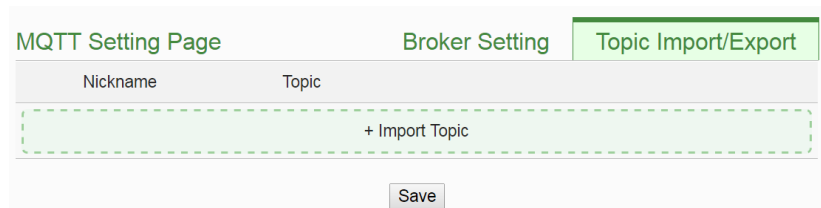


Figure9-12 : MQTT Topic Import/Export setting page

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:

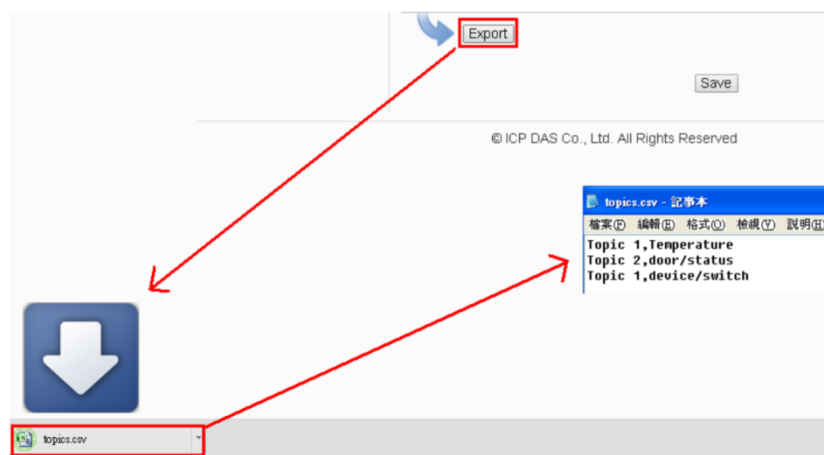


Figure9-13 : The Export of MQTT Topic

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.

Subscribe Topic Topic 1 Setting

*Nickname

Description

*Topic Use Prefix

Import

QoS 0 1 2

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:

Real-Time Data Sending Setting Page

Function Status Enable

Add Channel

Interface

Module

Channel Info.

Channel List

Channel	*Name
<input type="radio"/> COM3 PM-3112(1) CT1 V	<input type="text" value="COM3-N1-CT1-V"/>
<input type="radio"/> COM3 PM-3112(1) CT1 V	<input type="text" value="COM3-N1-CT1-V"/>
<input type="radio"/> COM3 PM-3133(3) Phase A V	<input type="text" value="COM3-N3-PHASEA-V"/>
<input checked="" type="radio"/> COM3 PM-4324(4) Submeter1 CT1 V	<input type="text" value="COM3-N4-SUB1-CT1-V"/>

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

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.

Channel List	
Channel	*Name
<input type="radio"/> COM3 PM-3112(1) CT1 V	<input type="text" value="COM3-N1-CT1-V"/>
<input type="radio"/> COM3 PM-3112(1) CT1 V	<input type="text" value="COM3-N1-CT1-V"/>
<input type="radio"/> COM3 PM-3133(3) Phase A V	<input type="text" value="COM3-N3-PHASEA-V"/>
<input checked="" type="radio"/> COM3 PM-4324(4) Submeter1 CT1 V	<input type="text" value="COM3-N4-SUB1-CT1-V"/>

- 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:

Historical Data Sending Setting Page

Function Status Enable

Sending Type Power Data
 I/O Channel Data

You need to enable the 'Data Logger' function to use this function.

Save

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 accounts 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:

Bot Service Message Setting Page

Nickname	Content
+ Add new message	

Save

Follow the steps below:

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

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

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
- 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:

Email Setting Page

	Nickname	Subject	Receiver
+ Add new email			
<input checked="" type="radio"/>	Google Test	Test Email	test@google.com.tw
<input type="radio"/>	Yahoo Test	Test Email	test@yahoo.com.tw

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:

Email Email 3 Setting

*Nickname	<input type="text" value="Email 3"/>
Description	<input type="text"/>

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:

SMTP Server Setting

*SMTP Server	<input checked="" type="radio"/> Specify an address of SMTP server <input type="radio"/> Google Gmail - smtp.gmail.com
Port	25
Authentication	<input checked="" type="checkbox"/> Enable <input type="checkbox"/> *ID: admin <input type="password"/> Password: <input type="checkbox"/> Security: SSL

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:

Email Address Setting

*Sender Name	Test
*Sender Email Address	Test@Yahoo.com
*Receiver Email Address	<input type="text" value="Test@google.com"/> <input type="button" value="Remove"/> <input type="button" value="Add"/>
Email Setting Test	<input type="button" value="Send"/>

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.

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.

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:

The screenshot shows the 'SMS Setting Page' with two tabs: 'SMS Alarm' (selected) and 'SMS Command'. Below the tabs is a 'PIN Code' input field. Underneath is the 'SMS Alarm List' section, which contains a table with the following structure:

Nickname	Phone Numbers	Message
+ Add new SMS alarm		
SMS Alarm 1	0958123456	Test message

Below the table, there are three buttons: 'Setting', 'Copy', and 'Remove'. A green arrow points to the 'Setting' button. At the bottom of the page, there is a 'Save' button.

Figure10-6 : SMS Setting Page (1)

Please follow the steps below:

- Make sure the “SMS Alarm” Tab is selected.
- In the PIN field, input the 4 digit SIM card PIN code. If the PIN code is not required, leave the field blank.
- Click “Add new SMS alarm”, the SMS Alarm Setting page will appear as follow:

SMS Alarm SMS Alarm 1 Setting

*Nickname	<input type="text" value="SMS Alarm 1"/>
Description	<input type="text"/>
*Phone Number	<input type="text" value="886987654321"/> <input type="button" value="Remove"/> <input type="button" value="Add"/>
*Message	<input type="checkbox"/> Multilingual Support(Unicode) <input type="button" value="View"/> <input type="button" value="Edit"/> Di 0 value :\$ <u>xd</u> 0 <input type="button" value="Source"/> XW-Board <input type="button" value="Module"/> XW310C <input type="button" value="Channel"/> DI Ch. 0 <input type="button" value="Insert"/>

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 to 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

- 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:

SMS Setting Page SMS Alarm **SMS Command**

PIN Code

SMS Command Function Disable Enable

*Authorized Phone Numbers

SMS Command List

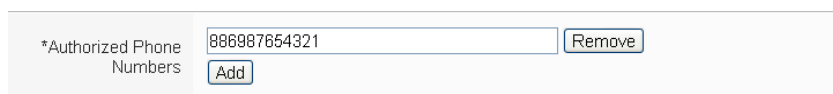
Command	Command String
+ Add new SMS command	
<input checked="" type="radio"/> status	GET:\$Xdi0

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

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”.



*Authorized Phone Numbers	<input type="text" value="886987654321"/>	<input type="button" value="Remove"/>
	<input type="button" value="Add"/>	

- 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.

SMS Command Setting

*Command: DATA

*Command String Editor

GET: \$Xdi0\$Xdi1\$Xdi2\$C2M3ri4352\$1

Source: Internal Register

No.: 1 (Internal Register 1)

OK Cancel

Figure10-9 : SMS Command Setting for GET Command

SMS Command Setting

*Command: AO

*Command String Editor

SET: \$Xao0/2.3

Source: XW-Board

Module: XW310C AO Ch. 0

Value: 2.3

OK Cancel

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.

SMS Command List

Command	Command String
+ Add new SMS command	
<input checked="" type="radio"/> DATA	GET:\$Xdi0,\$Xdi1,\$Xdi2,\$C3M2ri4410,\$1
<input type="radio"/> AO	SET:\$Xao0/2.3
<input type="radio"/> DO	SET:\$Xdo0/1

Setting Copy Remove

Save

Figure10-11 : SMS Command list

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.


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:

SNMP Trap Setting Page		
Nickname	Specific ID	Amount of Variable Bindings
<input type="text"/>	<input type="text" value="1"/>	-
<input type="radio"/> SNMP Trap 1	1	2
<input type="radio"/> Trap for Lighting	1	2
<input checked="" type="radio"/> Trap for Air Con.	1	2

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.

SNMP Trap SNMP Trap 1 Setting

*Nickname:

Description:

Specific ID:

SNMP Trap Variable Binding List

Content	Format
+ Add new variable bindings	

Figure10-13 : SNMP Trap Parameter Setting Page

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

- 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:

The screenshot shows the 'SNMP Trap Variable Binding Setting Page' with the 'Channel Data' type selected. The 'Type' section has radio buttons for 'Channel Data' (selected) and 'User-Defined Data'. The 'Channel Data' section contains three dropdown menus: 'Source' set to 'COM2', 'Module' set to 'PM-3114(1)', and 'Channel' set to 'Loop 1'. To the right of the 'Channel' dropdown is an 'Info.' field with a value of 'V'. The 'Format' section has a dropdown menu set to 'Opaque(Float)'. At the bottom are 'OK' and 'Cancel' buttons.

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.

SNMP Trap Variable Binding List

Content	Format
+ Add new variable bindings	
<input checked="" type="radio"/> PM-3114 Loop 1 V	Opaque(Float)
<input type="radio"/> PM-3114 Loop 1 kW	Opaque(Float)

Setting Copy Remove

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:

SNMP Trap Variable Binding Setting Page

Type Channel Data User-Defined Data

View Edit

*User-Defined Data

Source COM2

Module PM-3114(1)

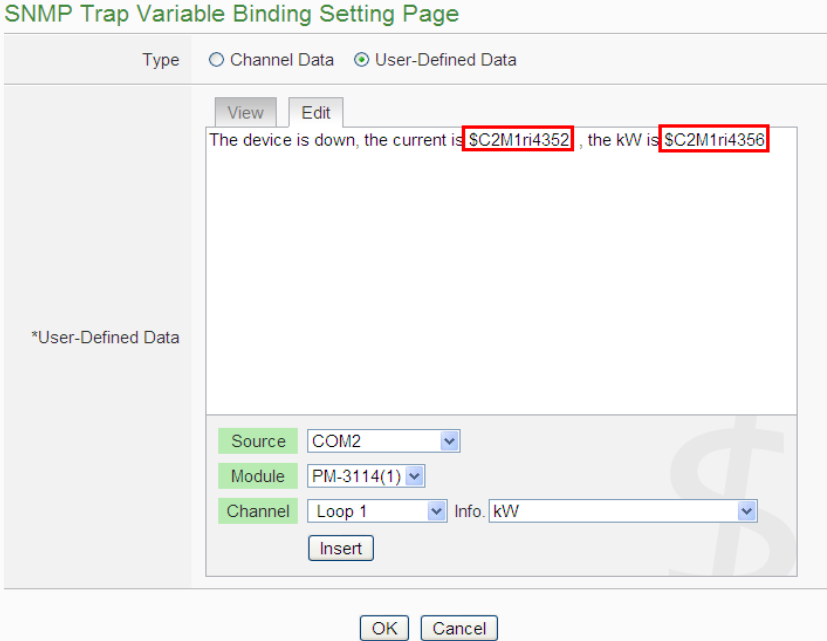
Channel Loop 1 Info. V

Insert

OK Cancel

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.



The image shows a web-based configuration interface titled "SNMP Trap Variable Binding Setting Page". At the top, there are two radio buttons for "Type": "Channel Data" (unselected) and "User-Defined Data" (selected). Below this, there are two tabs: "View" and "Edit", with "Edit" being the active tab. The main content area is a text field containing the message: "The device is down, the current is \$C2M1ri4352, the kW is \$C2M1ri4356". The encoded strings "\$C2M1ri4352" and "\$C2M1ri4356" are highlighted with red boxes. Below the text field, there are three dropdown menus: "Source" (set to "COM2"), "Module" (set to "PM-3114(1)"), and "Channel" (set to "Loop 1"). To the right of the "Channel" dropdown is a text input field containing "Info. kW". Below these dropdowns is an "Insert" button. At the bottom of the interface are "OK" and "Cancel" buttons.

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).

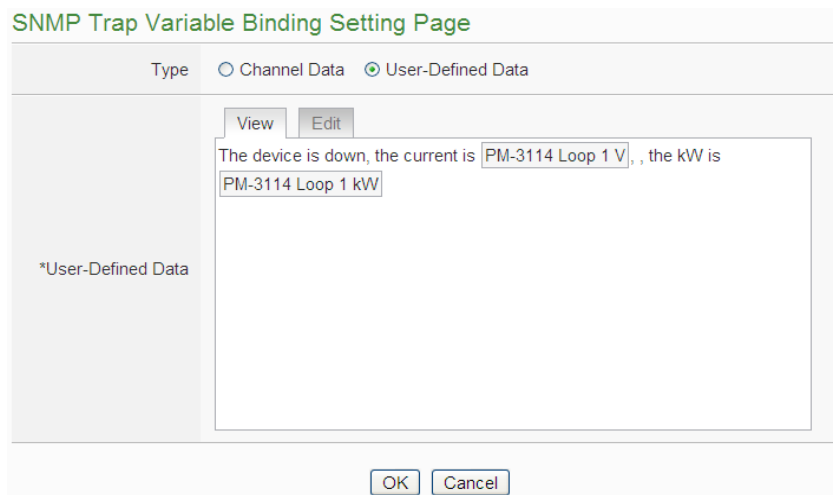


Figure10-18 : “User-Defined Data” Interface in View Mode

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

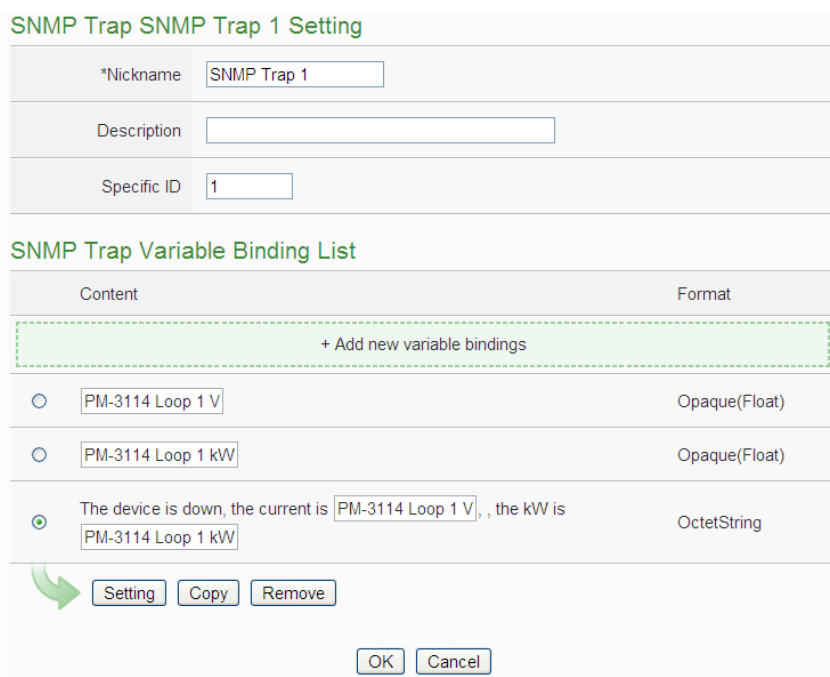


Figure10-19 : SNMP Trap setting with variable bindings list

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

added SNMP Trap.

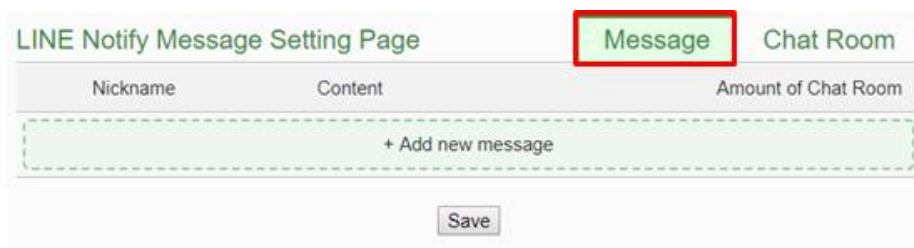
- ix To remove a pre-set SNMP Trap, please click the radio button in front of the pre-set SNMP Trap and then click “Remove”.
- x After you finishing all the SNMP Traps creation and setting, click “Save” button to save the settings.

10.4 LINE Notify Setting

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:



LINE Notify Message Setting Page		
Message		Chat Room
Nickname	Content	Amount of Chat Room
+ Add new message		
Save		

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:

The screenshot shows a web-based configuration page titled "Message Message 2 Setting". It contains the following elements:

- *Nickname:** A text input field containing "Message 2".
- Description:** An empty text input field.
- *Content:** A large text area with "View" and "Edit" buttons above it.
- *Chat Room:** A dropdown menu with the selected option "Do not upload to any chat room".
- Buttons:** "OK" and "Cancel" buttons at the bottom center.

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”.

This screenshot shows the same "Message Message 2 Setting" page as Figure 10-21, but with additional features in the *Content field:

- *Content:** The text area now contains "LINE Notify" followed by a red-coded string: `$$Ty/$STM/$STd $$Th/$STm.$STs`. Below the text area, there is an "Interface" dropdown menu set to "System Information", an "Item" dropdown menu set to "Time(Second)", and an "Insert" button.
- *Chat Room:** The dropdown menu remains "Do not upload to any chat room".
- Buttons:** "OK" and "Cancel" buttons are still present at the bottom.

Figure10-22 : LINE Notify 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 “[10.4.2 Chat Room Setting](#)”.

The screenshot displays the 'Message Message 2 Setting' interface. It includes a 'Nickname' field with the value 'Message 2', a 'Description' field, and a large 'Content' area. The content area contains the text 'LINE Notify' followed by a URL template: `$$Ty/$STM/$STd $$Th-$STm-$STs`. Below the content area, there are three buttons: 'Interface' (set to 'System Information'), 'Item' (set to 'Time(Second)'), and 'Insert'. The 'Chat Room' section is highlighted with a red box and shows a list of chat rooms: 'Do not upload to any chat room' and 'Mountain Hsu' (1-on-1). At the bottom of the page, there are three buttons: 'Add New Chat Room', 'Select All', and 'Unselect All'.

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:

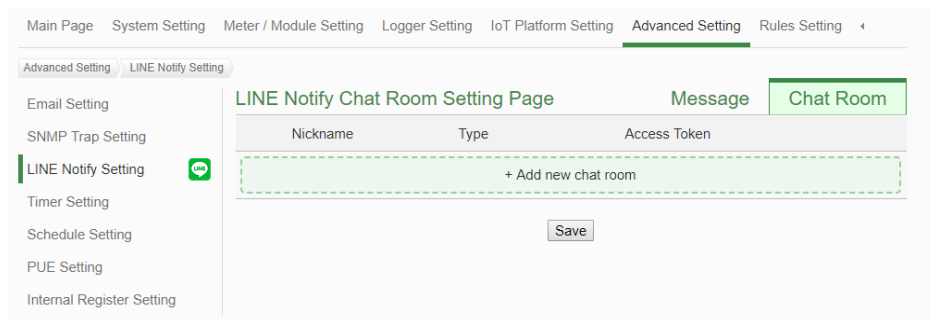


Figure10-24 : LINE Notify Chat Room Setting page (1)

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.

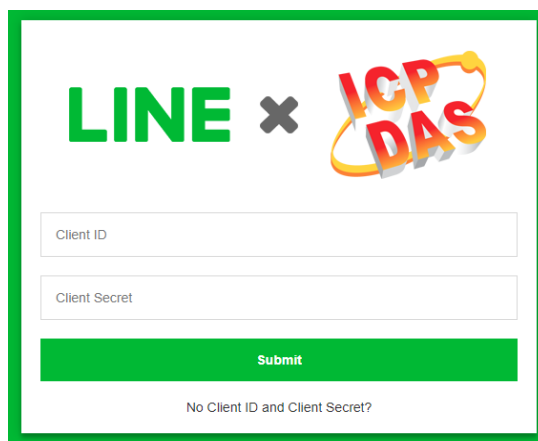


Figure10-25 : LINE Notify Chat Room Setting page (2)

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

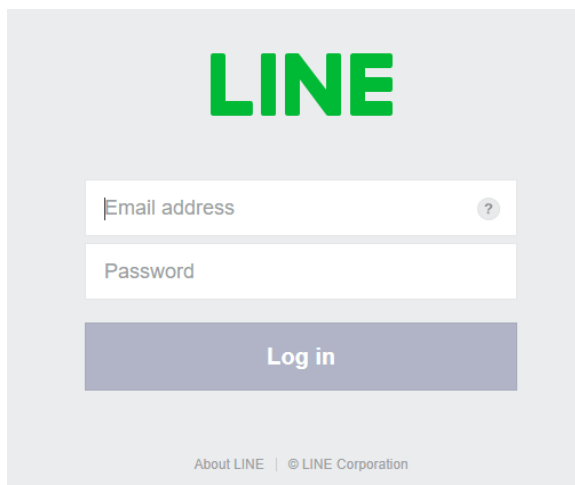


Figure10-26 : LINE Notify Chat Room Setting page (3)

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

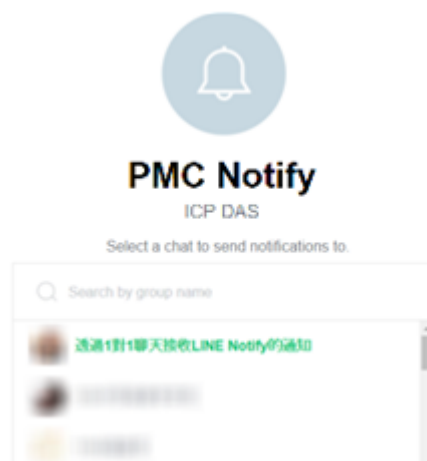


Figure10-27 : LINE Notify Chat Room Setting page (4)

- 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.

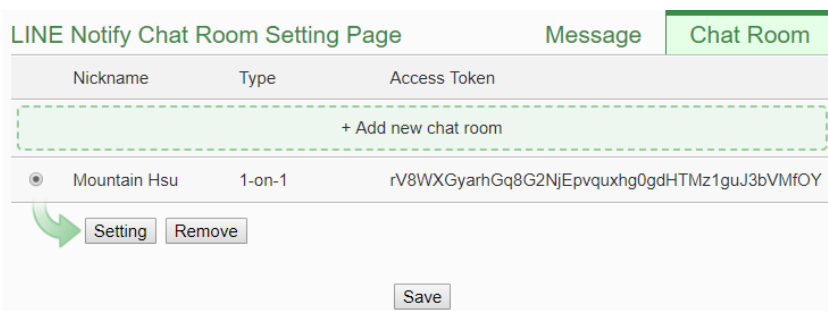


Figure10-28 : LINE Notify Chat Room Setting page (5)

- 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.

10.5 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” 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.

Figure10-29 : 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:

Figure10-30 : Timer setting Page(Assign Period)

Timer Timer1 Setting

*Nickname	Timer1
Description	
Initial Status	Stop
Period	Internal Register No. 1(IR1)

OK Cancel

Figure10-31 : 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.

10.6 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:

Schedule Setting Page

Nickname	Mode
+ Add new schedule	
<input type="radio"/> Schedule 1	Calendar
<input checked="" type="radio"/> Schedule 2	Repeat

Setting Copy Remove

Save

Figure10-32 : Schedule setting page

The settings steps are as below:

- i Click on “Add new schedule” to add a new schedule.

- 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:

Figure10-33 : 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

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:

Schedule Schedule 1 Setting

*Nickname	<input type="text" value="Schedule 1"/>
Description	<input type="text"/>

Schedule Content Setting

Mode	<input type="radio"/> Calendar <input checked="" type="radio"/> Repeat																								
*Day(s) of Week	<input type="checkbox"/> Sun <input checked="" type="checkbox"/> Mon <input checked="" type="checkbox"/> Tue <input checked="" type="checkbox"/> Wed <input checked="" type="checkbox"/> Thu <input checked="" type="checkbox"/> Fri <input type="checkbox"/> Sat																								
Exception Date(s)	<input type="button" value="Add"/>																								
*Time Range(s)	<table style="width: 100%; border: none;"> <tr> <td style="border: none;"><input type="text" value="08"/></td> <td style="border: none;">:</td> <td style="border: none;"><input type="text" value="30"/></td> <td style="border: none;">:</td> <td style="border: none;"><input type="text" value="00"/></td> <td style="border: none;">~</td> <td style="border: none;"><input type="text" value="12"/></td> <td style="border: none;">:</td> <td style="border: none;"><input type="text" value="00"/></td> <td style="border: none;">:</td> <td style="border: none;"><input type="text" value="00"/></td> <td style="border: none;"><input type="button" value="Remove"/></td> </tr> <tr> <td style="border: none;"><input type="text" value="13"/></td> <td style="border: none;">:</td> <td style="border: none;"><input type="text" value="00"/></td> <td style="border: none;">:</td> <td style="border: none;"><input type="text" value="00"/></td> <td style="border: none;">~</td> <td style="border: none;"><input type="text" value="17"/></td> <td style="border: none;">:</td> <td style="border: none;"><input type="text" value="30"/></td> <td style="border: none;">:</td> <td style="border: none;"><input type="text" value="00"/></td> <td style="border: none;"><input type="button" value="Remove"/></td> </tr> </table> <input type="button" value="Add"/>	<input type="text" value="08"/>	:	<input type="text" value="30"/>	:	<input type="text" value="00"/>	~	<input type="text" value="12"/>	:	<input type="text" value="00"/>	:	<input type="text" value="00"/>	<input type="button" value="Remove"/>	<input type="text" value="13"/>	:	<input type="text" value="00"/>	:	<input type="text" value="00"/>	~	<input type="text" value="17"/>	:	<input type="text" value="30"/>	:	<input type="text" value="00"/>	<input type="button" value="Remove"/>
<input type="text" value="08"/>	:	<input type="text" value="30"/>	:	<input type="text" value="00"/>	~	<input type="text" value="12"/>	:	<input type="text" value="00"/>	:	<input type="text" value="00"/>	<input type="button" value="Remove"/>														
<input type="text" value="13"/>	:	<input type="text" value="00"/>	:	<input type="text" value="00"/>	~	<input type="text" value="17"/>	:	<input type="text" value="30"/>	:	<input type="text" value="00"/>	<input type="button" value="Remove"/>														

Figure10-34 : Repeat mode of Schedule setting

- (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.

10.7 PUE Setting

PMC/PMD provides 10 PUEs; The configuration is shown as below:

PUE(Power Usage Effectiveness) Setting Page

No.	Nickname	Data Classification
+ Add new PUE		
<input checked="" type="radio"/>	1	PUE 1
<input type="radio"/>	2	PUE 2
<input type="radio"/>	3	PUE 3
<input type="radio"/>	4	PUE 4

Others Setting

Default Page Set as the default page after login

Figure10-35 : 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.

PUE PUE 1 Setting	
No.	1 ▾
*Nickname	PUE 1
Description	
Energy Setting	
	Operator Power Meter Channel
*Total Facility Energy	No Total Facility Energy Exist
	+ ▾ PM-3133-MTCP ▾ Phase A ▾ Add
	Operator Power Meter Channel
*IT Equipment Energy	No IT Equipment Energy Exist
	+ ▾ PM-3133-MTCP ▾ Phase A ▾ Add
Data Classification	kWh ▾
Display Setting	
Chart Boundary	Minimum 1
	Maximum 3
Chart Marker	<input type="checkbox"/> Enable
PUE Value	<input type="checkbox"/> Displayed in percentage
OK Cancel	

Figure10-36 : 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.

10.8 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.

Internal Register Setting Page

No.	Nickname	Initial Value
<input style="float: left; margin-right: 5px;" type="button" value="+"/> 6	<input type="text"/>	<input type="text" value="0"/>
<input type="radio"/>	Internal Register 1	0
<input type="radio"/>	Internal Register 2	0
<input type="radio"/>	Internal Register 3	0
<input type="radio"/>	Internal Register 4	0
<input checked="" type="radio"/>	Internal Register 5	0

Figure10-37 : 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

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.

Internal Register 1 Setting	
No.	1
*Nickname	Internal Register 1
Description	
Initial Value	0
Formula Setting	
Function Status	<input type="checkbox"/> Enable

Figure10-38 : 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:

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.

10.9 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.

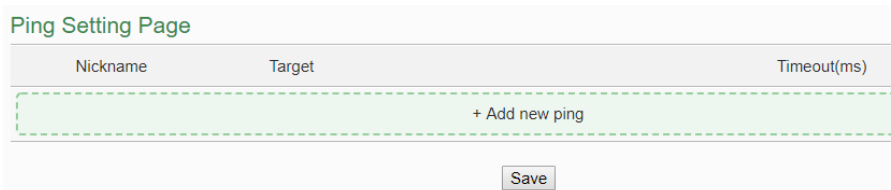


Figure10-39 : Ping List Page

- ii After clicking the “Add new Ping”, a setting page will appear, input a

name in the “Nickname” field and you could also input the description of this Ping in the “Description” field; shown as below:

The screenshot displays a configuration window titled "Ping Ping 1 Setting". It is divided into two main sections: "Ping Ping 1 Setting" and "Ping Attribute Setting".

- Ping Ping 1 Setting:**
 - *Nickname: Ping 1
 - Description: (empty field)
- Ping Attribute Setting:**
 - *Target: iotstardemo.icpdas.com
 - Timeout: 1000 millisecond(s)
 - Interval: 10 second(s)
 - Failure Condition: Continuous ping failed up to 5 times; Attempted 10 times, failed 5 times
 - Ping Testing: Ping

At the bottom right, there are "OK" and "Cancel" buttons.

Figure10-40 : 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.

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:

The screenshot shows the 'Rules Setting' interface. On the left, there is a list of rules under the heading 'Rules Setting'. The first rule is highlighted with a dashed green border and contains a '+ Add new rule' button. Below it are three entries for 'Air Conditioner Control', each with a '+' and an 'x' icon. On the right, the 'Rule Overview' section displays the logic for three rules:

```



Air Conditioner Control
< IF >
  Schedule(Schedule 1) Out of Range
< THEN >
  COM2 M-7005(2) DOQ(Air conditioner switch) = OFF (One Time)
< ELSE >
  COM2 M-7005(2) DOQ(Air conditioner switch) = ON (One Time)

Air Conditioner Control
< IF >
  COM2 PM-2134(1:PM-2134) Loop 1(Meeting Room) Forecast Demand >= 100 kW
< THEN >
  COM2 M-7005(2) DOQ(Air conditioner switch) = OFF (One Time)
< ELSE >
  No action

Air Conditioner Control
< IF >
  COM2 PM-2134(1:PM-2134) Loop 1(Meeting Room) Forecast Demand < 100 kW
< THEN >
  XW-Board XW310C DO0 = ON (One Time)
< ELSE >
  No action
  
```

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).

Rule Information Setting

*Nickname	<input type="text" value="Rule 4"/>
Description	<input type="text"/>
Status	<input checked="" type="radio"/> Enable <input type="radio"/> Disable

Rule Content Setting

IF	THEN	ELSE
Add a new Condition: <input type="text" value="Set a Condition"/>	Add a new Action: <input type="text" value="Set an Action"/>	Add a new Action: <input type="text" value="Set an Action"/>
No Condition exists	No Action exists	No Action exists

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:

- **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
- Ping

If the PMC/PMD is connected to ICP DAS XV-Board/M-7000/DL/IR 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 :

DI Condition Setting		
Module & Channel	I/O Interface	XV-Board
	Module	XV310
	Channel	0
Status	OFF	
<input type="button" value="OK"/> <input type="button" value="Cancel"/>		

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 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:

DI Counter Condition Setting

Module & Channel	Operator	Value
XV-Board XV310 Channel 0	=	User-Defined 0
<input type="button" value="OK"/> <input type="button" value="Cancel"/>		

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.

Value

User-Defined

0

- Internal Register: The “Internal Register” value could be

used as evaluation criteria; select the number of the Internal Register from the dropdown list.

A screenshot of a configuration window titled "Value". It contains a dropdown menu labeled "Internal Register" and a text field labeled "No." with the value "1(Internal Register 1)".

- **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.

A screenshot of a configuration window titled "Value". It contains a dropdown menu labeled "DI Counter", and three more dropdown menus: "Interface" (COM4), "Module" (M-7084(2)), and "Channel" (0).

- **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.

A screenshot of a configuration window titled "Value". It contains a dropdown menu labeled "AI", and three more dropdown menus: "COM3", "M-7016(10)", and "0".

- **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.

A screenshot of a configuration window titled "Value". It contains a dropdown menu labeled "AO", and three more dropdown menus: "COM3", "M-7016(10)", and "0".

- **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.

- **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 parameter could be used as evaluation criteria; select the variable name from the dropdown list to specify which variable will be used.

- Bluemix: The value of the Bluemix received parameter 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:

- 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 “=”, “>”, “<”, “>=”, “<=”.
- 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:

Discrete Input Condition Setting			
Module & Address	I/O Interface	COM3 ▼	Module User'defined(7) ▼
	Address	0 ▼	
Status	OFF ▼		

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

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:

Coil Output Condition Setting

Module & Address	I/O Interface	COM3 ▼	Module	User'defined(7) ▼	Address	0 ▼
Status	OFF ▼					

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:

Input Register Condition Setting

Module & Address	Operator	Value
COM3 ▼ User'defined(7) ▼ Address 0(流量) ▼	= ▼	User-Defined ▼ 0

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

- 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:

Holding Register Condition Setting

Module & Address		Operator	Value
COM3	User defined(7)	=	User-Defined
Address	0		0

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

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:

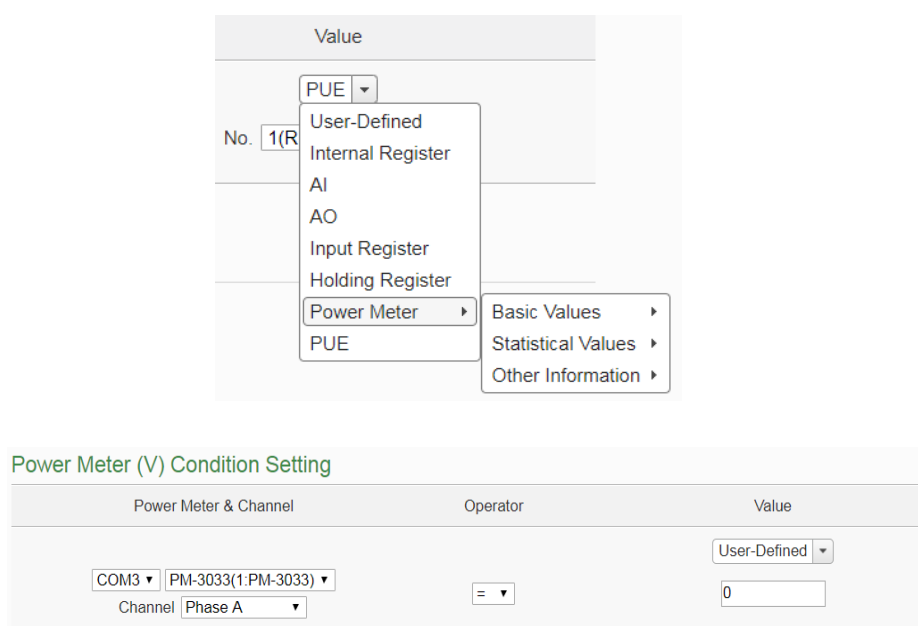


Figure11-10 : Power Meter condition setting page

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

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:

Name	Operator	Value
Variable Name Lighting	=	User-Defined 0

Figure11-12 : Microsoft Azure Subscribe Message condition setting

Follow the steps below:

- 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:

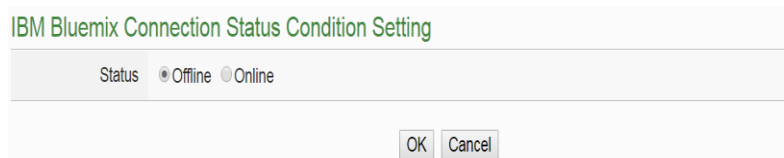


Figure11-13 : IBM Bluemix Connection Status condition setting

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

Bluemix can be used in the IF condition statements; the editing page for IBM Bluemix Subscribe Message condition setting is shown as below:

Name	Operator	Value
Command Name <input type="text" value="Room1"/>	=	User-Defined
Variable Name <input type="text" value="Lighting"/>		<input type="text" value="0"/>

OK Cancel

Figure11-14 : IBM Bluemix Subscribe Message condition setting

Follow the steps below:

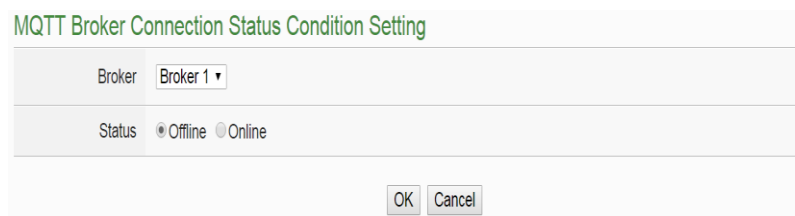
- i Specify the Command and Variable from the dropdown list of “Command Name” and “Variable Name” fields that you are going to include them in the IF condition statements. Only when the Subscribe Message is bound with the setting of the “Command Name”, then the IF condition statements will be processed. 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:



MQTT Broker Connection Status Condition Setting

Broker	Broker 1 ▾
Status	<input checked="" type="radio"/> Offline <input type="radio"/> Online

OK Cancel

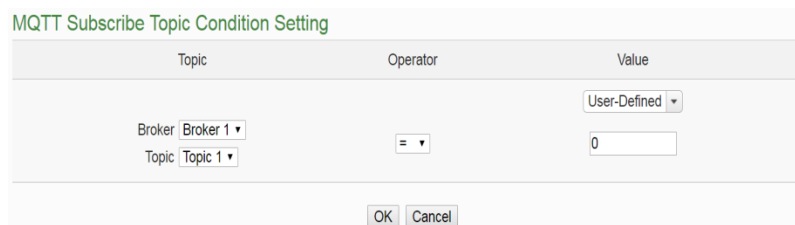
Figure11-15 : Broker Connection Status condition setting

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:



MQTT Subscribe Topic Condition Setting

Topic	Operator	Value
Broker Broker 1 ▾ Topic Topic 1 ▾	= ▾	User-Defined ▾ 0

OK Cancel

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

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:

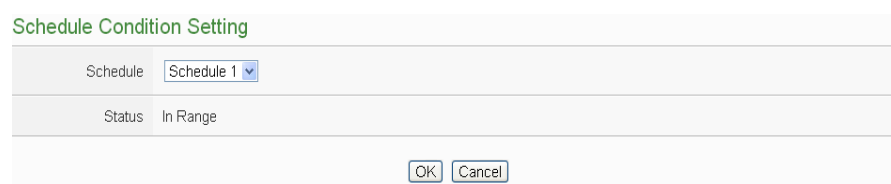
Figure11-18 : Timer condition setting page

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:



Schedule Condition Setting	
Schedule	Schedule 1
Status	In Range
<input type="button" value="OK"/> <input type="button" value="Cancel"/>	

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:

Unit	Operator	Value
<input checked="" type="radio"/> dBm <input type="radio"/> Percent(%)	=	User-Defined 0

OK Cancel

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:

Status
Upload Failed Continuing 1 Hour(s)

OK Cancel

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

condition statement; the editing page for SD Card Status Condition Setting is shown as follow:

SD Card Status Condition Setting

Status Abnormal

OK Cancel

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:

Rule Status Condition Setting

Rule Rule 1

Status Disable

OK Cancel

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

statement; the editing page for Internal Register Condition Setting is shown as follow:

Internal Register Condition Setting

No.	Operator	Value
1(Internal Register 1)	=	User-Defined 0

OK Cancel

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:

PUE Condition Setting

No.	Operator	Value
No. 1(ROOM1)	=	User-Defined 0

OK Cancel

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

- 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:



Ping Condition Setting	
Ping	Ping 1 ▼
Status	Failed

OK Cancel

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.

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
- Bot Service
- Re-boot System
- Reset modem
- Data Logger
- Rule Status
- Internal Register

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 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:

DI Counter Action Setting	
Module & Channel	I/O Interface <input type="text" value="XV-Board"/> Module <input type="text" value="XV310"/> Channel <input type="text" value="0"/>
Action	Reset

Figure11-27 : DI Counter action setting page

Follow the steps below:

- Select the DI channel to reset DI counter from the dropdown list of channel field in the “Module & Channel” section.
- 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:

DO Action Setting		
Module & Channel	I/O Interface	XV-Board ▾
	Module	XV310 ▾
	Channel	0 ▾
Status	OFF ▾	
Action Attribute Setting		
Execution Frequency	<input checked="" type="radio"/> One Time <input type="radio"/> Repeat	
Waiting Time	<input type="text" value="0"/> second(s)	

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:

AO Action Setting		
Module & Channel	Operator	Value
XV-Board ▾ XV310 ▾ Channel 0 ▾	= ▾	User-Defined ▾ <input type="text" value="0"/>
Action Attribute Setting		
Execution Frequency	<input checked="" type="radio"/> One Time <input type="radio"/> Repeat	
Waiting Time	<input type="text" value="0"/> second(s)	

Figure11-29 : AO action setting page

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.

The screenshot shows a form titled "Value". It contains a dropdown menu with "User-Defined" selected and a text input field containing the number "0".

- Internal Register: Select the number of the Internal Register from the dropdown list.

The screenshot shows a form titled "Value". It contains a dropdown menu with "Internal Register" selected and a text input field containing "1 (Internal Register 1)".

- 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.

The screenshot shows a form titled "Value". It contains a dropdown menu with "DI Counter" selected. Below it are three more dropdown menus: "Interface" with "COM4" selected, "Module" with "M-7084(2)" selected, and "Channel" with "0" selected.

- 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.

- 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

the broker and the subscribe topic from the dropdown list to specify which value will be used.

A screenshot of a 'Value' dropdown menu. The menu is open, showing three options: 'MQTT Subscribe Topic', 'Broker 1', and 'Topic 1'. Each option is preceded by a small square icon.

- Azure: using the value of Azure received parameter, select the parameter from the dropdown list to specify which value will be used.

A screenshot of a 'Value' dropdown menu. The menu is open, showing one option: 'Microsoft Azure Subscribe Message'. Below the menu, there is a 'Variable Name' field with the value 'aaa'.

- Bluemix: using the value of Bluemix received parameter, select the command and the parameter from the dropdown list to specify which value will be used.

A screenshot of a 'Value' dropdown menu. The menu is open, showing one option: 'IBM Bluemix Subscribe Message'. Below the menu, there is a 'Command Name' field with the value 'c1' and a 'Variable Name' field with the value 'aaa'.

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.

A screenshot of a 'Value' dropdown menu. The menu is open, showing one option: 'PUE'. Below the menu, there is a 'No.' field with the value '1(Room1)'.

- 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.

11.2.2 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:

Coil Output Action Setting		
Module & Address	I/O Interface	COM3 ▼
Module	User'defined(7) ▼	Channel
		0 ▼
Status	OFF ▼	
Action Attribute Setting		
Execution Frequency	<input checked="" type="radio"/> One Time <input type="radio"/> Repeat	
Waiting Time	0	second(s)
<input type="button" value="OK"/> <input type="button" value="Cancel"/>		

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:

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:

Power Meter (DO) Action Setting			
Power Meter & Channel	I/O Interface	COM3 ▼	Power Meter
			PM-3133(2:PM-3133) ▼
	Channel	0 ▼	
Status	OFF ▼		
Action Attribute Setting			
Execution Frequency	<input checked="" type="radio"/> One Time <input type="radio"/> Repeat		
Waiting Time	0	second(s)	
<input type="button" value="OK"/> <input type="button" value="Cancel"/>			

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:

Microsoft Azure Function Status Action Setting	
Status	<input checked="" type="radio"/> Disable <input type="radio"/> Enable
<input type="button" value="OK"/> <input type="button" value="Cancel"/>	

Figure11-33 : Microsoft Azure Function Status action setting

Follow the steps below:

- i Specify the connection operation between Microsoft Azure 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.

11.2.4.2 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

“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:

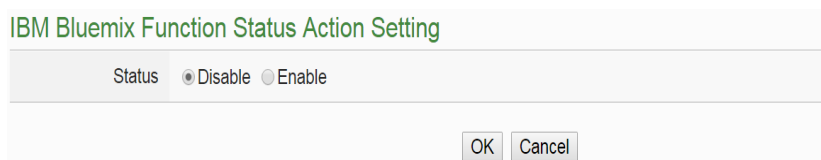


Figure11-36 : IBM Bluemix Function Status action setting

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:

IBM Bluemix Publish Message Action Setting	
Message	Message 1 ▾
Action	Publish
IBM Bluemix Publish Message Information	
Content	PM-3033 Total / Average kWh
<input type="button" value="OK"/> <input type="button" value="Cancel"/>	

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:

IBM Bluemix Reset Variable Action Setting		
Name	Command Name bc1 ▾	Variable Name b01 ▾
Action	Reset	
<input type="button" value="OK"/> <input type="button" value="Cancel"/>		

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

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:

MQTT Broker Function Status Action Setting

Broker	Broker 1 ▾
Status	<input checked="" type="radio"/> Disable <input type="radio"/> Enable
<input type="button" value="OK"/> <input type="button" value="Cancel"/>	

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:

MQTT Publish Message Action Setting

Message	Broker	Broker 1 ▾	Message	Message 1 ▾
Action	Publish			

MQTT Publish Message Information

Topic	com3/no3/total_avg/kwh
Content	PM-3033 Total / Average kWh
<input type="button" value="OK"/> <input type="button" value="Cancel"/>	

Figure11-40 : Publish Message action setting page

Follow the steps below:

- 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:

MQTT Reset Topic Action Setting

Topic	Broker	Broker 1 ▼	Topic	Topic 1 ▼
Action	Reset			

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:

Timer Action Setting	
Timer	Timer1 ▾
Action	Reset ▾
<input type="button" value="OK"/> <input type="button" value="Cancel"/>	

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:

Email Action Setting	
Email	TestEmail ▾
Action	Send
Email Information	
Receiver Email Address	Test@Yahoo.com
Subject	Test
Content	\$Xdi0 \$C2M1r4352
<input type="button" value="OK"/> <input type="button" value="Cancel"/>	

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.**

- 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:

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

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:

LINE Notify Action Setting	
Message	Message 1 ▾
Action	Send
Message Information	
Chat Room	Mountain Hsu
Content	PM-3133 Offline : [System Information Date(Year)]/[System Information Date(Month)]/[System Information Date(Day)] [System Information Time(Hour)]:[System Information Time(Minute)]:[System Information Time(Second)]
<input type="button" value="OK"/> <input type="button" value="Cancel"/>	

Figure11-46 : LINE Notify action setting page

Follow the steps below:

- i 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.

- ii Click “OK” button to confirm the settings and return to the Rule settings page.

11.2.12 Bot Service

You can send a specific Bot Service message to the LINE personal account which is bound with IoTstar when executing a THEN/ELSE Action statement. The setting page is show as below:

Bot Service Action Setting	
Message	Message 1 ▾
Action	Send

Message Information	
Content	PM-3112 CT1 V

Figure11-47 : 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 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.

11.2.13 Re-boot System

You can reboot the PMC/PMD controller when executing a THEN/ELSE Action statement. The setting page is show as below:

Reboot System Action Setting	
Action	Reboot


Figure11-48 : 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.

11.2.14 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 mobile connection would be re-started if the mobile network connection is enabled. The setting page is show as below:



Action	Reset

OK Cancel

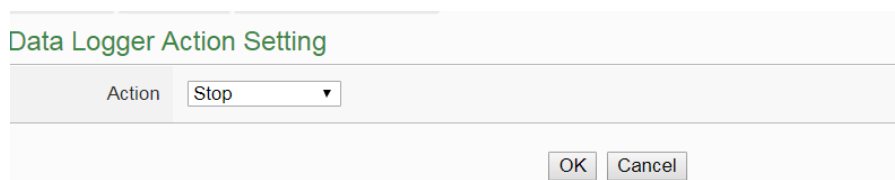
Figure11-49 : Reset modem action setting page

Follow the steps below:

- i Click “OK” button to confirm the settings and return to the Rule settings page.

11.2.15 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:



Action	Stop

OK Cancel

Figure11-50 : 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.

11.2.16 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:

Rule Status Action Setting

Rule	Air Conditioner Control
Action	Disable

OK Cancel

Figure11-51 : Rule Status action setting page

Follow the steps below:

- i 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.
- ii 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.
- iii Click “OK” button to confirm the settings and return to the Rule settings page.

11.2.17 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:

Internal Register Action Setting

No.	Operator	Value
No: 1(Internal Variable #1)	=	User-Defined 0

Action Attribute Setting

Execution Frequency One Time Repeat

Figure11-52 : 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.
 - “*=” : 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.

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.

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

Modbus Address	Coil Output (0x)	Discrete Input (1x)	Input Register (3x)	Holding Register (4x)
0~59	PMC/PMD System Data ₍₁₎			
60~75	/	RS-485-1 connection status ₍₂₎	RS-485-1 Information ₍₃₎	Internal Register Data ₍₄₎
76~91		RS-485-2 connection status ₍₂₎	RS-485-2 Information ₍₃₎	
92~107		LAN _(Modbus TCP) module connection status ₍₂₎	LAN _(Modbus TCP) module Information ₍₃₎	
108~123		/	/	
124~139	/	/	/	/
140~155	/	/	/	/
200~299	XV Board Data ₍₅₎			
300~319	PUE Data ₍₆₎			
1000~20999	Module / Power Meter Data of RS-485-1			
	(1) Each Module/Power Data block contains 1200 addresses. (2) Each Power Meter Information block contains 50 addresses.			

	1000~2199	Module/Power Data <small>(Index=1)</small> of RS-485-1 ⁽⁷⁾
	2200~3399	Module/Power Data <small>(Index=2)</small> of RS-485-1 ⁽⁷⁾
	3400~4599	Module/Power Data <small>(Index=3)</small> of RS-485-1 ⁽⁷⁾
	4600~5799	Module/Power Data <small>(Index=4)</small> of RS-485-1 ⁽⁷⁾
	5800~6999	Module/Power Data <small>(Index=5)</small> of RS-485-1 ⁽⁷⁾
	7000~8199	Module/Power Data <small>(Index=6)</small> of RS-485-1 ⁽⁷⁾
	8200~9399	Module/Power Data <small>(Index=7)</small> of RS-485-1 ⁽⁷⁾
	9400~10599	Module/Power Data <small>(Index=8)</small> of RS-485-1 ⁽⁷⁾
	10600~11799	Module/Power Data <small>(Index=9)</small> of RS-485-1 ⁽⁷⁾
	11800~12999	Module/Power Data <small>(Index=10)</small> of RS-485-1 ⁽⁷⁾
	13000~14199	Module/Power Data <small>(Index=11)</small> of RS-485-1 ⁽⁷⁾
	14200~15399	Module/Power Data <small>(Index=12)</small> of RS-485-1 ⁽⁷⁾
	15400~16599	Module/Power Data <small>(Index=13)</small> of RS-485-1 ⁽⁷⁾
	16600~17799	Module/Power Data <small>(Index=14)</small> of RS-485-1 ⁽⁷⁾
	17800~18999	Module/Power Data <small>(Index=15)</small> of RS-485-1 ⁽⁷⁾
	19000~20199	Module/Power Data <small>(Index=16)</small> of RS-485-1 ⁽⁷⁾
	20200~20249	Power Meter Information <small>(Index=1)</small> of RS-485-1 ⁽⁷⁾
	20250~20299	Power Meter Information <small>(Index=2)</small> of RS-485-1 ⁽⁷⁾
	20300~20349	Power Meter Information <small>(Index=3)</small> of RS-485-1 ⁽⁷⁾
	20350~20399	Power Meter Information <small>(Index=4)</small> of RS-485-1 ⁽⁷⁾
	20400~20449	Power Meter Information <small>(Index=5)</small> of RS-485-1 ⁽⁷⁾
	20450~20499	Power Meter Information <small>(Index=6)</small> of RS-485-1 ⁽⁷⁾
	20500~20549	Power Meter Information <small>(Index=7)</small> of RS-485-1 ⁽⁷⁾
	20550~20599	Power Meter Information <small>(Index=8)</small> of RS-485-1 ⁽⁷⁾
	20600~20649	Power Meter Information <small>(Index=9)</small> of RS-485-1 ⁽⁷⁾
	20650~20699	Power Meter Information <small>(Index=10)</small> of RS-485-1 ⁽⁷⁾
	20700~20749	Power Meter Information <small>(Index=11)</small> of RS-485-1 ⁽⁷⁾
	20750~20799	Power Meter Information <small>(Index=12)</small> of RS-485-1 ⁽⁷⁾
	20800~20849	Power Meter Information <small>(Index=13)</small> of RS-485-1 ⁽⁷⁾
	20850~20899	Power Meter Information <small>(Index=14)</small> of RS-485-1 ⁽⁷⁾
	20900~20949	Power Meter Information <small>(Index=15)</small> of RS-485-1 ⁽⁷⁾
	20950~20999	Power Meter Information <small>(Index=16)</small> of RS-485-1 ⁽⁷⁾
21000~40999	Module / Power Meter Data of RS-485-2	
	<p>(1) Each Module/Power Data block contains 1200 addresses.</p> <p>(2) Each Power Meter Information block contains 50 addresses.</p>	

	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.	

	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.

(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
RS-485-2 Connection Status	300022	1	UInt16	Each bit represents a module.
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

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	0~999999999(kW)
Carbon Footprint 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

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
⋮				

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)				

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

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

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

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

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

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

(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 $21000 + (3 - 1) \times 200 = 23400$. 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:

● **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

[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

● **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

● **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

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

- **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

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

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

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(°C)	SA + 300002	2	Float	Floating Point
Temperature(°F)	SA + 300004	2	Float	Floating Point

● **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(°C)	SA + 300004	2	Float	Floating Point
Temperature(°F)	SA + 300006	2	Float	Floating Point
Dew Point(°C)	SA + 300008	2	Float	Floating Point
Dew Point(°F)	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.

● **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
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
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
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
	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 (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	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

	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
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
CTI	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	

	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

	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	

● **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

	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

	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
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

(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

● **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

	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

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
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
T	V	SA + 300034	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 Accumulated Electricity	SA + 300086	2	Float	Floating Point
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 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

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	

● **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

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

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

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

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

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

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

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

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

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

	(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

	(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

	(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

	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

	(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

	(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

	(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

	(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

	(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

	(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

	(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

	(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

	(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

	(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

	(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

(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

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

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

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 $1000 + (3 - 1) \times 1200 = 3400$. The Modbus address of the I/O channel of the

module is in sequence arrangement from the module starting address 3400.

Modbus Mapping Table Address Setting Nickname Setting

Local Address	Coil Output (0x)		Discrete Input (1x)		Input Register (3x)		Holding Register (4x)	
	Data Address		Data Address		Data Address		Data Address	
3400	11		0		7		20	
3401	7		10		4		3	
3402								
3403								
3404								
3405								
3406								
3407								
3408								
3409								

Remove All Setting Expand All Collapse All

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

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 :

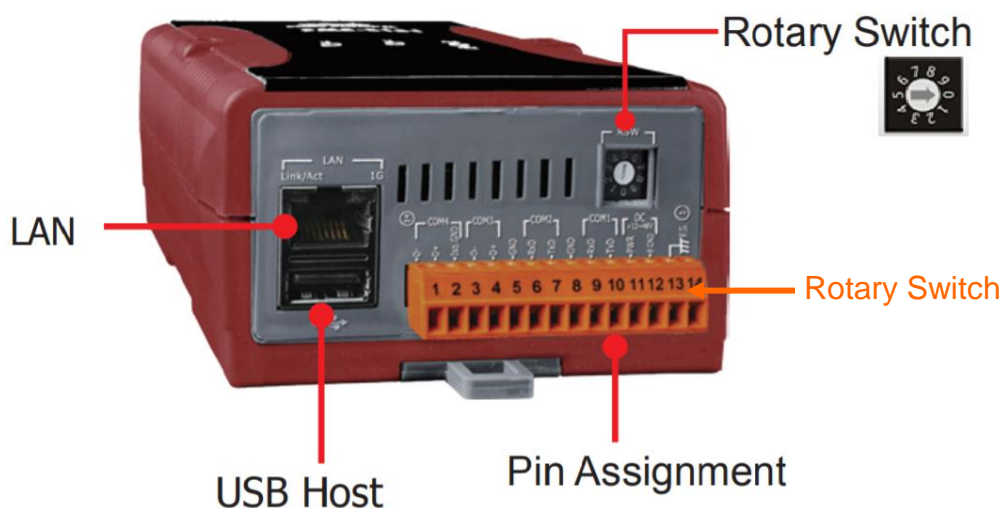
Input Register Index	The Modbus Address in Modbus RTU Module	The mapping Modbus Address in PMC/PMD
1	30007	33400
2	30009	33402
3	30011	33404
4	30013	33406

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

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	<ul style="list-style-type: none"> ■ 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.

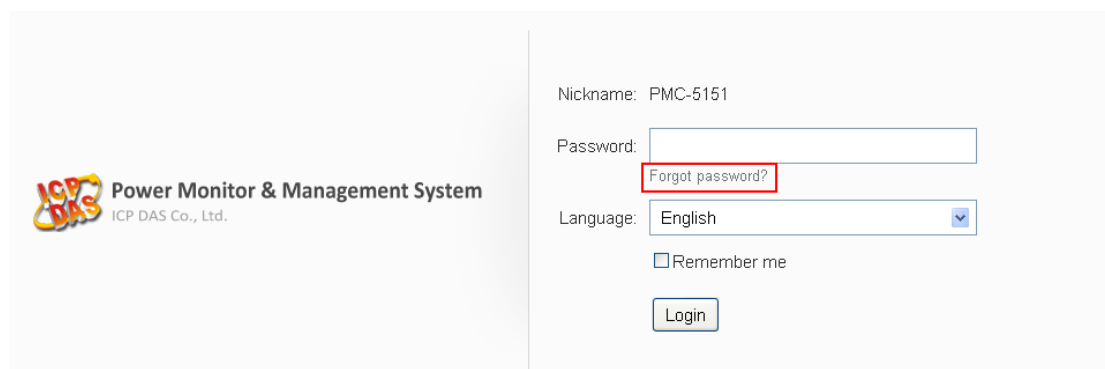
Please follow the steps below to restore network settings to factory default or send the login password to the Email account of the Administrator:

- Restore network settings to factory default

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

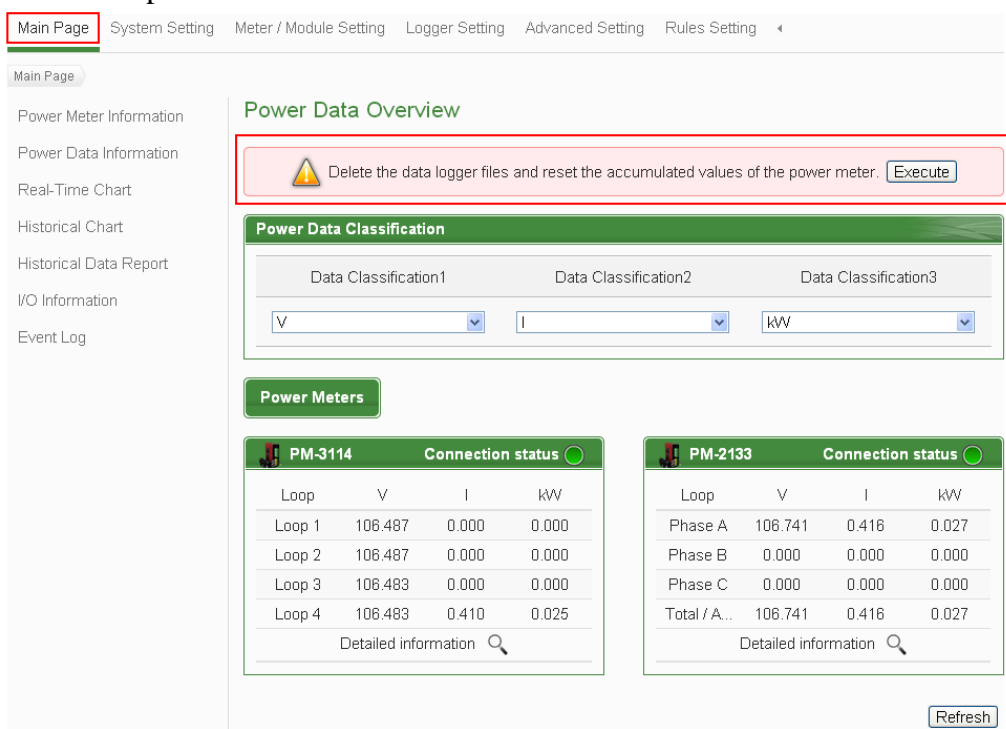
4. Switch the Rotary Switch to position 0
- Send the login password to the Email account of the Administrator
 1. Switch the Rotary Switch to position 8.
 2. Connect to PMC/PMD Login webpage via Web browser. Now a “Forget password” message will be displayed under the password field. Click the “Forget 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.

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.

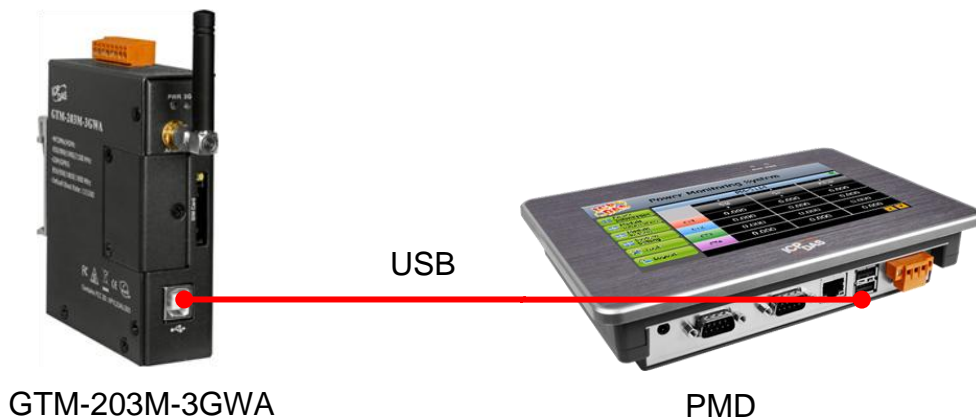
Appendix III : Setup the GTM-203M-3GWA with PMD

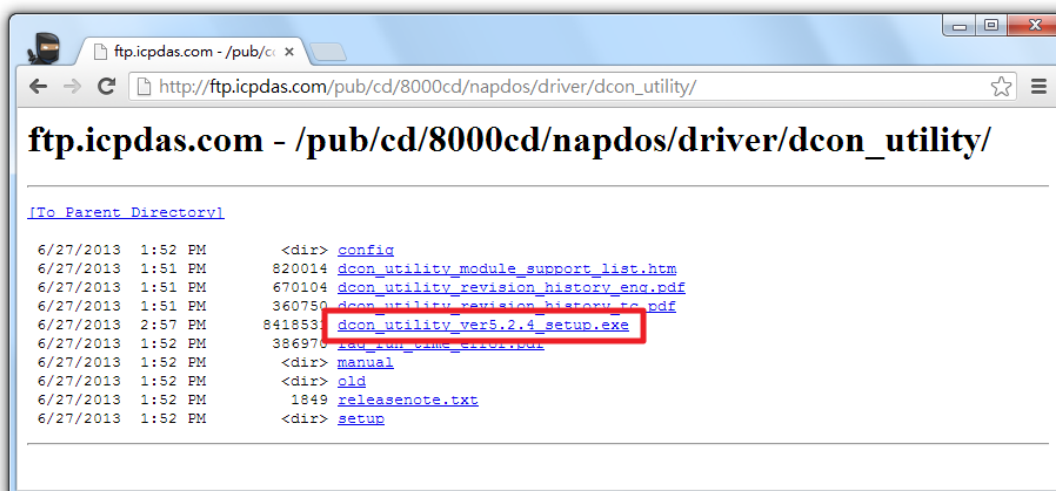
- Hardware installation

1. Install the SIM card and antenna on the GTM-203M-3GWA, and connect the device with Power(+10V_{DC} ~ +30V_{DC}).

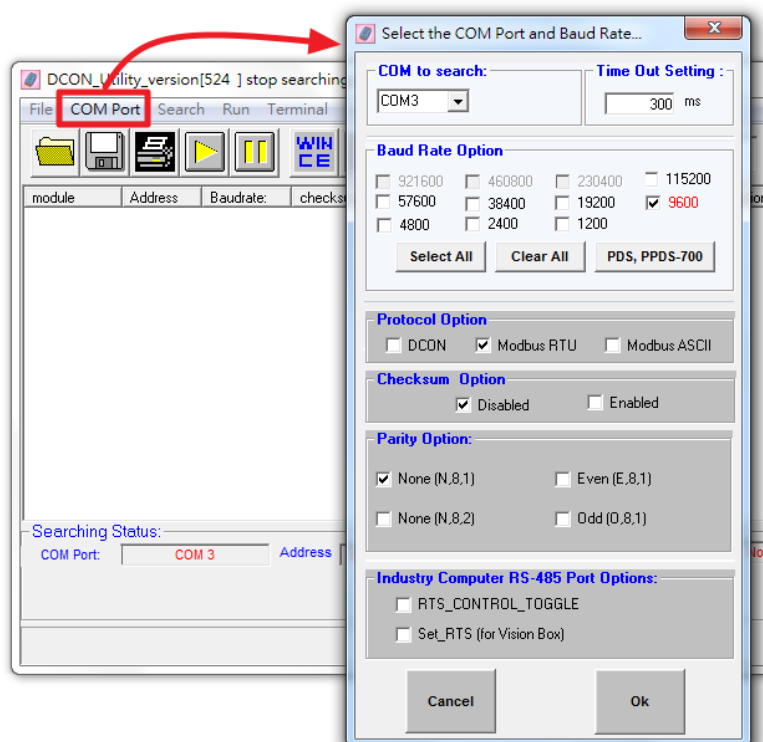


2. Connect the GTM-203M-3GWA and PMD by USB cable.

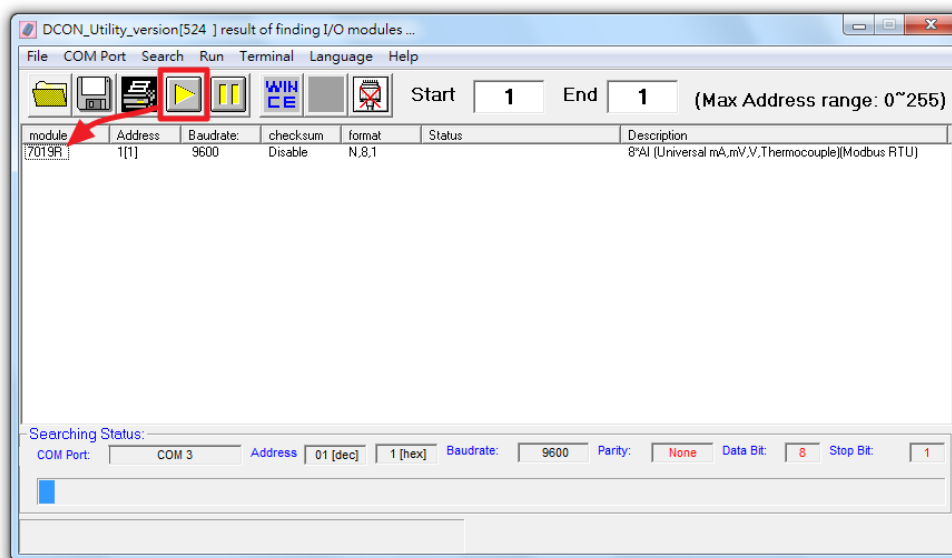




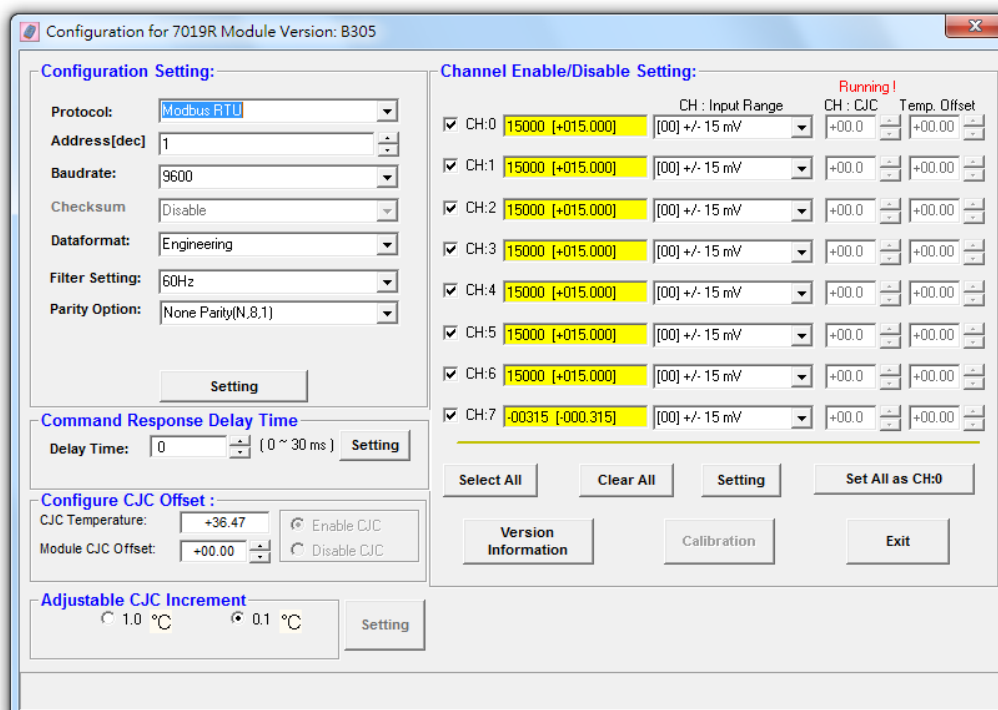
B. Start the DCON Utility and verify if the COM Port parameters are accurate.



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:

- **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_vXXX.pdf

- DL-302 module

Link	http://ftp.icpdas.com.tw/pub/cd/usbcd/napdos/dl-300/document/
File name	dl300_user_manual_english_vXXX.pdf

- IR module

Link	http://ftp.icpdas.com.tw/pub/cd/usbcd/napdos/ir/
File name	ir-XXX/manual/ ir-XXX_usermanual_en_vX_X.pdf

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

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			

● **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	carbonFootprintFactor	
	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

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 **com3pm1**), the Power Meter2 SNMP Variables are similar to listed information above but with prefix **com3pm2** instead, and the Power Meter16 SNMP Variables are also similar to the listed information above but with prefix **com3pm16** 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 **com4pm1**, the Power Meter2 SNMP Variables are similar to listed information above but with prefix **com4pm2** instead, and the Power Meter16 SNMP Variables are also similar to the listed information above but with prefix **com4pm16** 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 **lanpm1**, the Power Meter2 SNMP Variables are similar to listed information above but with prefix **lanpm2** instead, and the Power Meter16 SNMP Variables are also similar to the listed information above but with prefix **lanpm16** 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		

	com3io1DiscInputName	com3io1DiscInputValue			
	com3io1DiscInputModbusAdd	com3io1DiscInputCounterValue			
	com3io1DiscInputResetCounter	com3io1CoilOutputIndex			
	com3io1CoilOutputName	com3io1CoilOutput Value			
	com3io1CoilOutputModbusAdd	com3io1CoilOutputAdvFunction			
	com3io1InputRegIndex	com3io1InputRegName			
	com3io1InputReg Value	com3io1InputRegModbusAdd			
	com3io1InputRegType	com3io1InputRegScaleRatio			
	com3io1InputRegOffset	com3io1InputRegDeadband			
	com3io1InputRegScaleMin	com3io1InputRegScaleMax			
	com3io1HoldingRegIndex	com3io1HoldingRegName			
	com3io1HoldingReg Value	com3io1HoldingRegModbusAdd			
	com3io1HoldingRegType	com3io1HoldingRegScaleRatio			
	com3io1HoldingRegOffset	com3io1HoldingRegDeadband			
<p>The SNMP Variables naming rule of the I/O modules that are connected to PMC.</p> <ul style="list-style-type: none"> ● 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 com3io1), the I/O Module2 SNMP Variables are similar to listed information above but with prefix com3io2 instead, and the I/O Module16 SNMP Variables are also similar to the listed information above but with prefix com3io16 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 com4io1, the I/O Module2 SNMP Variables are similar to listed information above but with prefix com4io2 instead, and the I/O Module16 SNMP Variables are also similar to the listed information above but with prefix com4io16 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 lanio1, the I/O Module2 SNMP Variables are similar to listed information above but with prefix lanio2 instead, and the I/O Module16 SNMP Variables are also similar to the listed information above but with prefix lanio16 instead. 					
otherInfo	irIndex		irName	irValue	
	pueIndex	pueName	pueTotalEnergy	pueITEnergy	pueValue

PMD Series				
System	serialNumber	firmwareVersion	nickname	
	systemCurrentTime	webserverPort	modbusTcpPort	
	modbusTcpNetID	microSDFreeSpace	powerMeterAmount	
	ioModuleAmount	demandInterval	contractCapacity	
	modemStatus	registerStatus	signal	
	carbonFootprintFactor			
Power Meter1 (On Com1)	com1pm1Index		com1pm1Interface	
	com1pm1ModbusID		com1pm1Name	
	com1pm1PTIndex	com1pm1PTValue	com1pm1CTIndex	
	com1pm1CTValue	com1pm1PollingTimeout		
	com1pm1DOAmount		com1pm1RetryInterval c	
	com1pm1ScanRate		com1pm1StatusCode	
	com1pm1ChSubmeterIndex		com1pm1ChName	
	com1pm1ChVoltage		com1pm1ChCurrent	
	com1pm1ChKW	com1pm1ChKvar	com1pm1ChKVA	
	com1pm1ChPF	com1pm1ChKWh	com1pm1ChKvarh	
	com1pm1ChKVAh		com1pm1ChActualDemand	
	com1pm1ChForecastDemand		com1pm1ChMaxDemandH	
	com1pm1ChMaxDemandD		com1pm1ChMaxDemandM	
	com1pm1ChElectricityD		com1pm1ChElectricityM	
	com1pm1ChElectricityY		com1pm1DOIndex	
	com1pm1DOName		com1pm1DOValue	
	com1pm1HarmonicSubmeterIndex		com1pm1HarmonicSelector	
	com1pm1HarmonicVTHD		com1pm1HarmonicITHD	
	<p>The SNMP Variables naming rule of the Power Meter connected with PMD.</p> <ul style="list-style-type: none"> ● 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 			

prefix **com2pm2** instead, and the Power Meter16 SNMP Variables are also similar to the listed information above but with prefix **com2pm16** 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 **lanpm1**, the Power Meter2 SNMP Variables are similar to listed information above but with prefix **lanpm2** instead, and the Power Meter16 SNMP Variables are also similar to the listed information above but with prefix **lanpm16** 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 **com1io1**), the I/O Module2 SNMP Variables are similar to listed information above but with prefix **com1io2** instead, and the I/O Module16 SNMP Variables are also similar to the listed information above but with prefix **com1io16** instead.

- **The SNMP Variables naming rule of the I/O modules on Com2**

The I/O Module1 SNMP Variables are similar as listed information above but with prefix **com2io1**, the I/O Module2 SNMP Variables are similar to listed information above but with prefix **com2io2** instead, and the I/O Module16 SNMP Variables are also similar to the listed information above but with prefix **com2io16** 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 **lanio1**, the I/O Module2 SNMP Variables are similar to listed information above but with prefix **lanio2** instead, and the I/O Module16 SNMP Variables are also similar to the listed information above but with prefix **lanio16** instead.

otherInfo	irIndex		irName		irValue
	pueIndex	pueName	pueTotalEnergy	pueITEnergy	pueValue

Appendix VI : 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	<i>Prefix/SET/xvboard/do/channel_no</i>	
	Prefix	Please refer to 9.3 MQTT Setting
	channel_no	0~15
Message	0 or 1	

● AO channel of ICP DAS XV-Board

Topic	<i>Prefix/SET/xvboard/ao/channel_no</i>	
	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	<i>Prefix/SET/interface/module_no/do/channel_no</i>	
	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	

● **The AO channel of ICP DAS I/O module**

Topic	<i>Prefix/SET/interface/module_no/ao/channel_no</i>	
	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	<i>Prefix/SET/interface/module_no/coil_output/channel_address</i>	
	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	<i>Prefix/SET/interface/module_no/holding_register/channel_address</i>	
	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	<i>Prefix/SET/ir/ir_no</i>	
	Prefix	Please refer to 9.3 MQTT Setting
	ir_no	1~70
Message	Floating value	

Appendix VII : 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.	

"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 Distortio vthd
harmonic_ithd	Total Harmonic Distortio 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	

	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"
}
```

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.

```
{  
  "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"  
}
```

Appendix VIII : 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