

Power Measurement Unit

PM2218

Instruction Manual



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I、Introduction

Summary

The new generation PM2200 series Power Measurement Unit produced by Hsiang Cheng Electric Corp. is a smart grid concept power measurement unit. The appearance of PM2200 series is designed by aluminum metal and use the latest 32 bits ARMs CPU and 16 bits of 16 synchronized channels AD Converter, high speed vector conversion of alternating current vector can be increased by 4 times. PM2218 can execute conversion of transient value for Vrms, Arms, and progress the rms calculation for synchronized in-phase, and having function for measuring voltage, current, power, power factor, energy, frequency, power quality (harmonic analysis, voltage unbalance, voltage dips, voltage flicker, waveform record) and etc., is able to applied on feeder automation and power monitoring system.

PM2200 Series Power Measurement Unit is designed in accordance to the on-site requirements from users. All terminals are adopted clamp spring terminal blocks of regular nominal terminal blocks. The cord-end terminal can not only ensure the reliability for wiring, but also meet the convenience for onsite maintain. The function of PM2200 series is complete and comply the requirements for feeder automation and power monitoring system.

The measurement rms can transmit by a RS-485 port to progress a MODBUS communication transmission, the transmitting baud rate is up to 38400bps. PM2200 series is equipped with a standard RS-232 port (MINI-USB female connector) at the front panel; administrator can maintain and system function setting by connects directly RS-232 port on the front panel to PC.

PM2218 mainly progress the acquisition of alternating current and calculation of voltage unbalance for 1 BUS voltage and 8 feeder current, and monitoring on-site analog acquisition on feeder under the feeder automation system, and calculating power parameters by instantly convert data per cycle to detect feeder over voltage/low voltage, over frequency/low frequency and voltage unbalance as warning. PM2218 can be used as data acquisition tool for Automation Power System, and great tool for voltage monitoring.

Application and features

- Power supervision / SCADA systems
- Feeder automation / customized
- 0.05% high accuracy
- Cost saving for 8 feeder transducers
- Power quality analysis IEC 61000-4-30
 - Harmonic analysis
 - Voltage dips
 - Voltage unbalance (negative and zero sequence)
 - Voltage flicker ΔV_{10}
 - Voltage low frequency spectrum (0.5-5Hz)
- Speedy real data conversion rate up to 1 cycle
- Software defined for different input system configurations
- Waveform capture can be real waveform or rms value
 - Mapping (32 points in one cycle)

II 、 Specification

1. Processing system

1.1 Main CPU and Interface

CPU	32Bits ARMs Frame
Interface	<ul style="list-style-type: none"> ◎ Standard Comm Port: RS-485 Address: 1 – 254 ; Baud Rate: 1.2K/2.4K/4.8K/9.6K/19.2K/38.4K bps option : LAN-RJ45 ◎ Maintain Port: RS-232 Address: 1 Baud Rate: 19.2K bps
Protocol	Modbus RTU

1.2 Input Configuration and Software Setup (* = vector composed)

Voltages (Nominal) 3 phase 4 wires $V_a, V_b, V_c, *V_0$; $*V_{ab}, *V_{bc}, *V_{ca}$

3 phase 3 wires $*V_a, *V_b, *V_c$; V_{ab}, V_{bc}, V_{ca}

Currents/ 8 feeders $3I / I_a, I_b, I_c$ $I_a, I_b, I_c, *I_0$

$2I / I_a, I_c$ $I_a, *I_b, I_c$

Input setup and wiring 3P4W 3CT / 3U24I

3P3W 3CT / 3U24I

3P3W 2CT / 3U16I

System and wiring 3 phase 4 wires / 3 phase 3 wires

Nominal frequency: 50/60 Hz

Nominal Voltage: 10-320V

PT ratio : 1.0-5000.0

CT ratio : 1.0-5000.0

Conversion Interface 3 elements active power, reactive power ($P_1, P_2, P_3, Q_1, Q_2, Q_3$)

ADC/measuring 16 bits ADC with 16 synchronized channels

Data conversion True RMS conversion, 36 points per cycle; conversional cycle programable from 1,2,4,8,16 to 32.

1.3 Power quality analysis For IEC 61000-4-30

(Option) Harmonic Analysis (Up to 17th Harmonic)

Voltage Unbalance (negative sequence and positive sequence)

Voltage Flicker ΔV_{10} , (0.5 - 5Hz) Spectrum of low frequency oscillation (voltage)

Voltage dips (User's define interval curve)

1.4 Waveform Record Set rolling waveform record or effective value (V_{RMS})

(Option) 36 Points per cycle, length 16 cycles, totally 1728 records per system Record up to 8 feeders

Waveform or RMS data recording, user can set one of them at a time

2. Input Ranges

Voltage	10-300V phase to neutral Maximum Over $\leq 1000\text{VRms}$, 2 seconds Input Resistance $\geq 1\text{M}\Omega$
Current	Rated 5A (0 - 6A) or rated 1A (0 - 1.2A) Maximum Over $3 \times \text{CT}$ continuous : $\leq 25 \times \text{CT}$, 2 seconds : $\leq 50 \times \text{CT}$, 1 seconds Burden $\leq 0.1\text{VA}$ for 1 x CT rated
Frequency	45 - 65Hz

3. Measured Parameters

3.1 Parameters	$25 \pm 5^\circ\text{C}$ Stability $\leq 50\text{PPM}$ ($-10 \sim 50^\circ\text{C}$), $\leq 70\text{PPM}$ ($-30 \sim 70^\circ\text{C}$)
System Frequency (Hz)	0.05% of nominal frequency
Voltage (RMS)	<ul style="list-style-type: none"> ◎ Three Phase Voltage: 0.05% nominal voltage ◎ Neutral Voltage (V_0): 0.2% nominal voltage
Phase Sequence	Auto Detection
Current (RMS)	<ul style="list-style-type: none"> ◎ 0.05% Rated Current (Three Phase Current) 0.2% Rated Current (Neutral Current)
Power (Nominal)	<ul style="list-style-type: none"> ◎ Active Power (W) : 0.2% (nominal voltage x CT), phase and Σ ◎ Reactive Power (Var) : 0.2% (nominal voltage x CT), phase and Σ ◎ Active Energy (WH): 0.2% (nominal voltage x CT x power factor = 1), phase and Σ ◎ Reactive Energy (VarH): 0.2% (nominal voltage x CT x power factor = 1), phase and Σ ◎ Power Factor (PF) : 0.2% (Each phase for each feeder) ◎ Angle: 0.5° for phsae current to phase voltage

3.2 Power Quality Parameters

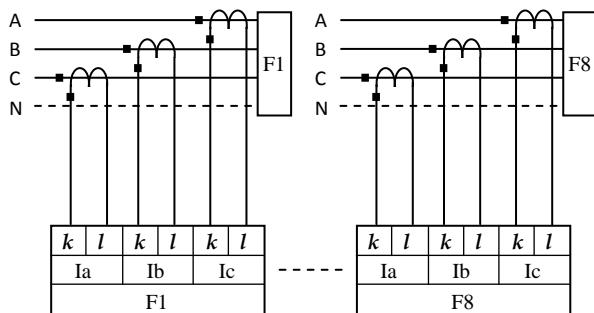
Sequence (Voltage)	<ul style="list-style-type: none"> ◎ 0.2% of nominal voltage Positive sequence Negative sequence Zero sequence
Voltage unbalance	<ul style="list-style-type: none"> ◎ 0.2% of positive sequence voltage Negative sequence unbalance (%) Zero sequence unbalance (%)
Distortion in harmonics	Analysis in $V_a, V_b, V_c, I_a, I_b, I_c$, Fundamental and With 2^{th} to 17^{th} Distortion, HD-F and THD-F
Voltage flicker	Voltage flicker $\triangle V_{10}$, 0.5–1–2–3–4–5 Hz, Spectrum of low frequency oscillation (Voltage)
Voltage dips	User's define interval curves 2 user's define interval curves (90%-20% of nominal voltage are totally 8 definite time)

4. Electrical characteristics

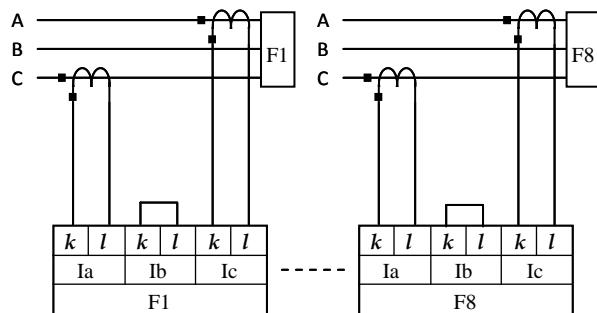
- | | |
|---------------------|---|
| Dielectric strength | ◎ IEC 255-5, 2KV ACRMS 1 minute |
| Impulse and surge | ◎ IEC 61000-4-2, class III
IEC 61000-4-3, class III
IEC 61000-4-4, class III
IEC 61000-4-5, class III
IEC 61000-4-12, class III |
| Safety | ◎ IEC 60068-2 standard for burn-in test : operating
Temperature cycling test -40 to 85°C (start at -40 to 85°C, 2 cycle 8 hours), RH 10 to 95% non-condensed
High temperature test 85°C RH 55% 16 hours
Temperature / humidity cycling test 40°C RH 95% 16 hours |
| | ◎ IEC 60068-2-6 :
Vibration endurance 2G 9-350Hz 1 hour |
| | ◎ IEC 60068-2-27 :
Mechanical shock test 15G 11ms 24 hours |
| Power supply | LO : DC 20-60V
HI : AC 80-260V @ 40-70 Hz, DC 80-330V
Dissipation maximum 10 VA for AC and 5W for DC |

5. Wiring

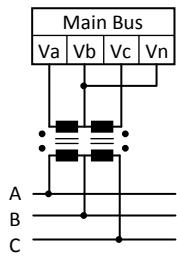
3 Current (Ia, Ib, Ic) for 3P4W, 3P3W



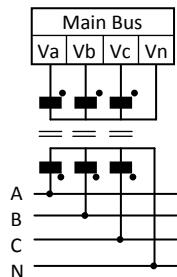
2 Current (Ia, Ic) for 3P3W



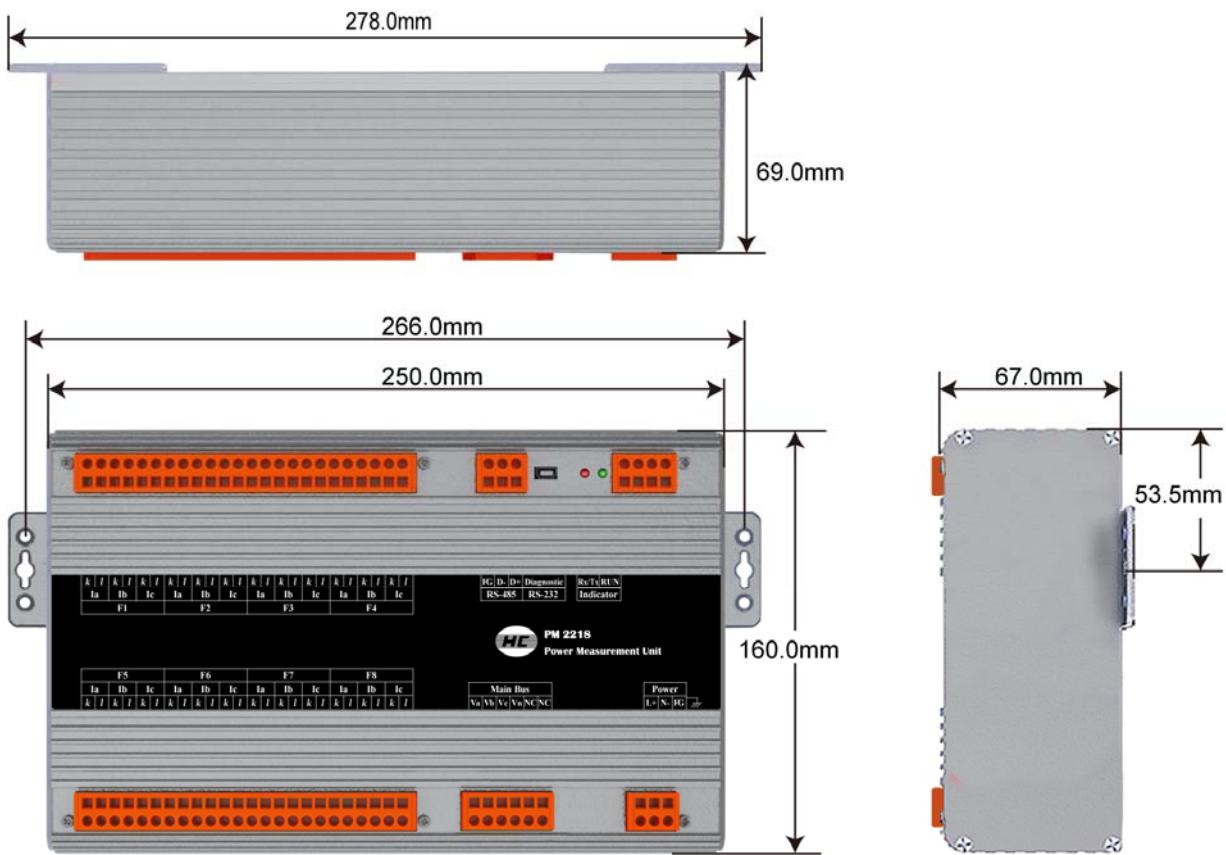
3 phase 3 wires 3U input



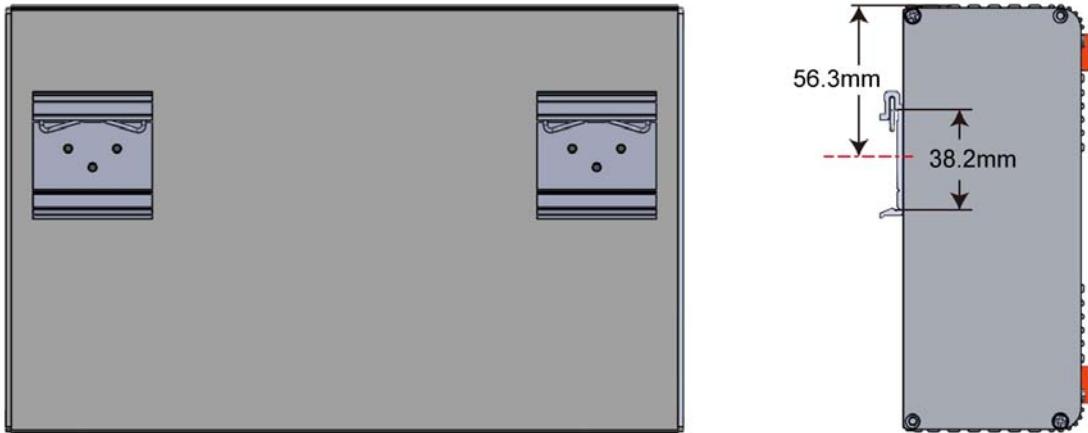
3 phase 4 wires 3U input



6. Dimension / Mounting



Din Rail Mount (with 35 mm)



7. Net Weight = 1300g ± 50g

III 、 Function

Parameter

Measure main power system frequency/ three phase voltage (Van, Vbn, Vcn)/ current/ /energy of 8 feeders. Calculate line voltage (Vab, Vbc, Vca) / zero phase voltage (V0) / phase sequence voltage by software composed. Based on voltage in-phase synchronized by instantly high speed convert data per cycle as warning.

Alarm

Status for 7 types of Alarm: Over voltage, Under voltage, Over frequency, Under frequency, Positive Voltage Unbalance, Negative Voltage Unbalance, Voltage flicker.

Each type of value for pickup and time for delay can be set as on or off to activate or deactivate. When the value is over limit of setting value for pickup, PM2218 start to count the time for pickup. If the time for pickup is over delay time, the status unit of PM2218 will turn to 1. After the value is under the pickup, the status unit of PM2218 will recover to 0 in five seconds.

	Function	Pickup	Delay (sec)
Phase Overvoltage	Off ▼	130.0 V	2.0
Phase Undervoltage	Off ▼	90.0 V	2.0
Overfrequency	Off ▼	51.0 Hz	2.0
Underfrequency	Off ▼	49.0 Hz	2.0
Unbalance Zero Voltage	Off ▼	2.0 %	2.0
Unbalance Neg. Voltage	Off ▼	2.0 %	2.0
Flicker Over	Off ▼	0.20 %	2.0

The PM2218 event recorder runs continuously and records the cause, time, date, status, and data at occurrence of each event.

The event recorder can store totally 200 most recent event in static memory (Data1 、 Data2). The content will be varied by the causes for difference event.

Cause	Data1	Data2
00 = No Event	0	0
01 = Power On / Reset	0	0
02 = Power Off	0	0
03 = Reserved	0	0
04 = Self Test Error	Exception Code	0
05 = Clear All Energy	0	0
06 = Clear System Event Record	0	0
07 = Time/Date set	0	0
08 = User's Map Parameter Changed	Address	Quantity
12 = Clear SAG Event Record	0	0

The PM2218 alarm event recorder runs continuously and record the cause, time, date, status (Over/Under), and data at occurrence of each event.

The event recorder can store totally 200 most recent events in nonvolatile memory (Data). The content will over limit by the causes for difference event.

Cause	Unit
00=No Event	0
01=Phase Overvoltage Alarm	BUS
02=Phase Undervoltage Alarm	BUS
03=Overfrequency Alarm	BUS
04=Underfrequency Alarm	BUS
05=Zero Sequence Unbalance Alarm	BUS
06=Negative Sequence Unbalance Alarm	BUS
07=Voltage Flicker Alarm	BUS
08= Sag Alarm	BUS

IV、Power Quality (Option)

1. Harmonic

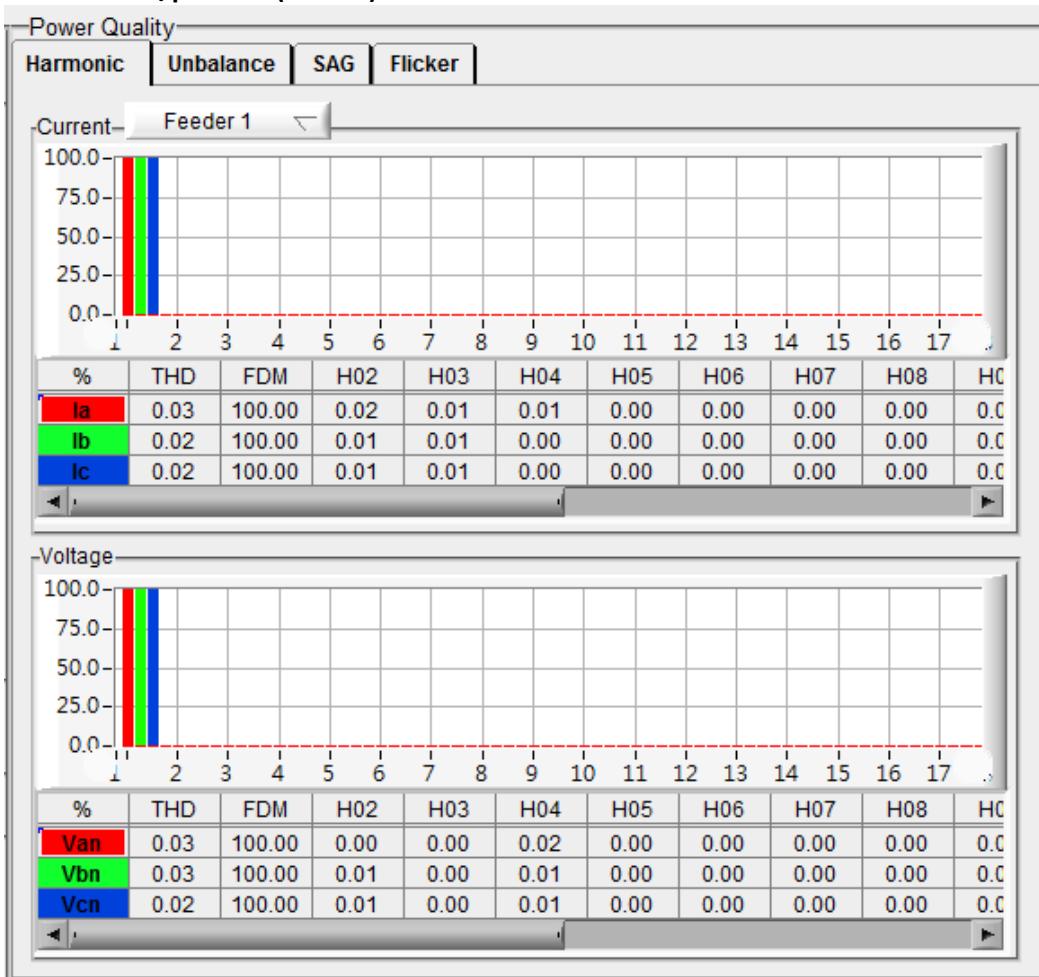
Harmonic will damage power generation equipment and user equipment, such as power consumption and overload of electrical equipment, overload and damage of capacitor, and interference caused by other equipments. Harmonic is one of the important items for power quality. The measuring parameters for harmonic of PM2218 are as follows:

Phase Analysis: Va, Vb, Vc ; Ia, Ib, Ic / Feeder (8 feeders maximum)

Harmonics Analysis: Analysis with fundamental and 2th to 17th Distortion, HD-F and THD-F

$$\text{THD-F} = \frac{\text{rms of harmonics}}{\text{rms of fundamental}} = \sqrt{\frac{H_2^2 + H_3^2 + H_4^2 + \dots + H_{17}^2}{\text{Fundamental}}}$$

Conversion Rate: 5 sec/per BUS (Feeder)



2. Flicker

The method for evaluate severity of PM2200 series voltage flicker is published by Central Research Institute of Electric Power Industry. The method is to take $\Delta V10$ of Voltage flicker 10Hz as standard to measure the severity of voltage flicker for electricity user. According to the article 431 of 「The governing rules for user premise power line placement」 of Taiwan, vibration of power load of electric arc furnace should comply with the following provisions: About the volume for voltage flicker at same point of vibration of power load for electric arc furnace, the equivalent maximum voltage ($\Delta V10$ max) vary 10 times per second should be lower than 0.45%. The voltage flicker value represent $\Delta V10$, therefore, the voltage flicker value of PM2200 series is to calculate $\Delta V10$ value of three phase voltage, and also to calculate voltage vibration ΔV and voltage spectrum of low frequency oscillation.

Voltage vibration ΔV and voltage flicker $\Delta V10$ are defined as follow:

$$\Delta V = \sqrt{\sum (\Delta V_{fn})^2}$$

$$\Delta V10 = \sqrt{\sum (a_{fn} \times \Delta V_{fn})^2}$$

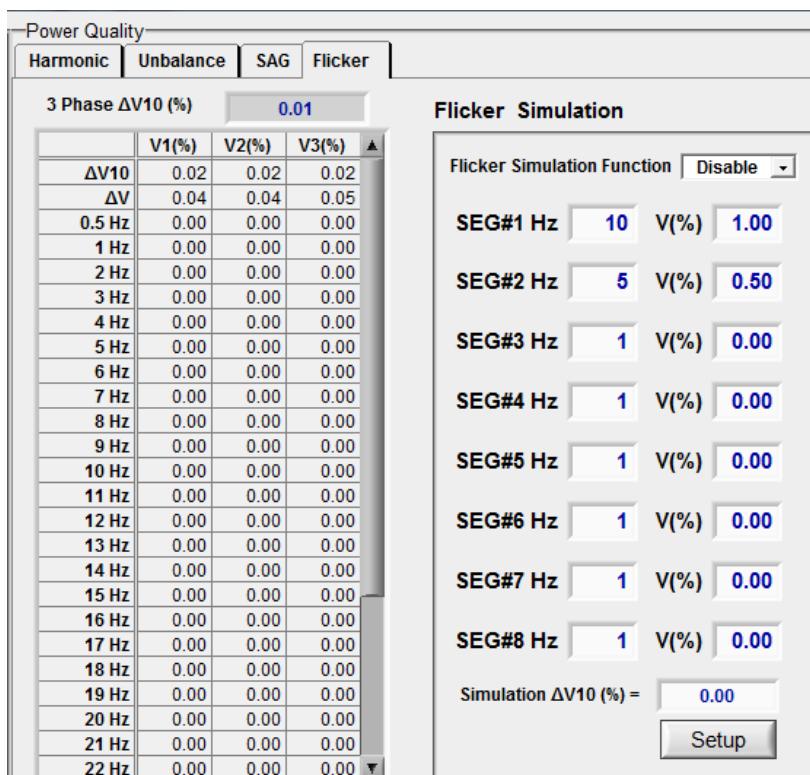
ΔV_{fn} is voltage vibration of frequency n Hz, a_{fn} is the coefficient of visual fatigue for fn Hz voltage vibration equivalent to 10Hz vibration. When vibrating frequency is lower than 0.5 Hz or higher than 30Hz, it is not easy for people to recognize by naked eyes and we usually ignore its effect. Therefore, the ΔV_{fn} voltage spectrum of low frequency oscillation of PM2200 series is to calculate 0.5Hz and from 1 to 30Hz, totally 31 spectrums of frequency oscillation for user to analyze.

Phase Analysis: Va, Vb, Vc/BUS

Voltage flicker value: $\Delta V10$

Voltage spectrum of low frequency oscillation: ΔV 、 $\Delta V_{0.5Hz}$ 、 $\Delta V_{1Hz} \sim \Delta V_{30Hz}$;

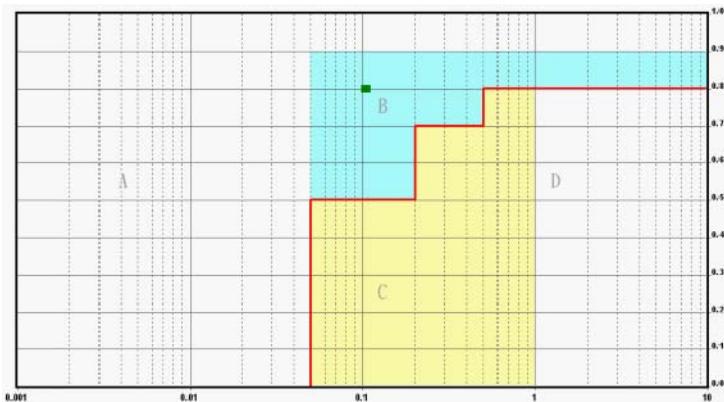
Conversion Rate: 5 sec/BUS



3. Voltage SAG detection

Voltage SAG refers voltage drop 10% to 90% below nominal value, the maximum time should not be over 1 minute. In general, the time for voltage sag is shorter than tenth of a second; the supply voltage can instantly recover to standard value.

In SEMI F47-0200, it requires tolerance time that semiconductor processing equipment should have for voltage SAGs is from 0.05 second to 0.2 second when voltage is 50% of nominal value, and from 0.2 second to 0.5 second when voltage is 70% of nominal value, and from 0.5 to 1.0 second when voltage is 80% of nominal value.



The voltage SAG function of PM2200 Series is designed according to the regulation of SEMI F47-0200. When any phase of three phase voltage among each BUS is lower than 90% nominal voltage but higher than Threshold, PM2200 series will start timing and trigger waveform record function (option). PM2200 series will have SAG Event log and record the lowest value for three phase voltage until all of three phase voltage are higher than 90% nominal voltage. If the decay time is over “Tolerance time curve”, the SAG Alarm will be activated. For the tolerance time level that equipment can tolerate voltage sag, user can set up tolerance time in 10% per unit for total 8 sections when voltage is between 90% nominal value to 20% nominal voltage value, and set up two curves for different equipments in advance. The functions are as following:

- ◎ Select Function: On/Off
- ◎ Threshold: Setting as percentage of nominal voltage
- ◎ Selection of Curve: Two curves (A/B)
- ◎ Tolerance Time Curve: 8 sections of tolerance time (90%~20%)

Percentage of Voltage SAG (Curve A/B)	Tolerance Time Set	Default Value
90% of Nominal value	10 ~ 60000 ms	10000 ms
80% of Nominal value	10 ~ 60000 ms	500 ms
70% of Nominal value	10 ~ 60000 ms	200 ms
60% of Nominal value	10 ~ 60000 ms	200 ms
50% of Nominal value	10 ~ 60000 ms	50 ms
40% of Nominal value	10 ~ 60000 ms	50 ms
30% of Nominal value	10 ~ 60000 ms	50 ms
20% of Nominal value	10 ~ 60000 ms	50 ms

4. SAG Event Log

When any phase of three phase voltage is lower than 90% nominal voltage but higher than Threshold, PM2200 series start timing until all of three phase voltage are higher than 90% nominal voltage. The meter will have SAG Event log and record time of accident, date, BUS (Unit), phase (State) duration time, and minimum three phase voltage. Totally 64 events can be stored in the Event log.

Sag Event Log						
<input type="button" value="Save Sag Event Log"/>		Total Number:	2	<input type="button" value="Clear Sag Event Log"/>	2014/02/25 13:24:44 26	
	Date	Time	Cause		Duration	Voltage
1	2014/03/03	11:07:48 096	BUS #1 ;Phase C Voltage Vcn / Vca		1326	78.380
2	2014/03/03	11:07:48 096	BUS #1 ;Phase A Voltage Van / Vab		1327	42.270

5. Waveform Record (Option)

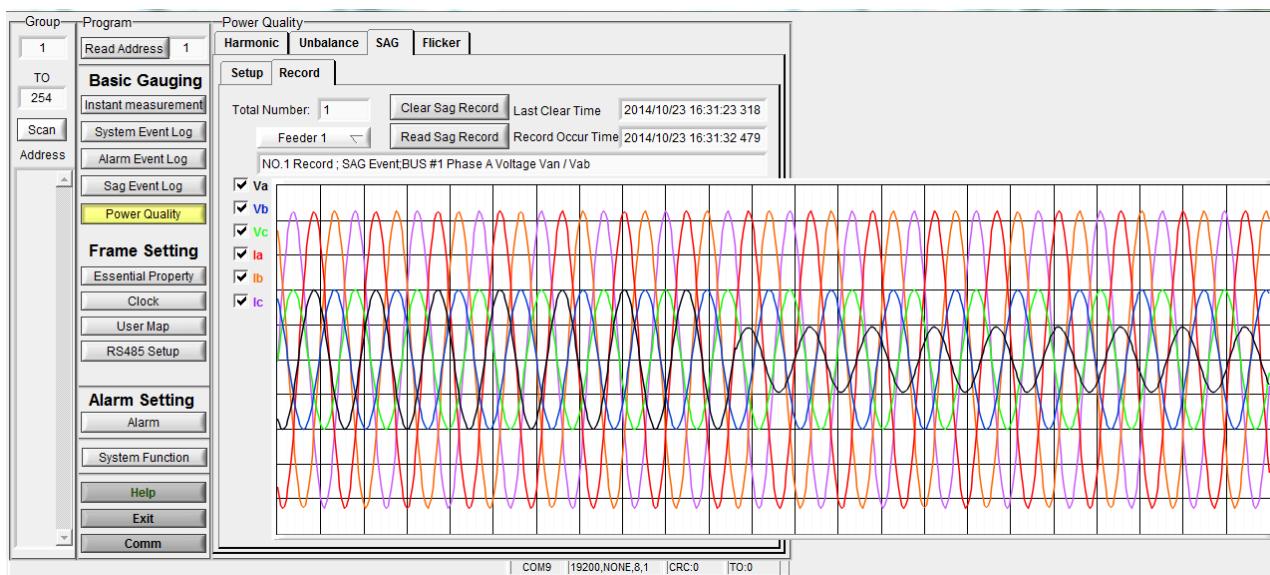
When voltage sag is happened or Waveform Capture command is being released, the waveform record function for three phase voltage will be triggered and record time, date, BUS (Unit), and phase (State) of accident. After the record is completed, the Total Number will be increased by 1. User can take the Total Number as a reference for confirming if data is completely recorded. The function is as following:

Phase Record : Va, Vb, Vc ; Ia, Ib, Ic / Feeder (8 feeders maximum)

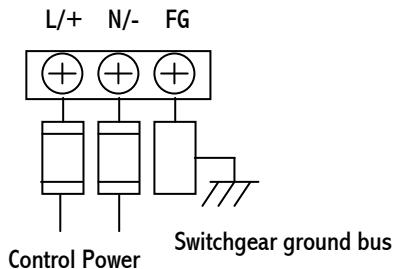
Data Capacity: 36 Points per cycle, length 16 cycles , totally 1728 events/per three phase system

- Select Function: Off/SAG Trigger/Waveform Capture
- Data Status Type: Input Waveform/ True RMS Data value (VRMS)
- Trigger Type: 1 ~ 8 weeks (Before trigger)
- Trigger Mode: One Shot / Retrigger

If user selects one shot trigger, and then giving “clear fault record” command before retrigger the waveform record.



6. Control Power



Note: Control power supplied to PM2200 series must match the allowable range. If applied voltage does not match, damage may occur.

A standard power supply to PM2200 series is a universal supply voltage with the allowable range. Considerable filtering with transient protection is built into the PM2200 series to ensure reliable operation. Transient energy must be suppressed & conducted back to the source through filter ground terminal FG. User should remove transient protection components before doing dielectric strength test for transient protection components of filter ground terminal FG, and then installed transient protection components back after test is completed. User should properly install transient protection components to meet the safety regulation.

Voltage Input

The voltage input range of PM2200 series is allowed from 10-300Vac between Va , Vb , Vc and Vn. The input voltage can be input to PM2200 series by directly connect.

When the measuring voltage is higher than 300Vac, it is required external PT to input voltage to PM2218. The Vn terminal of PM2200 series is reference voltage of voltage input; user must properly connect the Vn terminal. Vn = Vn when measuring three phase four wires system, and Vb needed to connect with Vn when measuring three phase three wires system. Please refer to the wiring for detailed connection.

Shielding ground

The input and output wiring to the PM2200 series for RS485 com port are required to use shielding cable “the shielding ground should be with one end ground at PM2200 series end only or at SCADA / PLC / Computer only” to minimize noise effects.

RS485 communication wiring

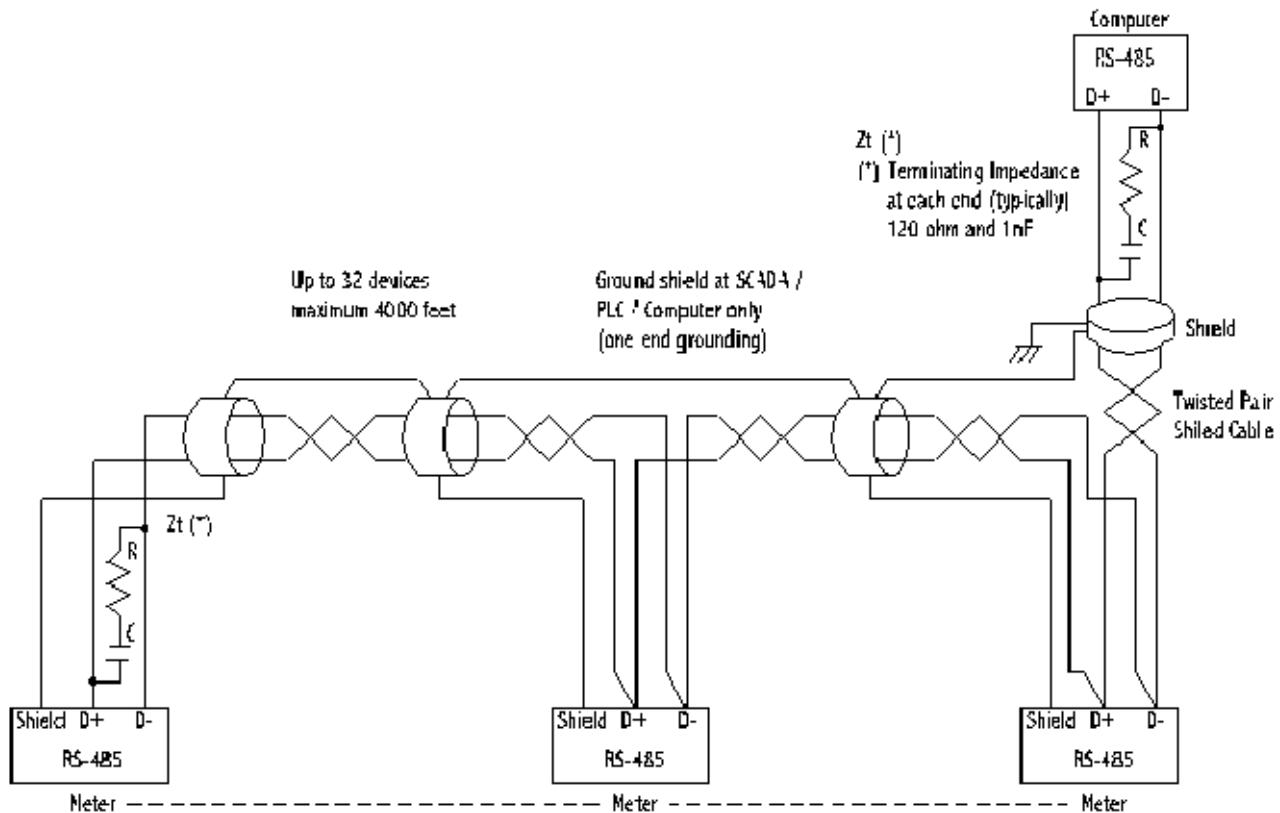
A serial port provides communication capabilities between the PM2200 series and remote computer, PLC or distributed control system (DCS). Up to thirty-two PM2200 series can be daisy chained together with 24 AWG stranded, shielded, twisted pair wire on a single communication channel. Suitable wire should have a characteristic impedance of 120 ohms. These wires should be routed away from high power AC lines and other sources of electrical noise. The total length of communications wiring should not exceed 4000 feet for reliable operation. Correct polarity is essential for the communications port to operate. Terminal (485+) of every PM2200 series in a serial communication link must be connected together. Similarly, terminal (485-) must be connected together. These polarities are specified for a 0 logic and should match the polarity of master device.

The last PM2200 series in the chain and the master computer need a terminating resistor and terminating capacitor to prevent communication errors by ensuring proper electric matching of the loads. Using terminating resistors on all the PM2200 series would load down the communication network while omitting them at the ends could cause reflections resulting in communication errors. Install the 120Ω terminating resistor and 1nF capacitor externally.

Power Measurement Unit

PM2218

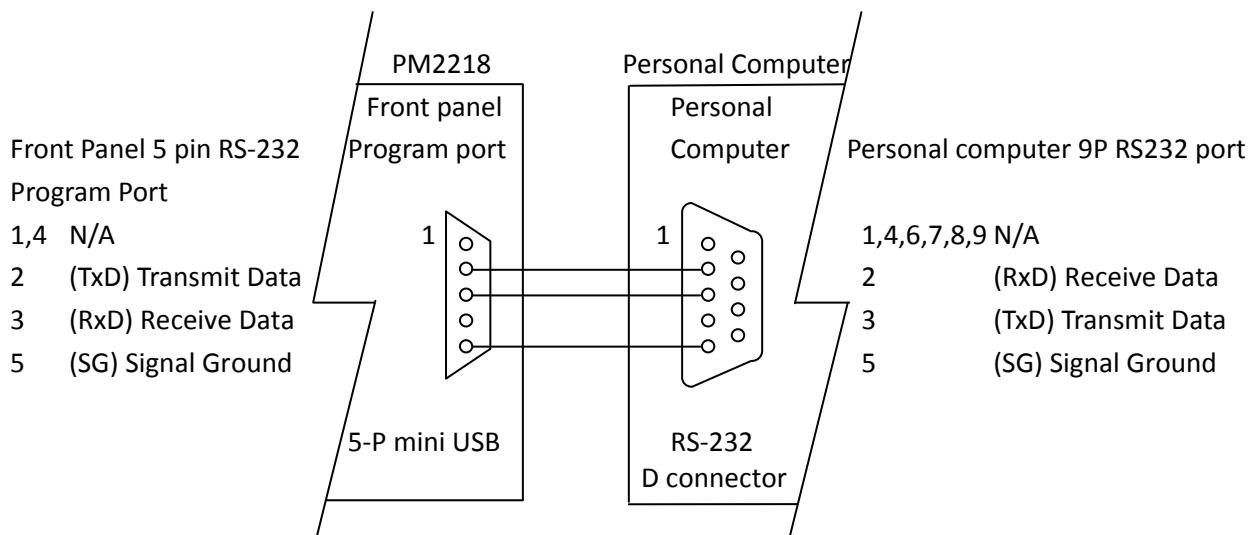
RS-485 front panel port



RS-232 Front Panel Port

A mini USB 5-pin RS232 serial port is provided on the front panel for programming the PM2218 using a personal computer. This port uses the same communication protocol as rear terminal RS485 ports. To use this interface, the personal computer must run the local programming software, PM2218 PC, provided with the PM2218. Connect PM2218 mini USB port to the PC RS-232 port by a special mini USB to RS-232 cable; wiring as follow

Note : RS232 port always communication use Address = 1 and Baud rate = 19200.



V、PCTool PM2218 Operating mode

1. Overview

PM2218_PCTool is a utility program that can help user to connect to PM2218 Distributed Terminal Unit rapidly. It also provides the full function of operating interface which is convenient for checking the meter's data and parameters.

PM2218_PCTool can connect to 254 PM2218 meters simultaneously and user can operate multiple meters by a single communication line.

Requirement:

Hardware requirement: Pentium PC

Software requirement: Windows 98(1) / 98SE(1) / ME(1) / NT / 2000 / WIN7

◎ Required to install different version of VISA(Virtual Instrumentation Software Architecture)

Connection to PM2218 meters:

RS232: Using PC's communication port to connect to PM2218 directly.

RS485: Using PC's communication port to connect to PM2218 by RS232/RS485 converter.

2. Installation and uninstallation of PM2218

This chapter describes how to install and uninstall PCTool program.

PCTool requires windows 98 or higher versions to operate. Please remove previous version of PCTool if user wants to reinstall this program.

To perform PM2218 correctly, first user needs to enter basic setpoints and system CT/PT ratio according to current requirements at the job site

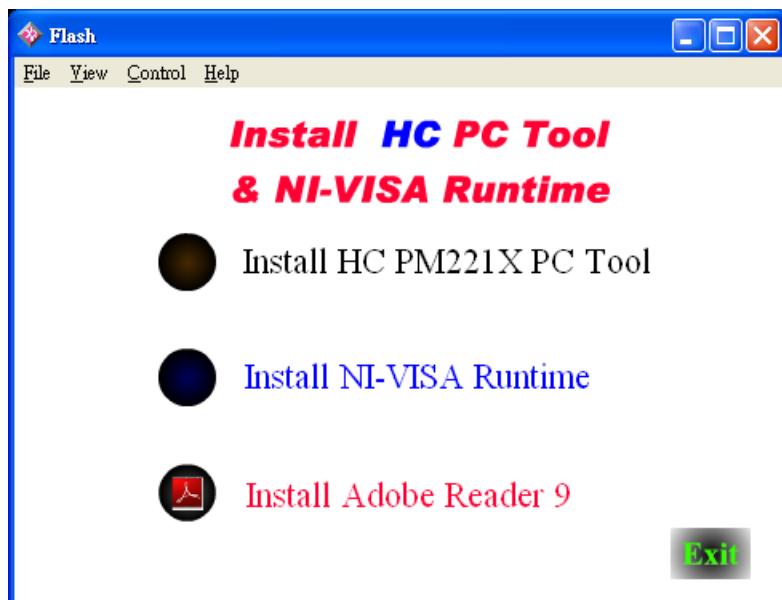
2.1 Installation

2.1.1 Installation of PCTool

Before running the PCTool, user is request to install the program on PC first (if an old version of PCTool is already installed please refer to Ch.2.2 to remove first).

A: Place the Install CD into the Driver, the system will auto display below screen:

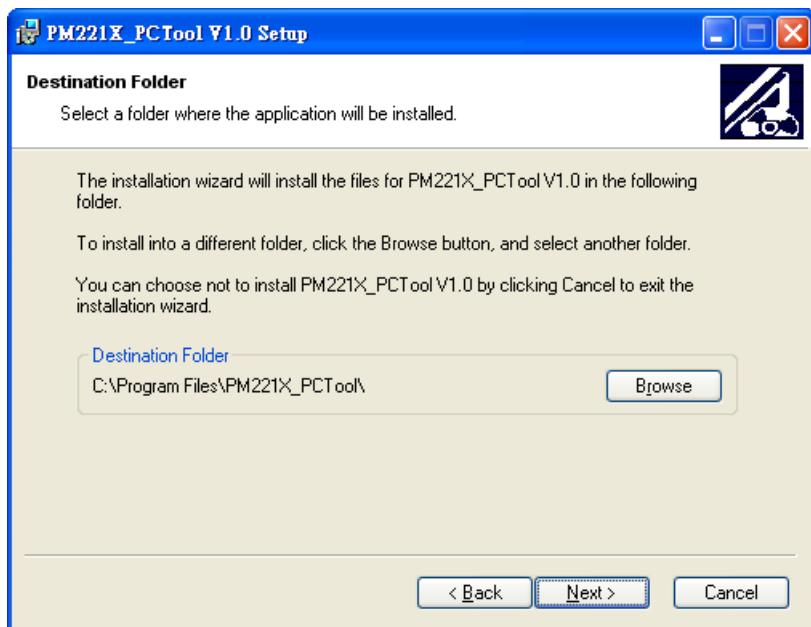
Click Install PM2218 PC Tool to start the PC Tool installation.



B: If no auto display above screen, enter the file manager “CD Drive” → Click PM221X PCTool file → installer → click setup.exe to enter the installation screen.



To start the PCTool installation procedure, click **Next >** to enter next step, or click **Cancel** to cancel the procedure.



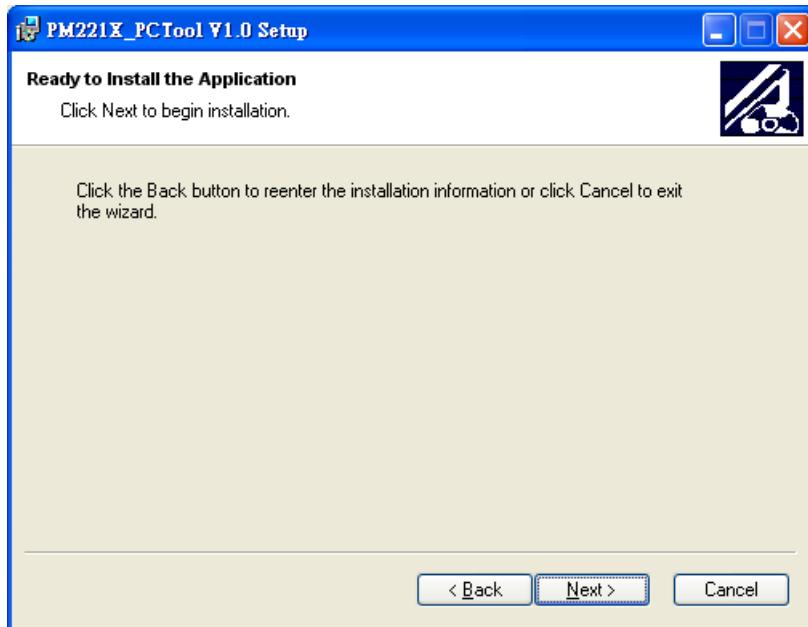
Select the directory to install the PCTool, the default directory of the PCTool is installed to "C:\Program Files\PM2218 v1.0"; the location is for user where to place the execution file of PCTool. User usually does not change the location. In general, it is recommended to install PCTool in the default destination folder.

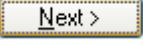
Click **Next >** to enter the next installation procedure.

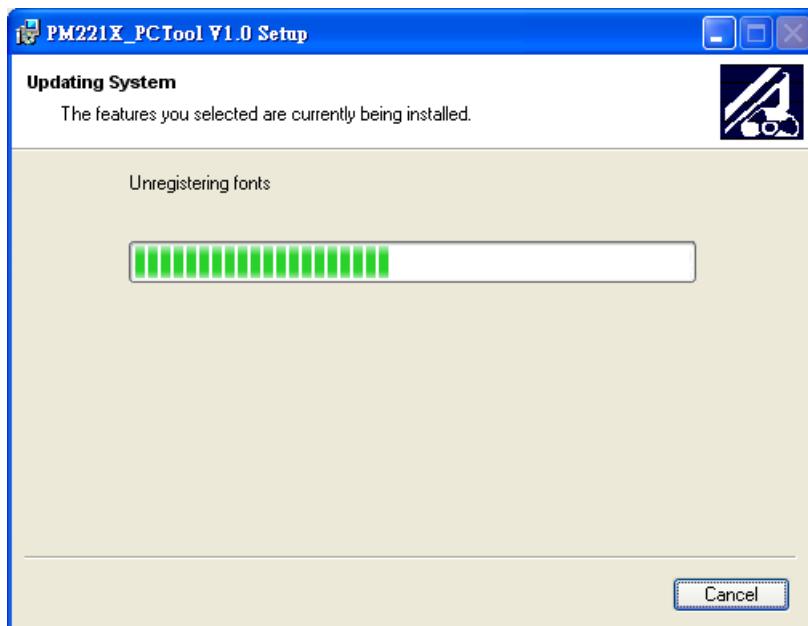
If user would like to change the installation directory or the destination folder has no enough capacity to install, user can also click on **Browse** as follow to install the PCTool to the appoint Folder.



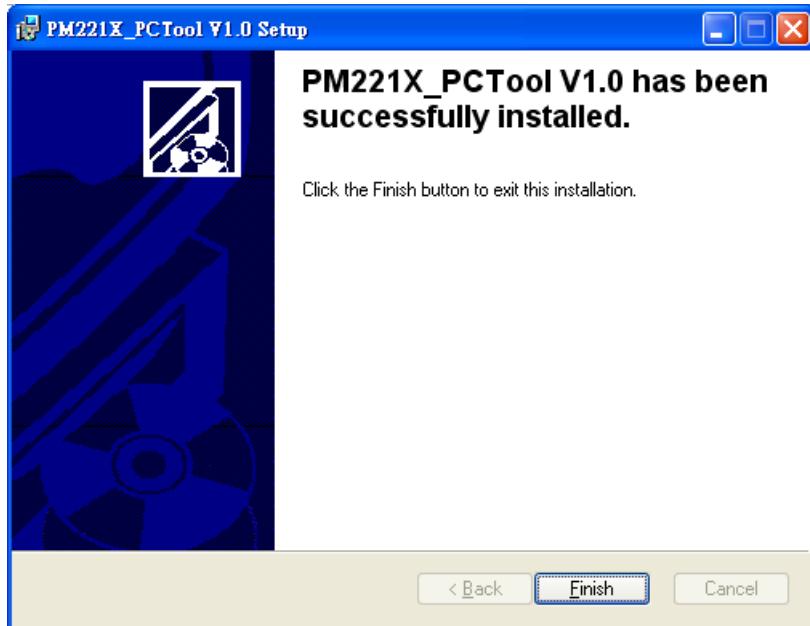
To stop the installation, click  to cancel the installation.



The system will double confirm the installation of PCTool, click  to enter next step or click  to cancel the install procedure.



During the installation, system will indicate the progress and information. Click  to cancel the procedure.



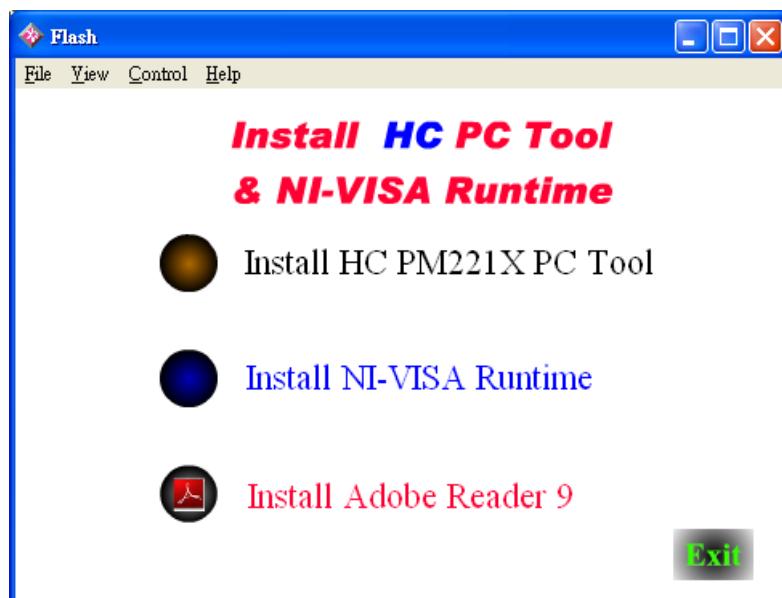
Above display has indicate the complete of installation, click **Finish** to exit the PC Tool installation procedure.

2.1.2 Install NI-VISA Runtime

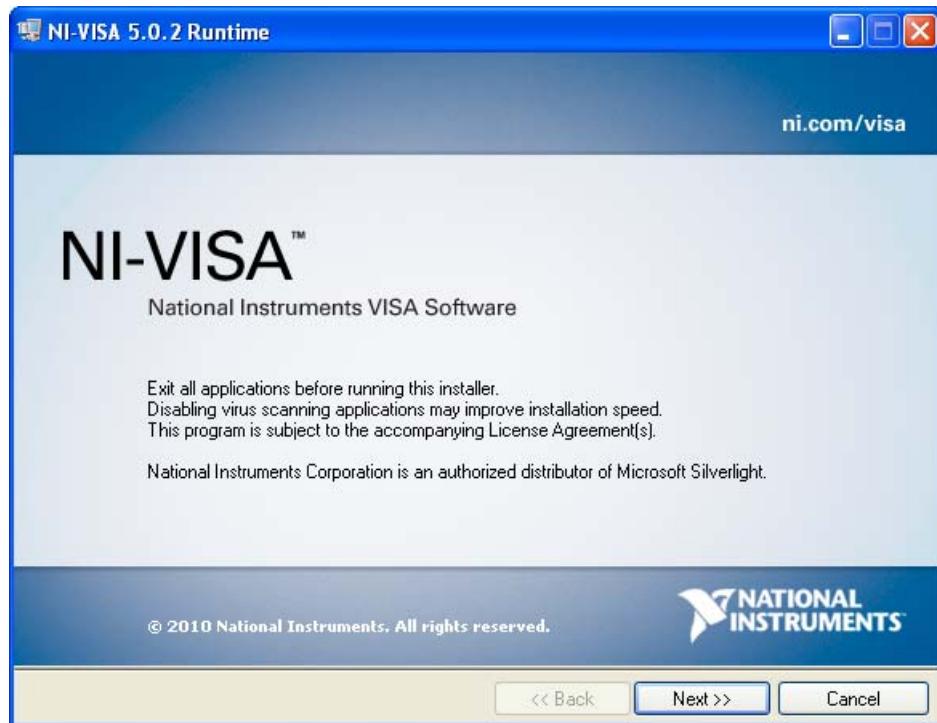
This PC Tool use the LabVIEW published by NI Company, when executing the program a basic Runtime program is request to be installed; this procedure is only allow to install once for each PC, if user is requesting to install other PCTool from HCE, the NI-VISA Runtime is no need to re-installed.

Procedure of Installation:

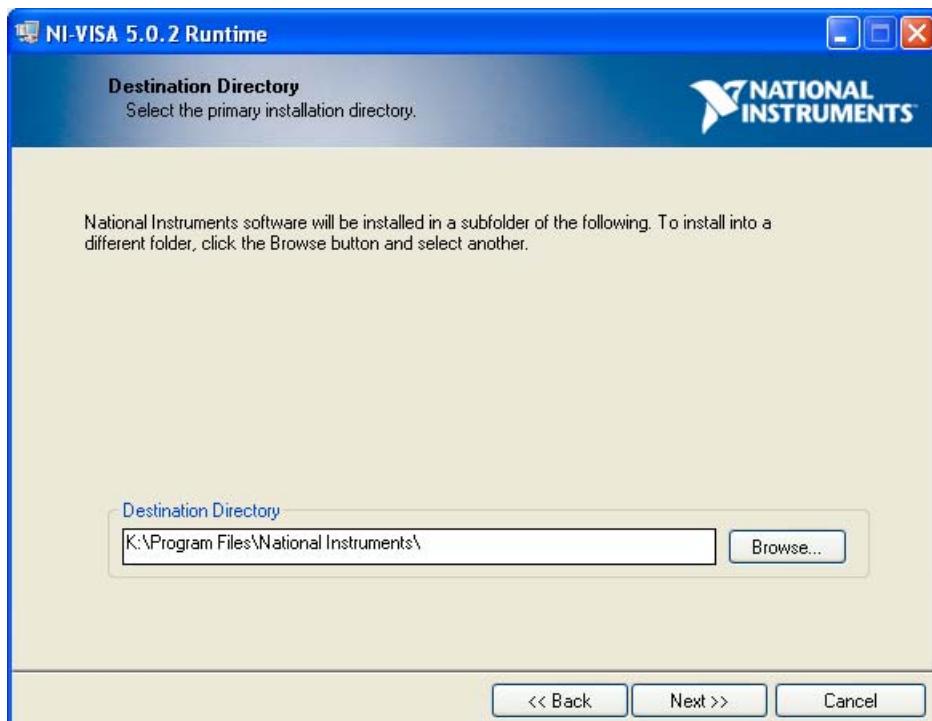
- A: Place the Install CD into the Driver, the system will auto display below screen:
Click "Install NI-VISA Runtime", to start the installation procedure.



- B: If no auto display above screen, enter the file manager "CD Drive" → click NI-VISARuntime502 file → 5.0.2 file → click setup.exe to enter the installation screen.



Enter the installation procedure, the above screen will display. Click **Next >>** to enter next step or click **Cancel** to exit the installation screen.

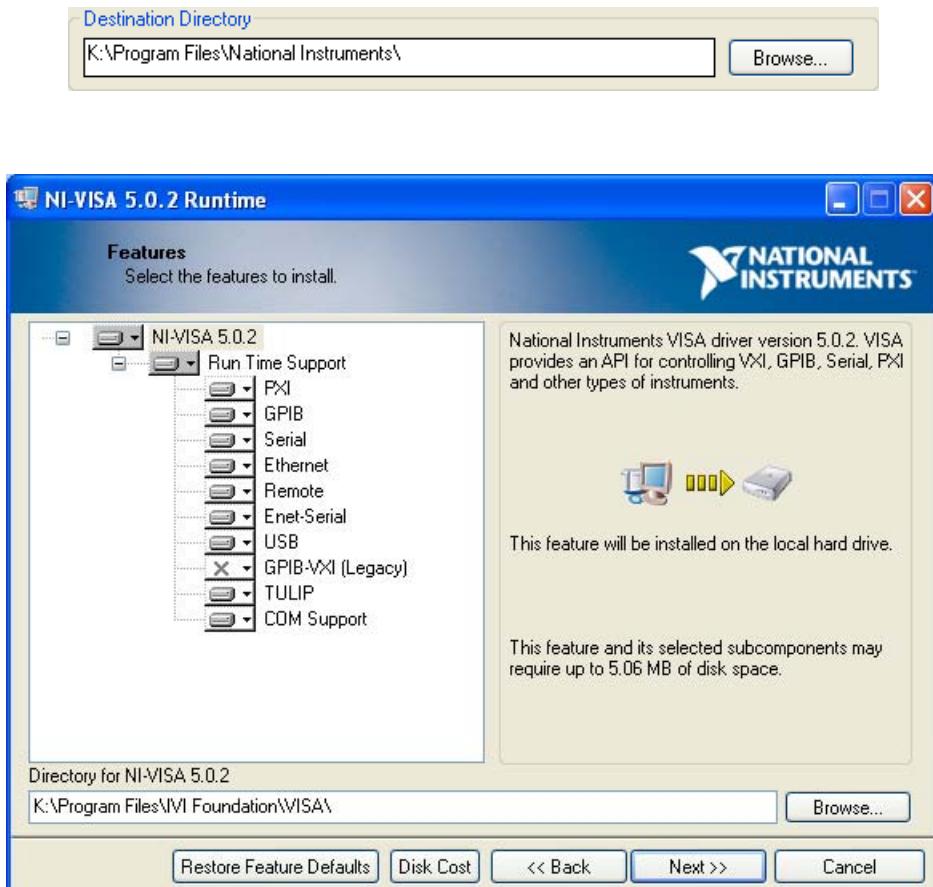


Select the directory to install the program, the default directory of the PCTool is installed to "C:\Program Files\National Instruments\"; the location is for user where to place the execution file of PCTool. Click **Next >** to enter next installation procedure.

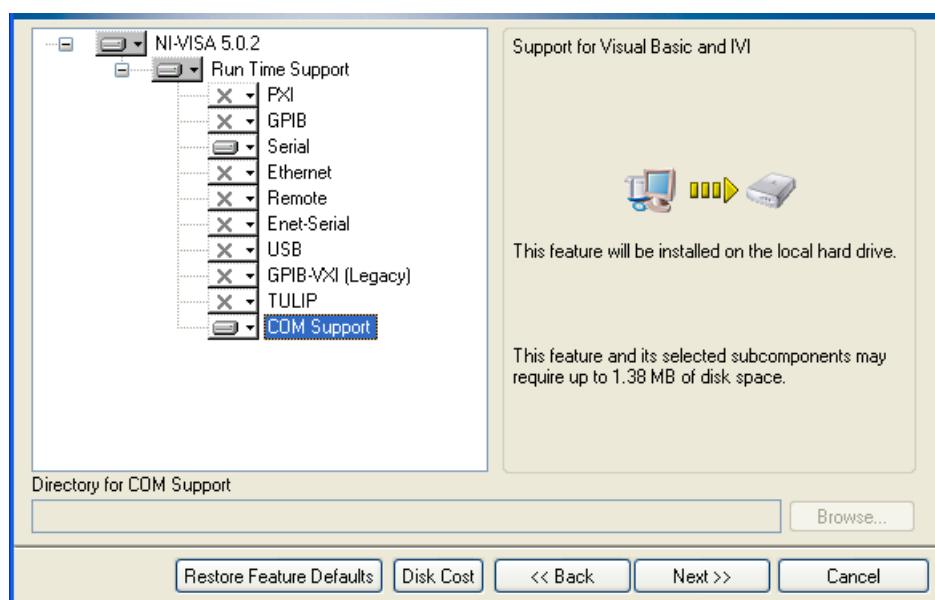
Power Measurement Unit

PM2218

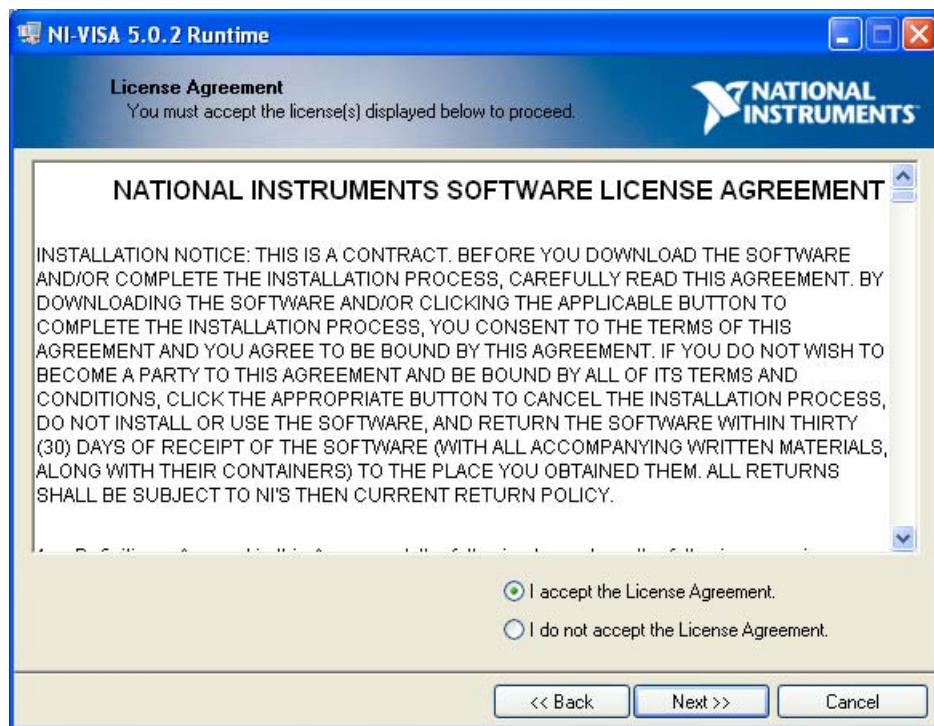
If user would like to change the installation directory or the destination folder has no enough capacity to install, user can also click on **Browse** button as follow



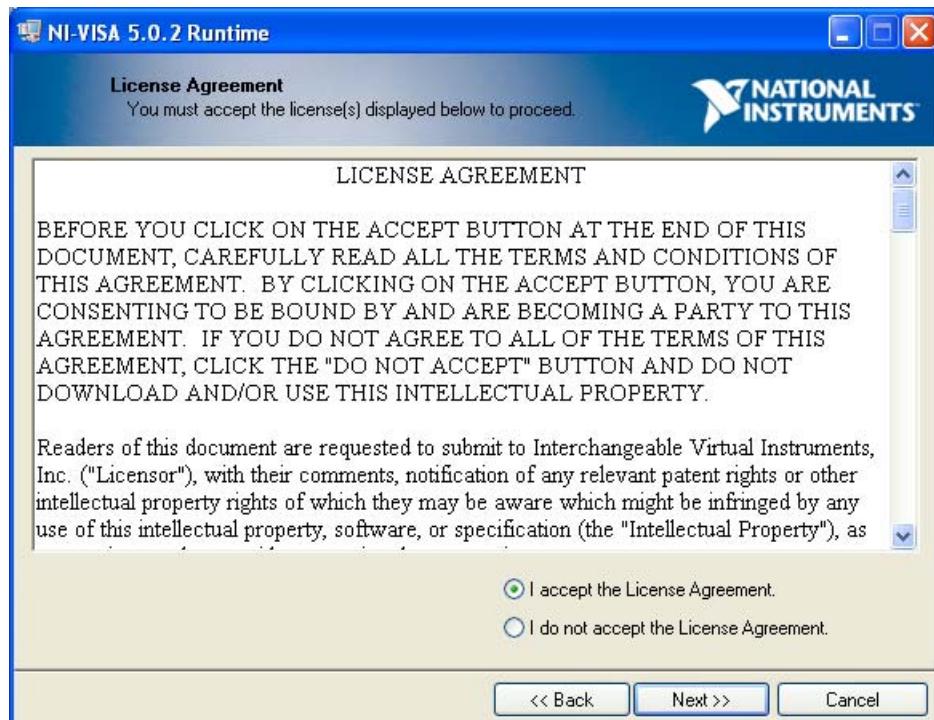
Due to the NI-VISA is capable to support multi-type communication, the system will inform the user whether to install all or not. If there is enough space, we suggest installing all; otherwise, install the Serial and COM Support only as follow.



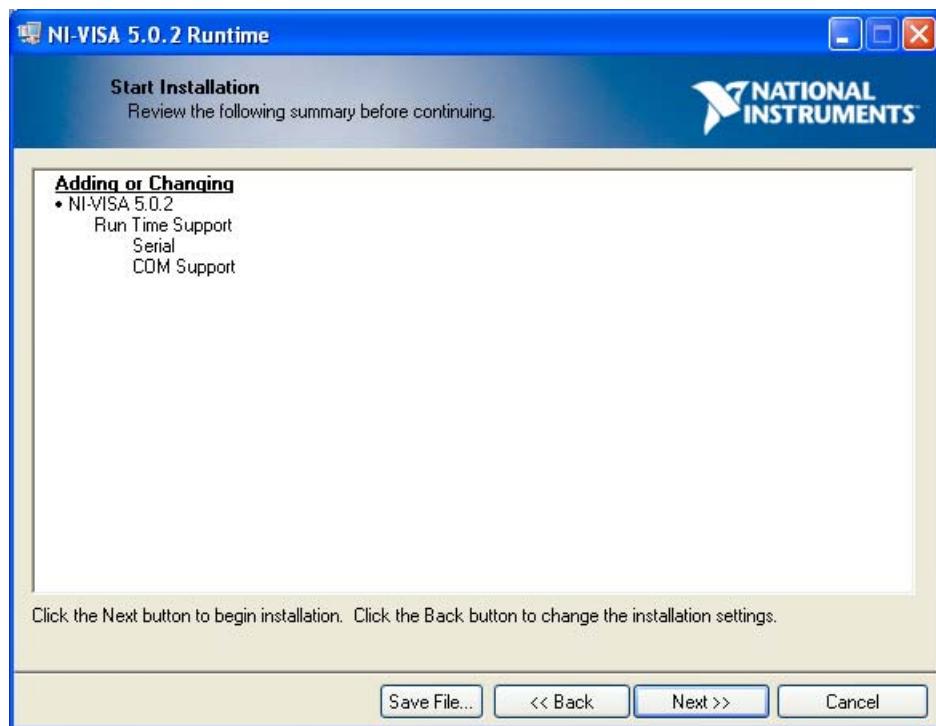
Click **Next >>** after confirm to enter the next step.



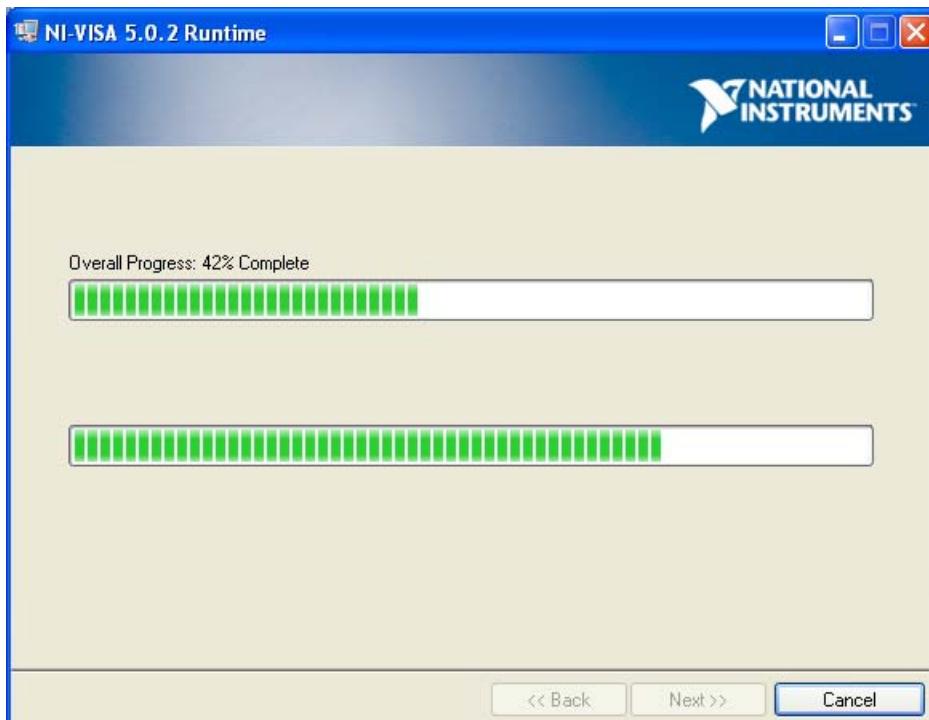
Clause I, click "I accept the License Agreement", and click **Next >>** to enter next step.



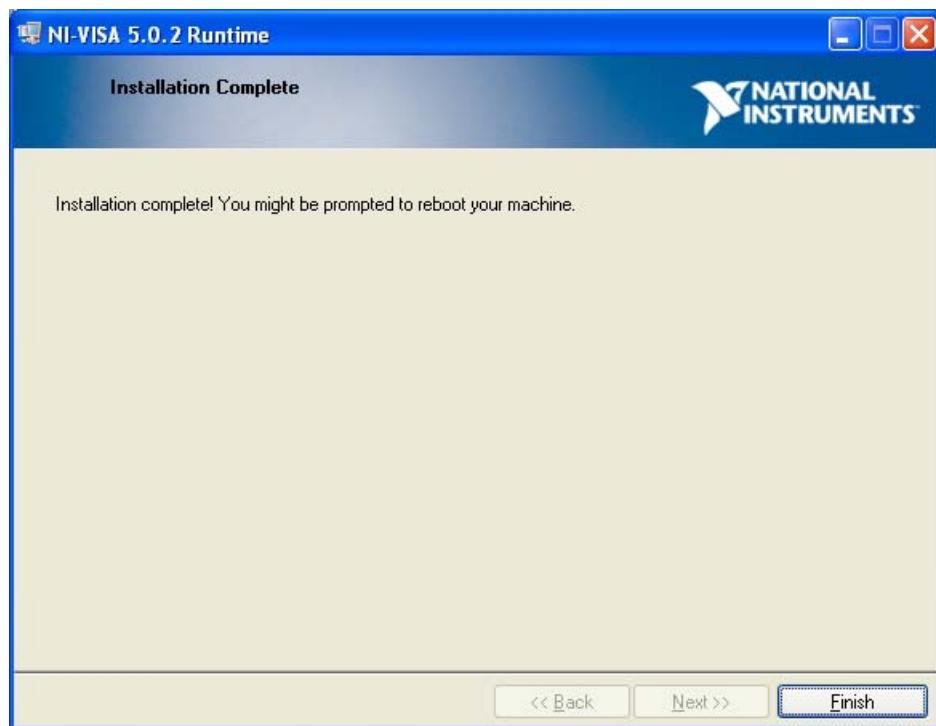
Clause II, click "I accept the License Agreement", click **Next >>** to enter next step.



The system will confirm the installed item. If correct click **Next >>** to enter next step.



Indication of the installation progress. The time of installation will be determined by PC.



Complete installation; the Restart of the PC is requested.

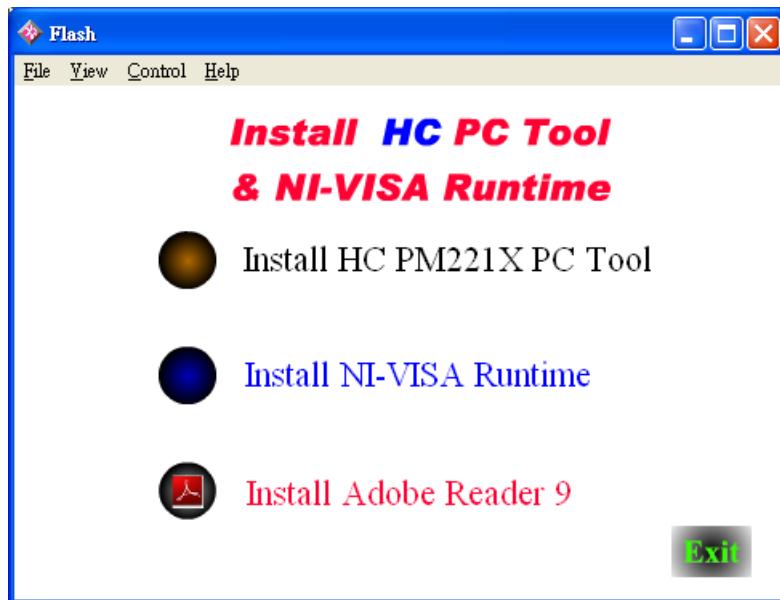


2.1.3 Installation of Adobe Reader

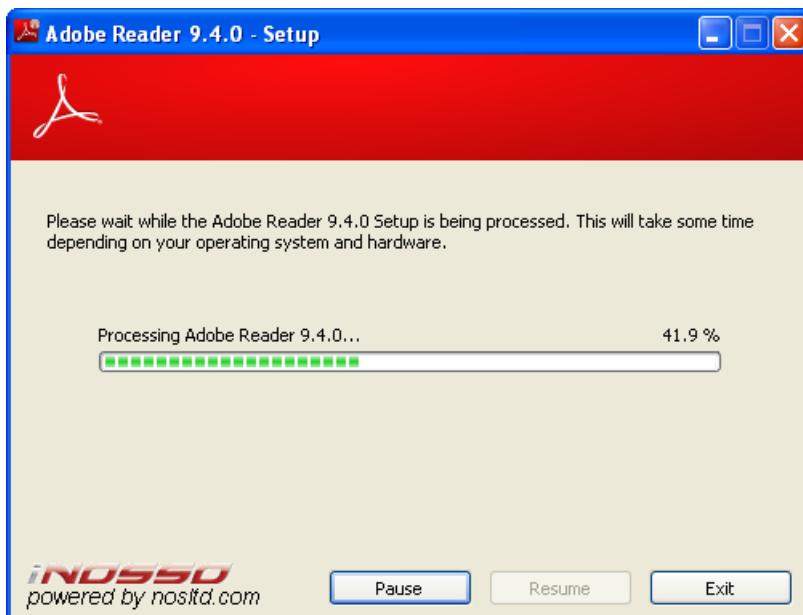
The manual content in the PC Tool has request for Adobe Reader, the user is request to install the program. The CD is containing the Adobe Reader 9 program. If the PC is using a lower version, please upgrade. Installation has TwoTypes

A: Place the Install CD into the Driver, the system will auto display the below screen:

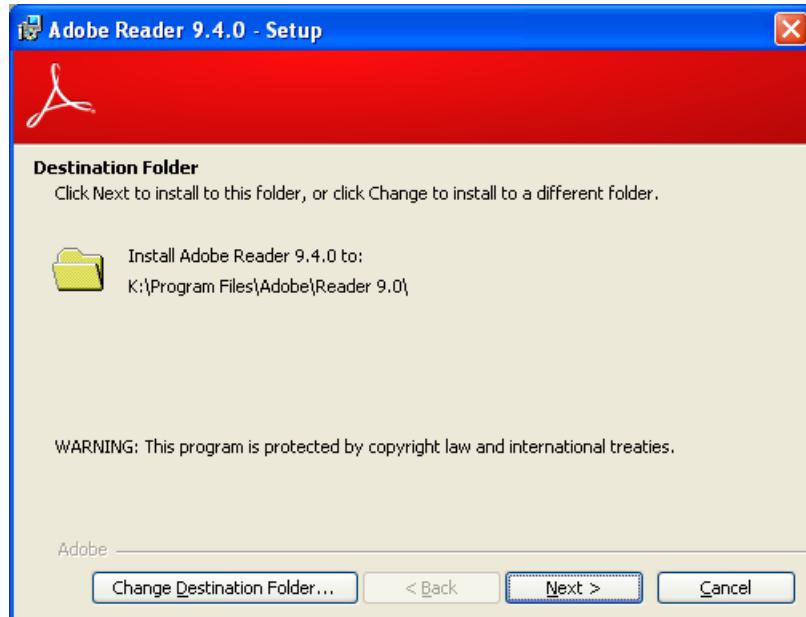
Click Install Adobe Reader 9 to initial the installation procedure



B: If no auto display above screen, enter the file manager → click AdbeRdr940_en_US.exe to enter the installation.

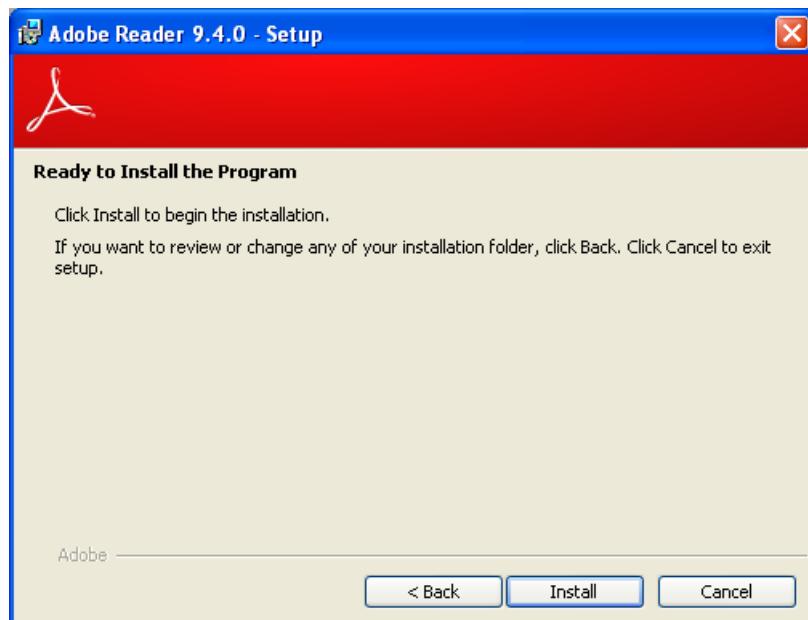


The program will open the package.

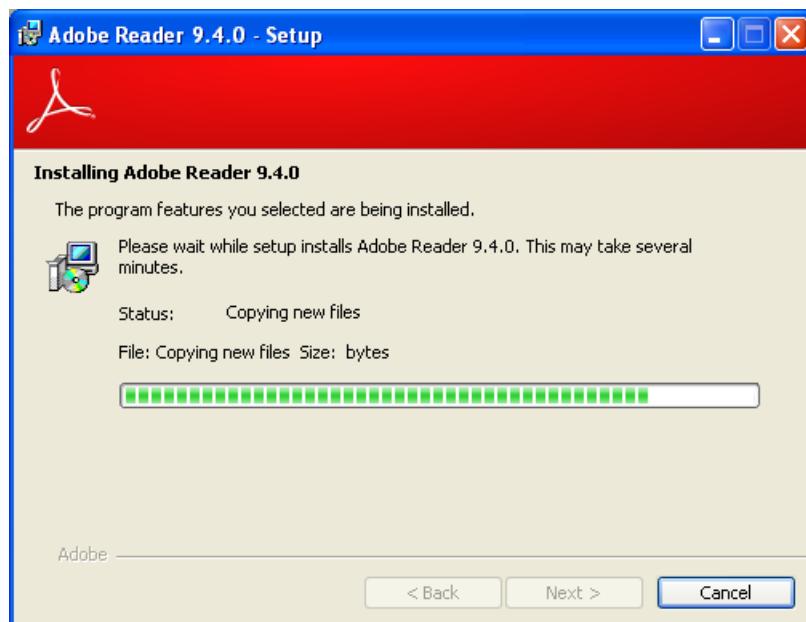


Select the directory to install the program; the default directory of the Adobe Reader is installed to "C:\Program Files\Adobe\Read 9.0"; the location is for user where to place the execution file of Adobe Reader. Click **Next >** to continue the installation procedure.

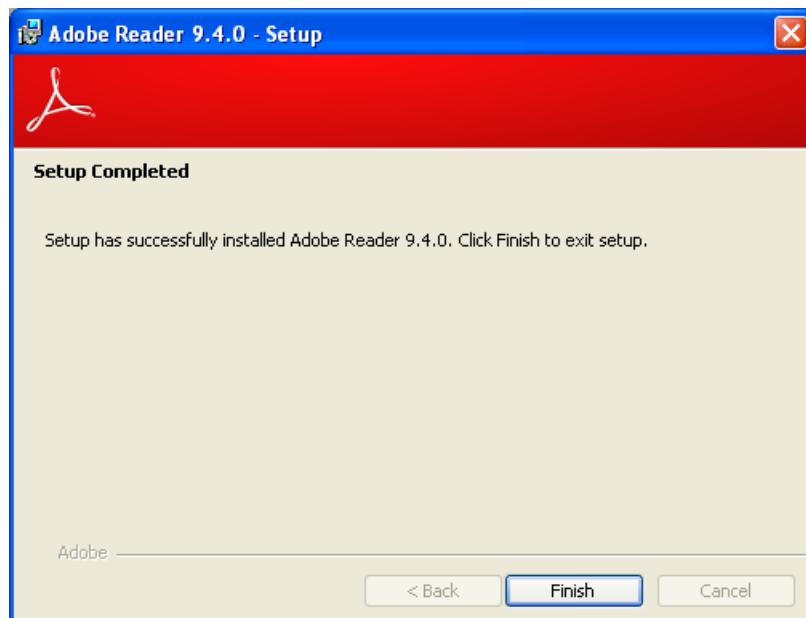
If user would like to change the installation directory or the destination folder has no enough capacity to install, user can also click on **Change Destination Folder...** to relocate.



Confirm the installation of Adobe Reader program, click **Install** to install.



Progress



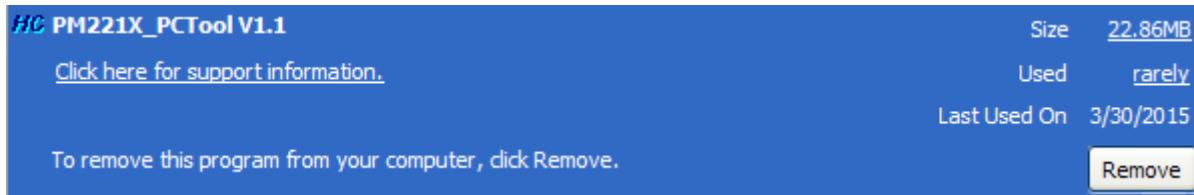
Complete installation, click **Finish** to complete installation.

2.2 Remove of PC Tool

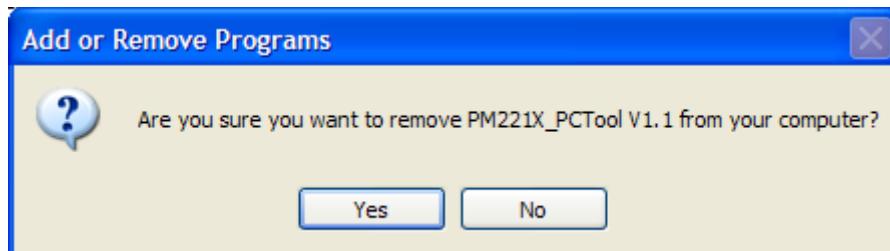
2.2.1 Remove PC Tool



To update the PCTool or to remove PCTool, click "Start" → "Control Panel" → "Add or Remove Programs". Double click "Add or Remove Programs" to enter below screen.



Select PM2218_PCTool, in the lower right corner click Remove

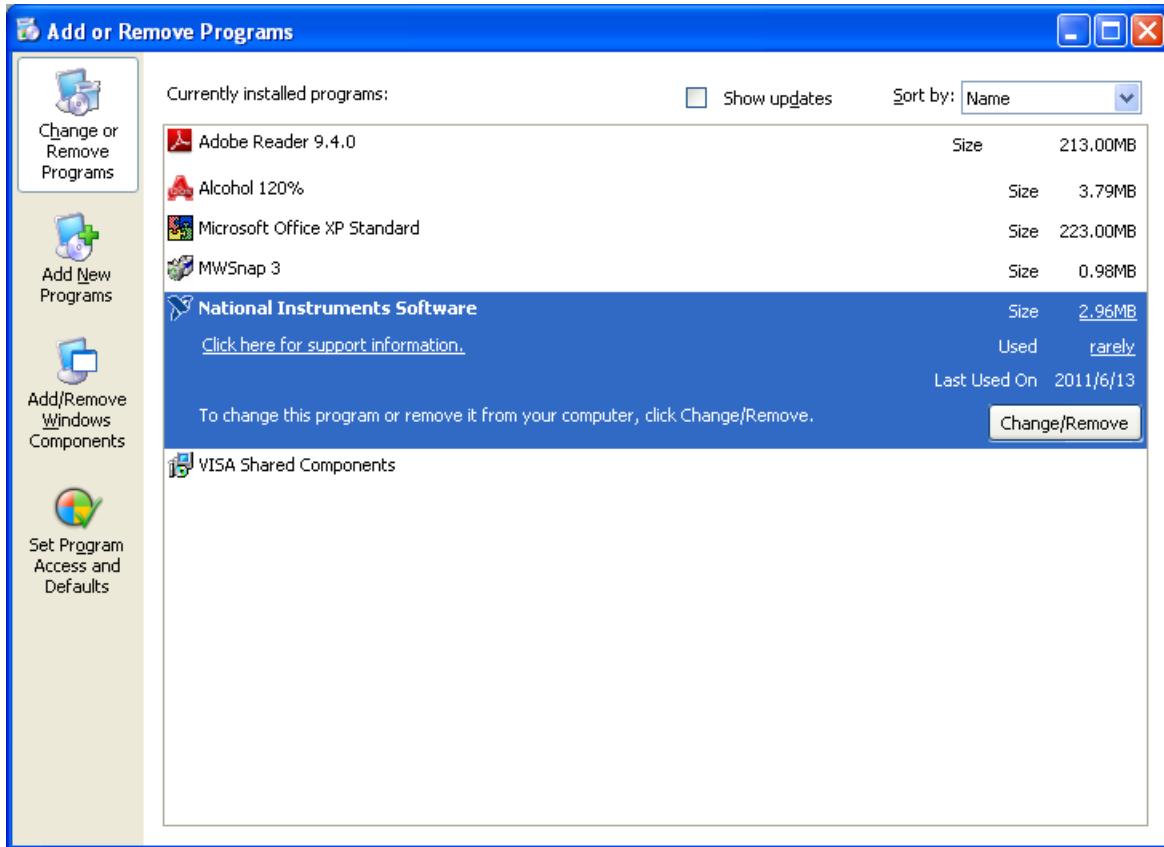


A confirmation of remove message for PM2218_PCTool, click Yes to remove or click No to cancel the remove.

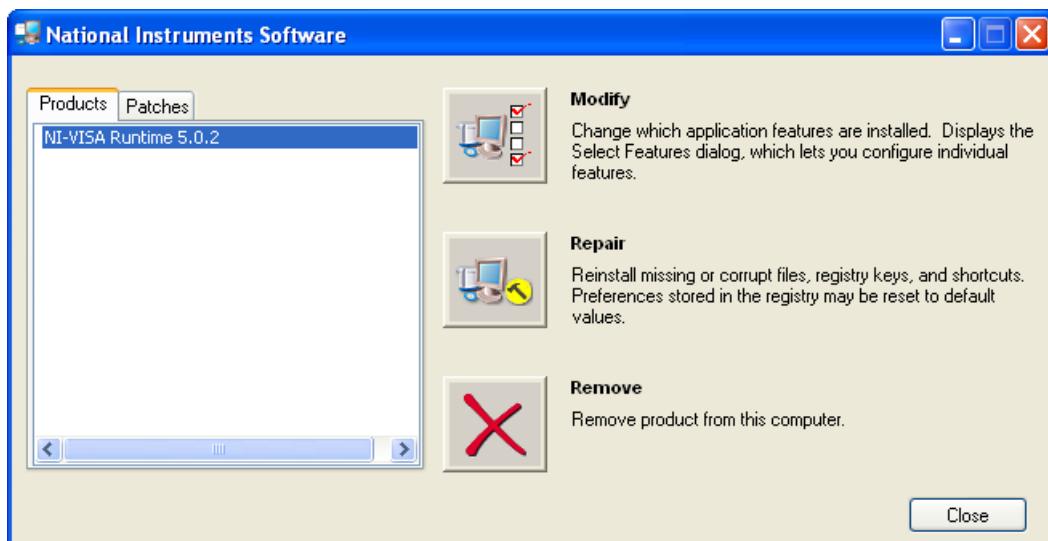
If click Yes, the program will start the remove procedure. Once the progress is completed, the program is removed.

2.2.2 Remove of NI-VISA Runtime

As below to enter “Add or Remove Programs”
Click “National Instruments Software”



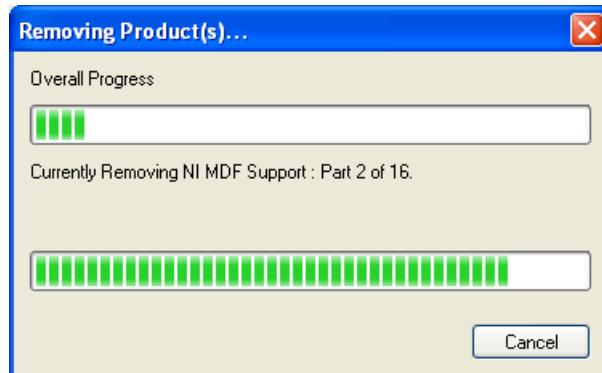
At the lower right corners, click **Change/Remove** to start the remove procedure.



Select NI-VISA Runtime 5.0.2 in the left message box, and click Remove to start the procedure.



Confirmation message will be displayed. Click Yes to start the procedure, or click No to cancel the remove procedure.

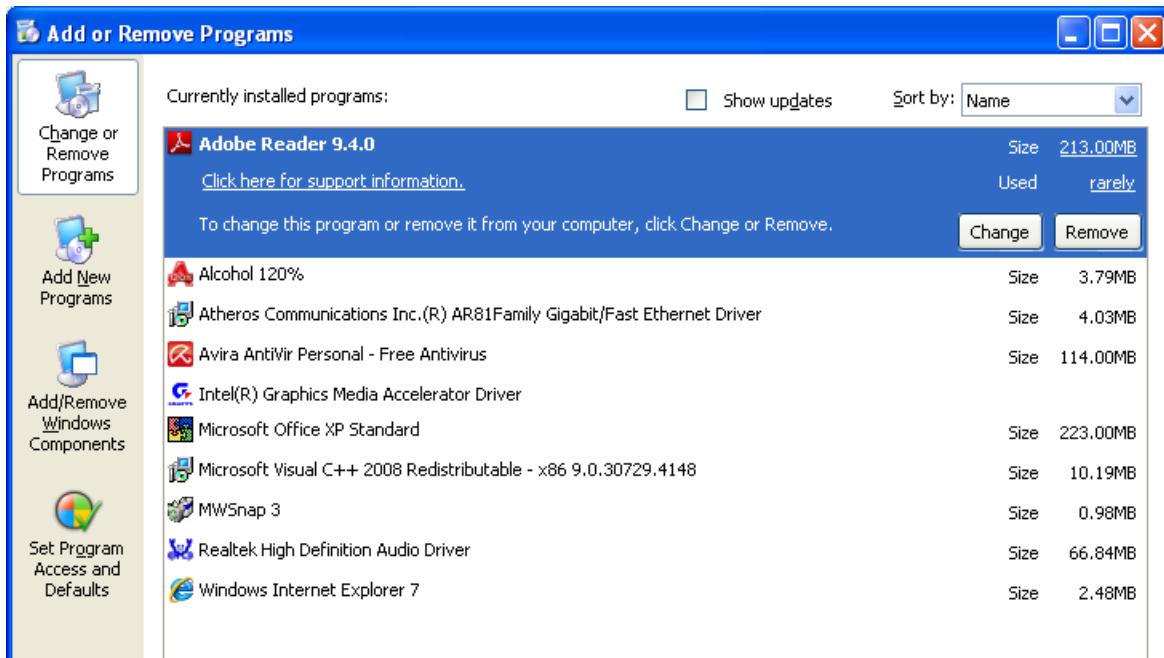


Click Yes to remove; once the progress is complete, the program is removed.

2.2.3 Remove Adobe Reader

As above, to enter “Add or Remove Programs”

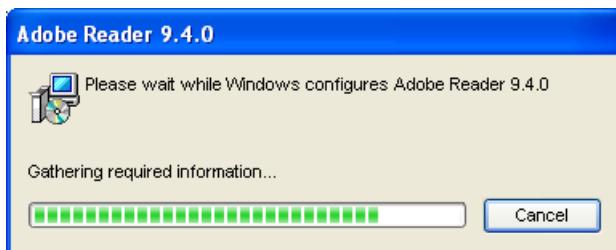
Click Adobe Reader 9.4.0



At the lower right corners, click **Remove** to start the remove procedure.



Confirmation message will be displayed, click Yes to start the procedure, or click No to cancel the remove procedure.



Click Yes to remove; once the progress is complete, the program is removed.

Note: The “Add or Remove Programs” will be slightly different from different version of Windows. User can also refer these steps to the Operation Manual of Windows.

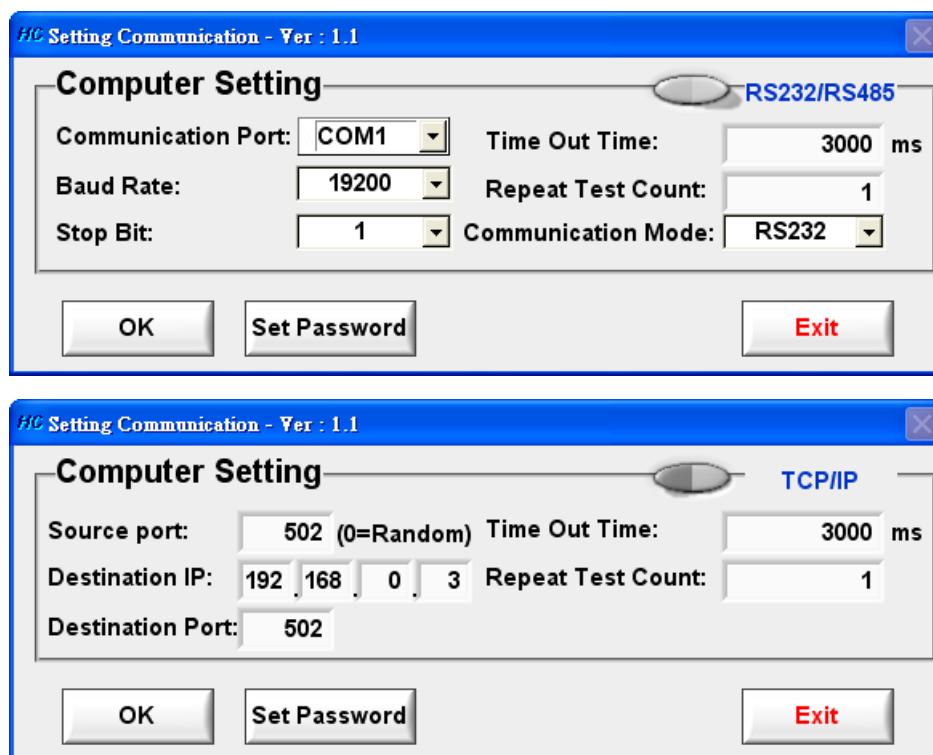
3. Software Operation

After installing PCTool, user can use the software. Before using the software, user should know the location for software execution, the method for connecting with PM2218 meters, and basic introduction for software features. Above issues are all stated in this chapter.

3.1 Execute, exit and set communication



You can start PM2218_PCTool from Windows. Use the Windows Start menu to navigate your programs and find [HC PC Tool] – [PM2218_PCTool x.x] to execute the PCTool. "x.x" means the version of PCTool.



The setting communication window appears before the main program window. You would need to set up the communication parameters so that your PC has the same communication setting as PM2218. This window allows users to add new user name and password by the following instruction.

Note: You can change the communication parameters, user name and password during operation of main program. Just click **Comm** to display setting communication window.

(A) RS232/RS485 Mode

The communication parameters you need to setup on PC are listed as below:

Communication port: COM1 ~ COM256. The default port is COM1.

The RS-232 is used as standard serial port on PC, which is connected with 9-pin connector. For USB port on PC, you would need to have a converter. For serial port on PC, more than COM1 and COM2, you would need additional communication interface card and execute program.

Baud Rate: 1200, 2400, 4800, 9600, 19200 and 38400. The default baud rate is 19200(RS485). *bps means bit per second.

Stop Bit: 1 and 2. The default unit is 1.

Number of stop bits used by a serial port. Stop bits signal the end of unit of

transmission on the serial line.

Time Out Time : The time out unit is ms. The default value is 3000ms.

This is the time to delay between PCTool attempting to communicate with PC. The PCTool would record the numbers of time delay and reply to user about this problem for communication. User would be able to check with the PC, PM2218 and communication.

Repeat Test Count : Repeat Test Count. The default value is 1

When the CRC Error appears, the PCTool is able to set the number of repeat test count to determine if the problem comes from faulty communication.

Communication Mode: RS232: RS232 communication always use Address = 1 and Baud Rate =19200;

RS485: Communication Address and Baud Rate base on setting of PM2218

(B) TCP/IP Mode

Source Port: LAN port. After key in 0 on PCTool, computer will assign an available port for PCTool. If meter needs a fixed port for connection, please setup a fixed port.

Destination IP : Connect to IP Address of meter, registered IP: 192.168.0.3

Destination Port : Connect to port of meter, registered port : 502

Time Out Time : Same as Time Out Time for RS232/RS485

Repeat Test Count : Same as Report Test Count for RS232/RS485

OK

: To enter the main program window and save the communication parameters.

Set Password

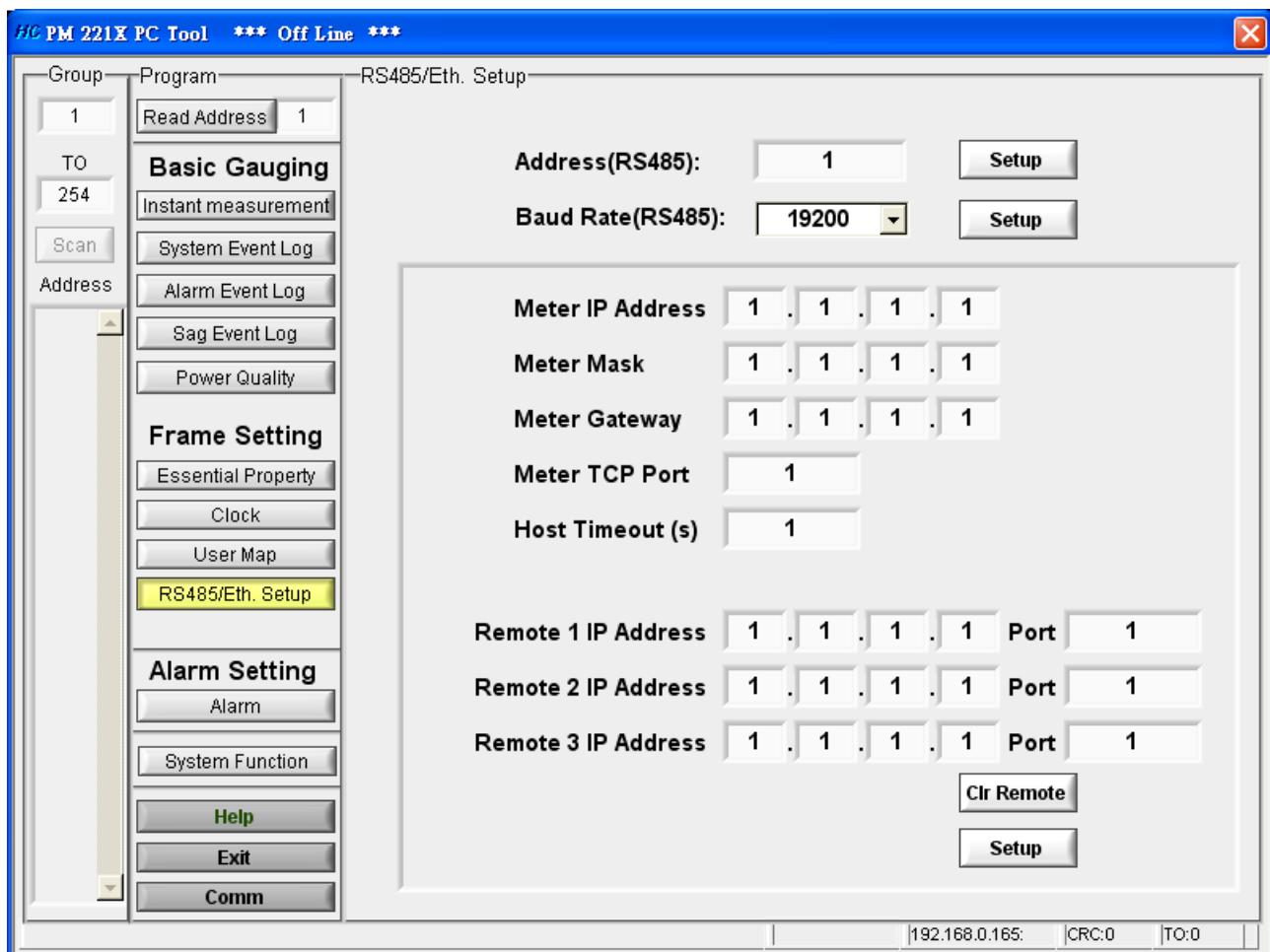
: To set the user name and password

Exit

: To exit the operation of PCTool.

OK

When you completed the settings of communication parameter, click **OK** button to save all the parameters. User can click **OK** button to directly enter the main program window next time.



You can enter the main program window if click **OK** button in setting communication window. User can progress the complete function operation of PCTool. Following is the simple instruction of each function.

In the main program window, there are 5 zones, 3 buttons, and 1 status bar:

Scan of group: For connecting more than 1 unit of PM2218 in one communication line, click **Scan** to scan the addresses of all the PM2218 from address 001 to max. 254.

Address: When scanning the PM2218 meter, the meter Address will be displayed to the Address area. User is capable to select the Meter Address to connect to meter.

Program: This area includes all the data and parameter setting of PM2218. All data and parameter setting are gathered as a function according to relative data and corresponding to function button. Click on the requested function button in Program zone to operate the related function.

RS485/Eth.Setup : For setting the RS485 Address, Baud Rate, and TCP\IP parameters of PM221X in the Setup zone; TCP\IP parameters are including IP Address, Mask, Gateway, port, and Host Timeout (PM221X will disconnect the network when master stop communication with PM221X for a period of time of PM221X, and 3 sets programmable Remote. After setting (one set is nonzero) the Remote IP Address, PM221X will only communicate with network by remote Address & port with the setting IP. The programmable Remote is to avoid parameters of PM221X being modified easily).

Function displaying and executing zone: Gray and blank zone in the middle is for function operating, displaying, and executing.

Exit : To exit the operation of PCTool.

Comm : To enter the setting communication window.

Status:



Display the PCTool status.

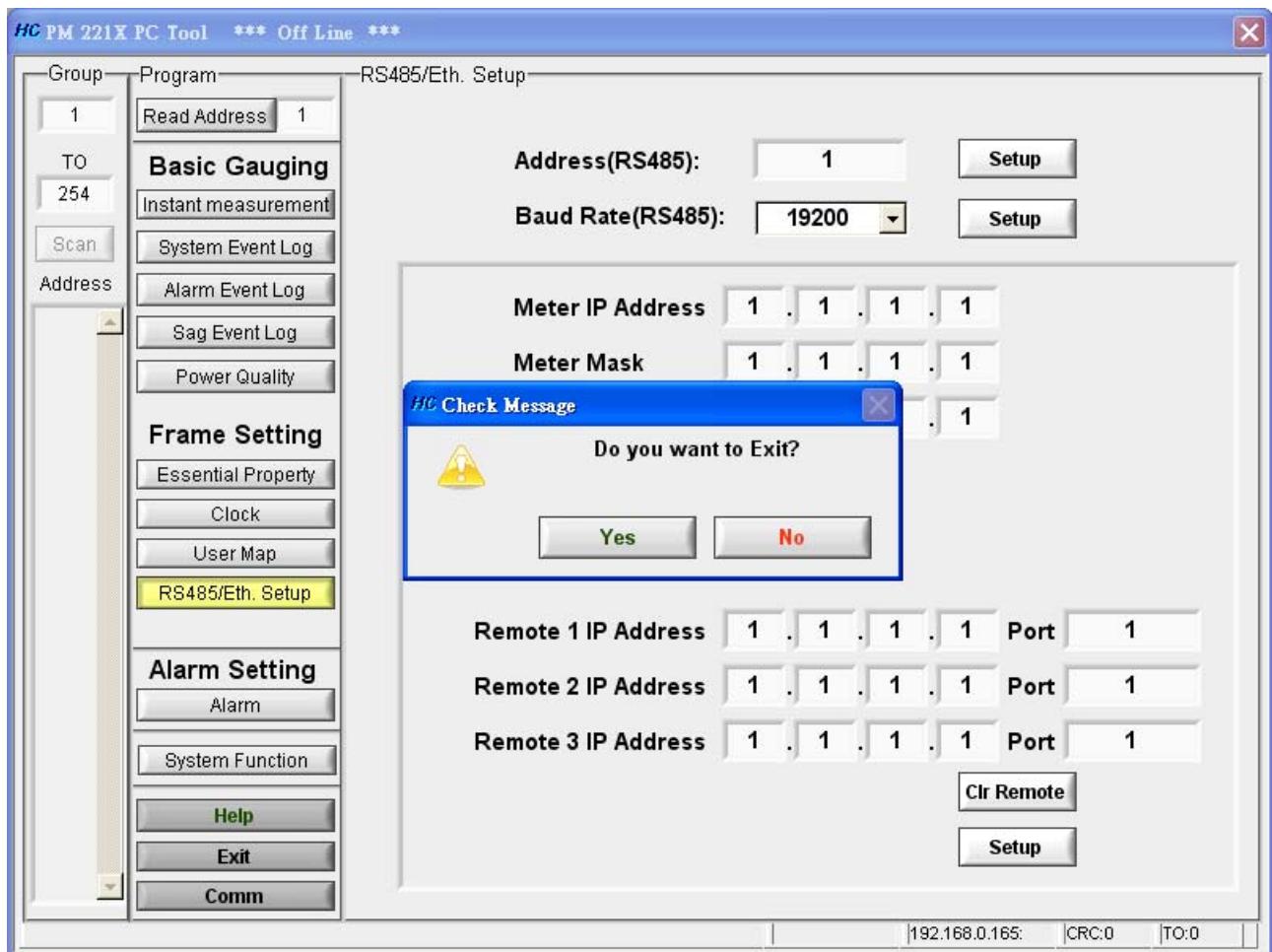
Display the communication port

Display the communication parameter.

CRC (Cyclic Redundancy Check): To display the CRC Error.

TO (Time Out): The times of communication daley.

Communication Status, ":" display the glint



Click **Exit** to exit the operation of PCTool. The above message box will pop up and confirm if user want to exit the operation of PCTool. User can click **Yes** to exit the PCTool, or click **No** back to PCTool screen.

3.2 Setting User Name & Pass Word

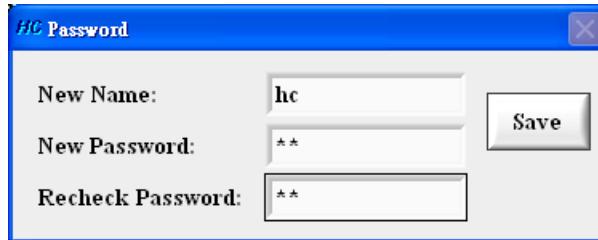


For the safety reason, the PM2218_PCTool requires users to enter user name and password to operate before setting parameters of PM2218 and using many functions. This is protecting PM2218 operating by authorized personnel only. You can add more than one user name and password.

Click **Set Password** (In the main function window, user can click **Comm** to enter setting communication window.) on the setting communication window to add user name and password. When the Password message box pops up, user can enter the username and password into Old Name and Old Password column. After entering the Old Name and Old Password, user can click **Ok** to confirm. (In the password message box, if the incorrect password and user name are entered, the Password message box would be closed and all setup would be cancelled.)

For the first time user or user who forgets username and password, there is a default user name and password in the PCTool. The default user name and password is listed as below:

User Name : Hsiang Cheng
Password : 29175865



When the Set Password window appears, please enter the new user name and password. It could be any combination of letters and/or numbers but not particular character. The characters entered in New Password column and Recheck Password column must be the same:

User Name: 12 characters (Max. limit)

Password: 8 characters (Max. limit)

Recheck Password: Same as password you entered. It is for confirming if the entered password is correct or not.

After entering the new user name and new password, you can click **Save** to confirm the new user name and new password.

3.3 Setting Address & Baud Rate

RS485/Eth. Setup

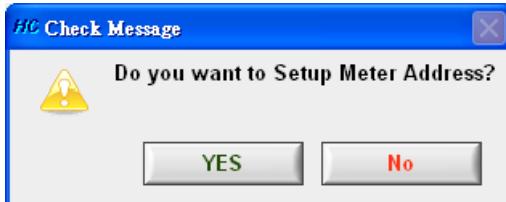
Address(RS485):	<input type="text" value="1"/>	<input type="button" value="Setup"/>
Baud Rate(RS485):	<input type="text" value="19200"/>	<input type="button" value="Setup"/>
Meter IP Address	192 . 168 . 0 . 165	
Meter Mask	255 . 255 . 0 . 0	
Meter Gateway	192 . 168 . 0 . 1	
Meter TCP Port	502	
Host Timeout (s)	90	
Remote 1 IP Address	0 . 0 . 0 . 0	Port <input type="text" value="0"/>
Remote 2 IP Address	0 . 0 . 0 . 0	Port <input type="text" value="0"/>
Remote 3 IP Address	0 . 0 . 0 . 0	Port <input type="text" value="0"/>
<input type="button" value="Clr Remote"/>		
<input type="button" value="Setup"/>		

Please enter the Address of PM2218 and communication Baud Rate matching your system at site, and then click to complete the setup.

The Address is from 1 to max. 254. The address number 0 and 255 can not be the address of PM2218 since those numbers have the particular purpose. The PM2218 defines the 1st byte of communication protocol as the address of PM2218 since the communication protocol of PM2218 is Modbus RTU. When the PCTool wants to read or setup data from assigned PM2218, the PCTool will use this address to confirm PM2218 data.

For 1st byte as address 0: For purpose of communication broadcast. All meters connected on the communication line will receive the communication command, but will not return regardless of any command. For example, as purpose of synchronization settings for Clock.

For 1st byte as address 255: For purpose of reading/setting any address of only one PM2218. Only one PM2218 meter can be connected on the communication line. If there is only one PM2218 in communication line without knowing its address, you would need to use this to read/set the data of PM2218.

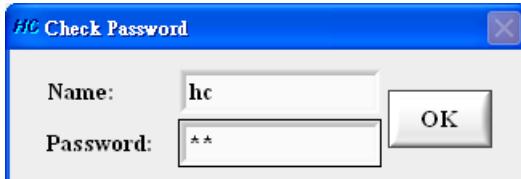


Confirmation window: setup the PM2218 address.



Confirmation window: setup the communication baud rate.

After entering or selecting the number of Address and the value of baud rate, user can click **Setup**. The check message box will pop up and confirm if user want to set Address or baud rate of PM2218. Click **YES** to confirm the setup or click **No** to cancel the setup.



Please enter the user name and password, and click **OK** to finish setup. If user enter correct data, then the setup is complete. Otherwise, user will be request to do it again.

Note: When the user Name and Password is correct, PCTool no longer need to enter a password in next 5 minutes.

TCP\IP Setup (The parameters in RS485/Eth.Setup screen can only be setting when selecting TCP\IP Option Function)

Meter IP Address	192	.	168	.	0	.	165
Meter Mask	255	.	255	.	0	.	0
Meter Gateway	192	.	168	.	0	.	1
Meter TCP Port	502						
Host Timeout (s)	90						
Remote 1 IP Address	0	.	0	.	0	.	0
	Port	0					
Remote 2 IP Address	0	.	0	.	0	.	0
	Port	0					
Remote 3 IP Address	0	.	0	.	0	.	0
	Port	0					
Clr Remote							
Setup							

Meter IP Address : Setup the IP4 Address of meter.

Meter Mask : Setup the Mask of Meter.

Meter Gateway : Setup the Gateway of Meter.

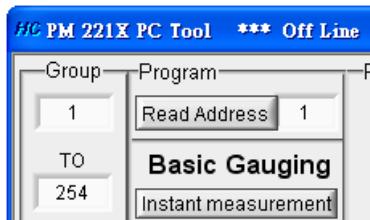
Meter TCP Port : Setup TCP port of meter

Host Timeout(s) : PM221X will disconnect the network when master stop communication with PM2218 for a period of time.

Remote 1~3 IP Address : 3 sets programmable Remote. After setting (one set is nonzero) the Remote IP Address, PM2218 will only communicate to network by Remote Address & Port with the setting IP. The programmable Remote IP Address is to avoid parameters of PM2218 being modified easily.

Clr Remote :when user need to clear All Remote 1~3 IP Address & Port, click **Clr Remote** ,then click **Setup** set Zero data to Meter .

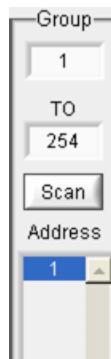
3.4 Online PM2218



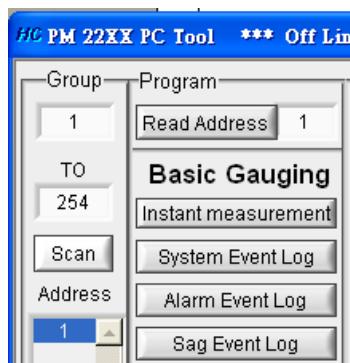
When user operate meter by PCTool, it is important to provide Address of meter to PCTool. Then, PCTool can progress reading/setting on meter according to the Address. User can enter Address of meter by manual key in or automatic reading function.

First you would need to connect PM2218 with PC communication port and scan the address of PM2218. You may enter the scan range from 001 to 254 (Note: The address number 0 and 255 can not use. It is exceptional use in the 「Scan Zone」, and click **Scan** to scan the address of PM2218. When scanned Address of meters are in the range, all the scanned Address of meter will be added one by one in the 「Address Area」 and displayed on the Address button, and enable its address button.

To stop scan, click **Stop Scan Meter** to stop scan.



Above pix has indicate the complete of scanning, which will be display the address of the meter in the "Address Area", click to connect to the selected meter.



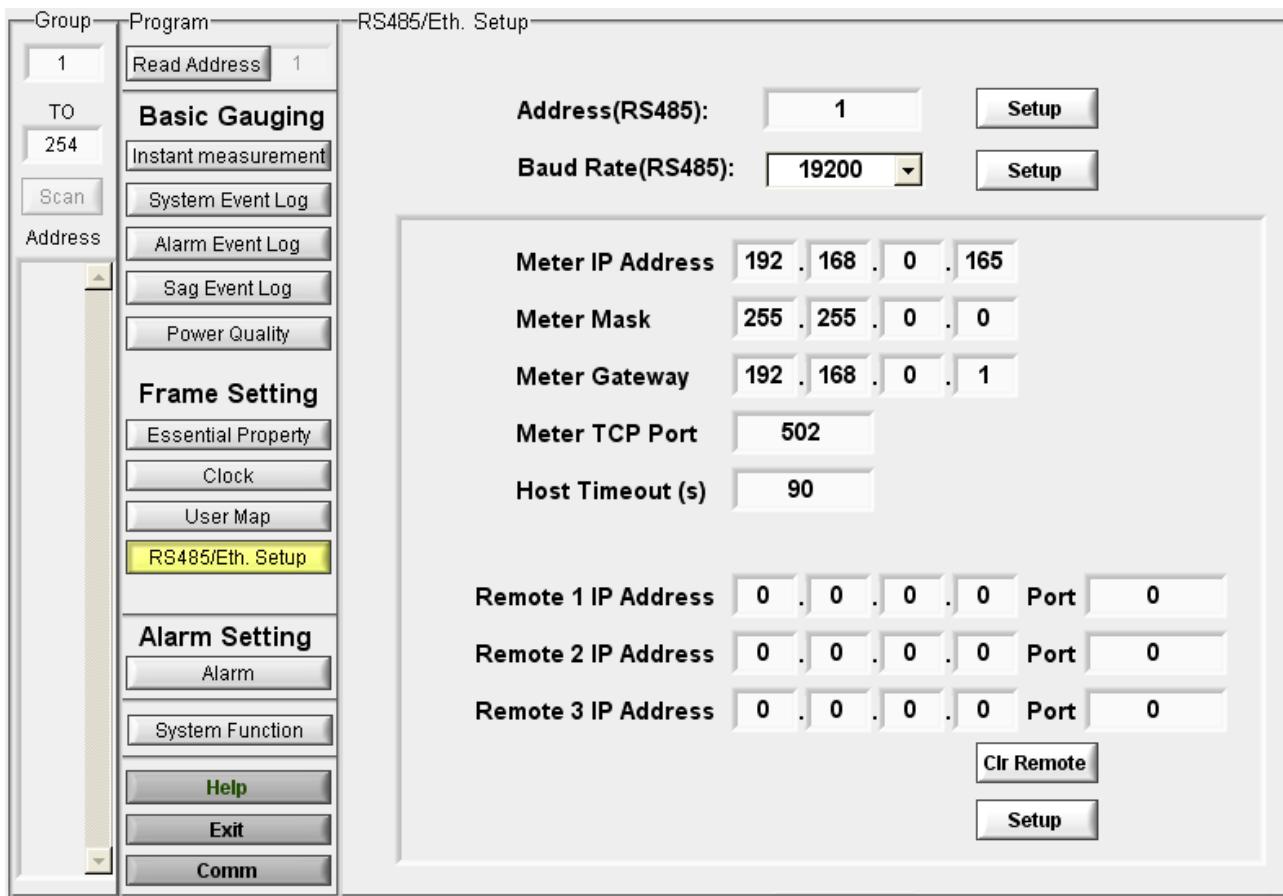
You can enter the PM2218 address directly if you know the correct Address number. Click [Enter] to connect the PCTool with PM2218.

If there is only one PM2218 on line, you can click **Read Address** to quickly get the address of this PM2218 and also get online with it.

Power Measurement Unit

PM2218

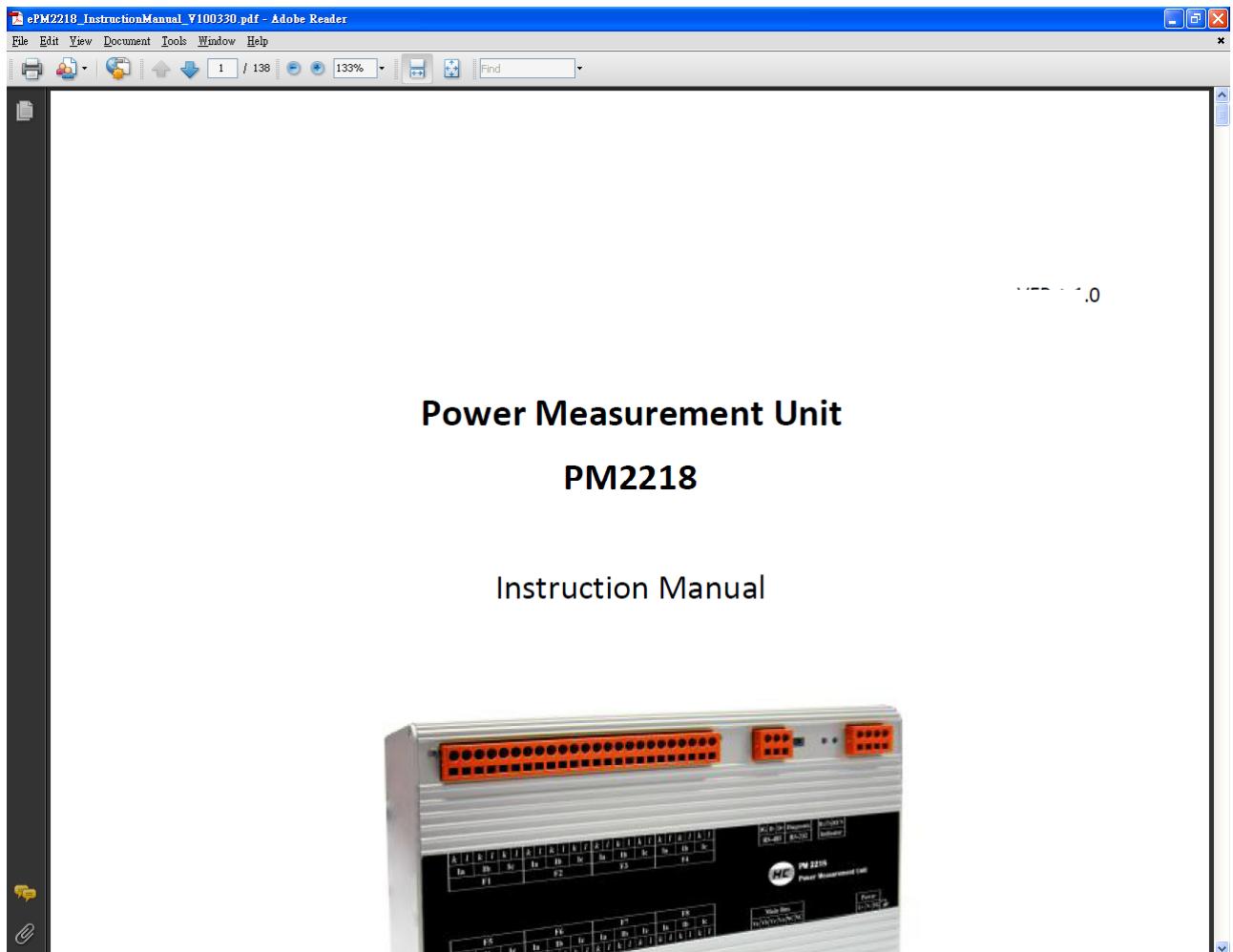
When using **Read Address**, you would need to make sure there is only one PM2218 on the communication line; or there would be some problems encounter.



You can choose the address according to the selected PM2218 for reviewing all the data or setting the parameters. User can click **Read Address** for Address of this PM2218 or directly enter Address of this PM2218 to get online. Or, user can choose the address according to the other selected PM2218 for reviewing all the data or setting the parameters. User can click the **Read Address** for Address of another PM2218 or directly enter Address of another PM2218 to get online.

When PM2218 gets online with PCTool, the main program window would show "PM2218 PC Tool Ver:X.XX" on title bar. You may choose the selected function on <Program> area. "x.xx" is the version of PCTool.

3.5 HELP



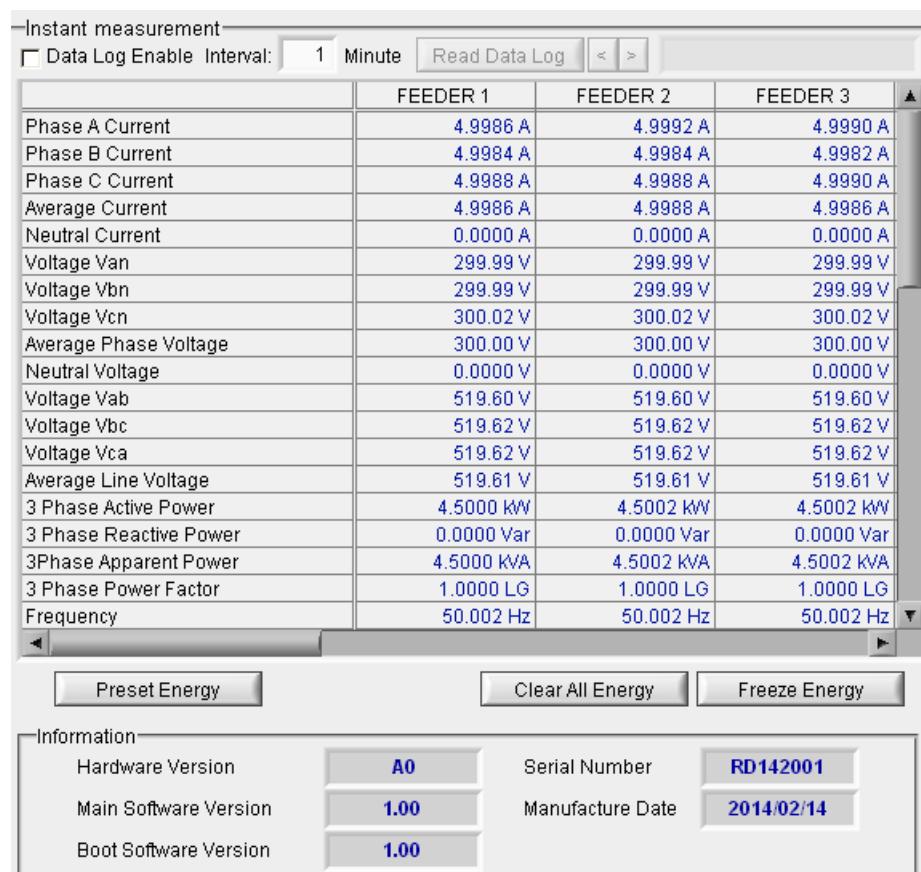
Click  to display the help window. User can find the explanation of the Fault Current Detection, communication Address and other information.

4. Data Display and Configuration

PCTool provides a user-friendly interface that user can simply choose desired function in the program, and the result or configuration of the function will be displayed for reviewing and setting on the area. User can immediately review the data or configurate parameters of meter.

This chapter describes how to display the measured value and how to configure the setpoints of PM2218.

4.1 Basic Power parameters, basic Power System information and Data log



Click **Instant measurement**: The function displays basic power parameters and basic power system information and data log.

User can check the instant measured value of meters, verify PT / CT ratio 、Wire and other configuration to display measured value correctly, and check the hardware, firmware version, serial number of meters. The instant measurement window displays actual values of measured current, voltage, power, frequency, rotate, energy, freeze energy and other basic power for Feeder 1~8. The detailed introduction is as following

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- Instant current value: Phase current, average of the 3 phase currents, and neutral current

	FEEDER 1	FEEDER 2	~	FEEDER X
Phase A Current	4.9986 A	4.9990 A	~	4.9984 A
Phase B Current	4.9984 A	4.9982 A	~	4.9988 A
Phase C Current	4.9988 A	4.9988 A	~	4.9992 A
Average Current	4.9986 A	4.9986 A	~	4.9988 A
Neutral Current	0.0000 A	0.0000 A	~	0.0000 A

- Instant voltage value: Phase voltage, average of the 3 phase voltages, neutral voltage, line voltage and average of the 3 line voltages.

	FEEDER 1	FEEDER 2	~	FEEDER X
Voltage Van	299.98 V	299.98 V	~	299.98 V
Voltage Vbn	299.99 V	299.99 V	~	300.00 V
Voltage Vcn	300.04 V	300.03 V	~	300.04 V
Average Phase Voltage	300.00 V	300.00 V	~	300.00 V
Neutral Voltage	0.0000 V	0.0000 V	~	0.0000 V
Voltage Vab	519.59 V	519.59 V	~	519.60 V
Voltage Vbc	519.64 V	519.63 V	~	519.65 V
Voltage Vca	519.63 V	519.62 V	~	519.63 V
Average Line Voltage	519.62 V	519.61 V	~	519.62 V

- Instant power value: Frequency, active power (kW), reactive power (kVar), apparent power (kVA) and power factor.

	FEEDER 1	FEEDER 2	~	FEEDER X
3 Phase Active Power	4.5004 KW	4.4998 KW	~	4.5000 KW
3 Phase Reactive Power	0.0000 Var	0.0000 Var	~	0.0000 Var
3 Phase Apparent Power	4.5004 KVA	4.5000 KVA	~	4.5002 KVA
3 Phase Power Factor	1.0000 LG	0.9999 LG	~	0.9999 LG
Frequency	50.002 Hz	50.002 Hz	~	50.002 Hz
Phase A Active Power	1.5002 KW	1.5000 KW	~	1.4998 KW
Phase A Reactive Power	0.0000 Var	0.0000 Var	~	0.0000 Var
Phase A Apparent Power	1.5002 KVA	1.4998 KVA	~	1.4998 KVA
Phase A Power Factor	1.0000 LG	1.0000 LG	~	1.0000 LG
Phase B Active Power	1.5000 KW	1.4998 KW	~	1.4998 KW
Phase B Reactive Power	0.0000 Var	0.0000 Var	~	0.0000 Var
Phase B Apparent Power	1.5000 KVA	1.5000 KVA	~	1.5000 KVA
Phase B Power Factor	1.0000 LG	1.0000 LG	~	0.9998 LG
Phase C Active Power	1.5002 KW	1.5000 KW	~	1.5004 KW
Phase C Reactive Power	0.0000 Var	0.0000 Var	~	0.0000 Var
Phase C Apparent Power	1.5002 KVA	1.5002 KVA	~	1.5004 KVA
Phase C Power Factor	1.0000 LG	0.9998 LG	~	1.0000 LG

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- Phase Rotation and Angle

	FEEDER 1	FEEDER 2	~	FEEDER X
Phase Rotation	Positive Sequence	Positive Sequence	~	Positive Sequence
3 Phase Angle	0.8	0.8	~	0.8
Phase A Angle	0.0	0.0	~	0.0
Phase B Angle	0.0	0.0	~	1.1
Phase C Angle	1.1	1.1	~	0.0

- Energy : Positive Active Energy (+WH), negative Active Energy (-WH), positive react energy (+VarH), negative react energy (-VarH)

	FEEDER 1	FEEDER 2	~	FEEDER X
3 Phase Positive Active Energy	2.045k	2.041k	~	2.061k
3 Phase Negative Active Energy	0.000k	0.000k	~	0.000k
3 Phase Positive React Energy	0.036k	0.036k	~	0.037k
3 Phase Negative React Energy	0.000k	0.000k	~	0.000k
Phase A Positive Active Energy	0.694k	0.693k	~	0.700k
Phase B Positive Active Energy	0.680k	0.678k	~	0.685k
Phase C Positive Active Energy	0.816k	0.815k	~	0.821k

- Freeze Energy: Temp record Energy Data and Freeze Date/Time

	FEEDER 1	FEEDER 2	~	FEEDER X
Freeze Energy Date/Time	2014/2/14 14:52:02	2014/2/14 14:52:02	~	2014/2/14 14:52:02
Freeze 3 Phase WH	2.179k	2.179k	~	2.179k
Freeze 3 Phase WH	0.000k	0.000k	~	0.000k
Freeze 3 Phase VarH	0.036k	0.036k	~	0.036k
Freeze 3 Phase VarH	0.000k	0.000k	~	0.000k
Freeze Phase A WH	0.739k	0.739k	~	0.739k
Freeze Phase B WH	0.724k	0.724k	~	0.724k
Freeze Phase C WH	0.861k	0.861k	~	0.861k

Information:				
Hardware Version	A0	Serial Number	RD142001	
Main Software Version	1.00	Manufacture Date	2014/02/14	
Boot Software Version	1.00			

Product information: Displays hardware version, main firmware version, boot firmware version, serial number and date of manufacture.

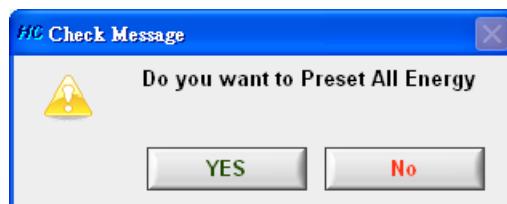
Three setting buttons are on Instant Measurement window as following:

Preset Energy : Preset value of Energy

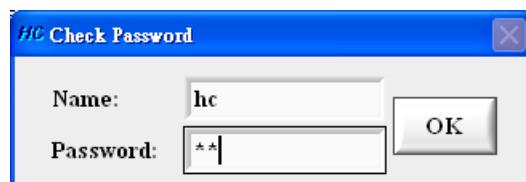
Clear All Energy : Clear all energy values to zero.

Freeze Energy : Capture Active Date/Time and all energy values

Click **Preset Energy**, the message box will pop up as following.



Click **YES** to enter next screen or click **No** to return to the main screen.



User need to enter password before setting to verify the PCTool is operated by authorized engineer.

After confirming the password, the following screen will display. The values in columns are present value.

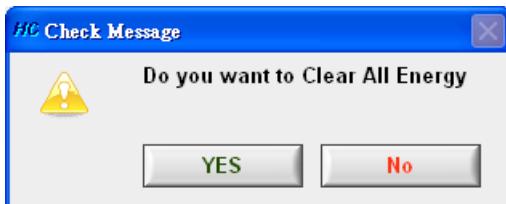
User can fill Preset energy value in sequence, and click **Preset** to progress Preset or click **Cancel** to cancel.

Preset Energy							
	Positive Real Energy(+VH)			Negative Real Energy(-VH)			Positive React. Energy(+VarH) 3 Phase
	Phase A	Phase B	Phase C	3 Phase	3 Phase	Negative React. Energy(-VarH) 3 Phase	
Feeder1	1.175	1.160	1.297		0.000	0.036	0.000
Feeder2	1.175	1.160	1.297		0.000	0.036	0.000
Feeder3	1.176	1.161	1.297		0.000	0.036	0.000
Feeder4	1.174	1.159	1.296		0.000	0.037	0.000
Feeder5	0.000	0.000	0.000		0.000	0.000	0.000
Feeder6	0.000	0.000	0.000		0.000	0.000	0.000
Feeder7	0.000	0.000	0.000		0.000	0.000	0.000
Feeder8	0.000	0.000	0.000		0.000	0.000	0.000

Preset **Cancel**

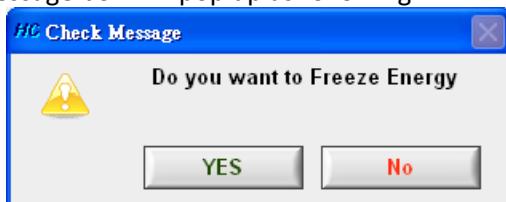
Click **Preset** to return to main screen. The download statusbar **Preset Energy**  will display next to **Preset Energy**, and will vanish after the setting.

Click **Clear All Energy**, the message box will pop up as following



Click **YES** to clear all energy, or click **No** to return to the main screen.

Click **Freeze Energy**, the message box will pop up as following

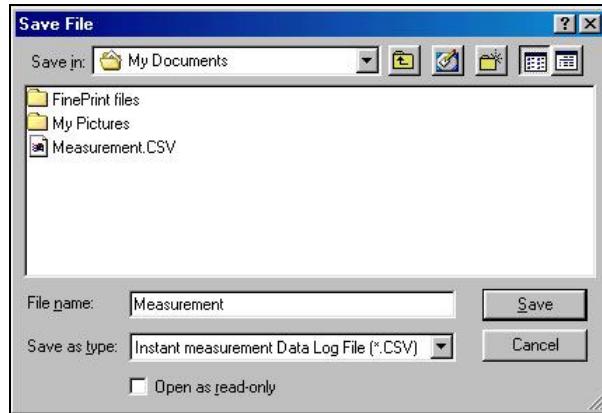


Click **YES** to put present energy into freeze energy data, or click **No** to return to the main screen.

The Data Log function can capture one data for all measured value in accordance with the setting time interval and save as text files separated by comma. For example, if you set up time interval as 1 minute, the file name is Test.csv, 60 records measured value data will be saved in the Test.csv file after Data Log is being disabled after 1 hour. Mark Data Log Enable option to enable or cancel Data Log Enable option to disable Data Log. If user wants to read data from Data Log, the **Read Data Log** on Data Log can only be used when the PCTool is offline.

Data Log :

- ① **Data Log Enable** : Enable or disable data logger function
- ② Interval: Minute : Data Logging rate (min)
- ③ **Read Data Log** : Read logged data from saved files
- ④ **<** : Previous logged data
- ⑤ **>** : Next logged data
- ⑥ : Date and time



Mark this option Data Log Enable to activate data logger, a save file window will popup, User can enter file name of Data Log at File name column and then click , PCTool will start to save all measured values and Energy values to assigned file in PC at the rate of intervals.

```

Measurement - Notepad
File Edit Search Help
5/24/05 10:36:32 AM,0.0000 mA,0.0000 mA,0.0000 mA,0.0000 mA,0.0 %,0.0000 mU,
5/30/05 10:34:55 AM,2.5075 A,2.5084 A,2.5048 A,2.5069 A,2.2000 mA,0.0 %,119.56 U,119.6
5/30/05 10:35:59 AM,2.5077 A,2.5085 A,2.5047 A,2.5070 A,2.3000 mA,0.0 %,119.56 U,119.6
5/30/05 10:37:02 AM,2.5077 A,2.5084 A,2.5049 A,2.5070 A,2.1000 mA,0.0 %,119.56 U,119.6
5/30/05 10:38:05 AM,2.5076 A,2.5085 A,2.5047 A,2.5070 A,2.3000 mA,0.0 %,119.56 U,119.6
5/30/05 10:39:07 AM,2.5076 A,2.5083 A,2.5048 A,2.5069 A,2.1000 mA,0.0 %,119.56 U,119.6
5/30/05 10:40:08 AM,2.5076 A,2.5085 A,2.5047 A,2.5070 A,2.4000 mA,0.0 %,119.56 U,119.6
5/30/05 10:41:10 AM,2.5076 A,2.5083 A,2.5048 A,2.5069 A,2.1000 mA,0.0 %,119.56 U,119.6
5/30/05 10:42:13 AM,2.5076 A,2.5085 A,2.5046 A,2.5069 A,2.4000 mA,0.0 %,119.56 U,119.6
5/30/05 10:43:16 AM,2.5076 A,2.5082 A,2.5047 A,2.5069 A,2.0000 mA,0.0 %,119.57 U,119.6
5/30/05 10:44:19 AM,2.5075 A,2.5085 A,2.5046 A,2.5069 A,2.4000 mA,0.0 %,119.56 U,119.6
5/30/05 3:15:54 PM,2.5077 A,2.5082 A,2.5046 A,2.5069 A,2.0000 mA,0.0 %,119.57 U,119.69

```

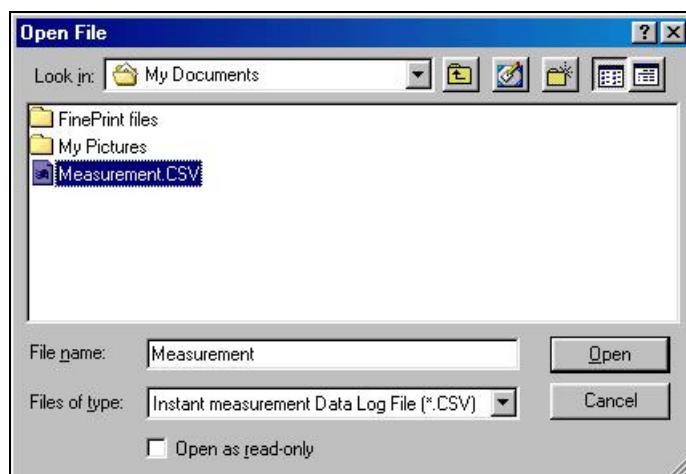
The logged data will be saved as comma separated value (*.csv) file.

The content of saved file is separated as date, time, V, A, W, power parameter measured values and Energy values

Unmark the option Data Log Enable to deactivate data logger.

Instant measurement		FEEDER 1	FEEDER 2	FEEDER 3
<input type="checkbox"/> Data Log Enable	Interval: 1 Minute	Read Data Log	<	>
Phase A Current				
Phase B Current				
Phase C Current				
Average Current				
Neutral Current				
Voltage Van				
Voltage Vbn				
Voltage Vcn				
Average Phase Voltage				
Neutral Voltage				
Voltage Vab				
Voltage Vbc				
Voltage Vca				
Average Line Voltage				
3 Phase Active Power				
3 Phase Reactive Power				
3Phase Apparent Power				
3 Phase Power Factor				
Frequency				

When PCTool is offline status, you can click **Read Data Log** button to retrieve saved data.



After click **Read Data Log**, an open file window will pop up, please select the previous saved Data Log file and click **Open** to open the file. Now you can read data from PCTool and use **<** or **>** to read every log of saved data, date, and time.

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Instant measurement			
Data Log Enable Interval:		1 Minute	Read Data Log
	FEEDER 1	FEEDER 2	FEEDER 3
Phase A Current	4.9984 A	4.9988 A	4.9984 A
Phase B Current	4.9986 A	4.9982 A	4.9980 A
Phase C Current	4.9986 A	4.9986 A	4.9986 A
Average Current	4.9984 A	4.9984 A	4.9982 A
Neutral Current	0.0000 A	0.0000 A	0.0000 A
Voltage Van	299.99 V	299.99 V	299.99 V
Voltage Vbn	299.99 V	299.99 V	299.99 V
Voltage Vcn	300.03 V	300.03 V	300.03 V
Average Phase Voltage	300.00 V	300.00 V	300.00 V
Neutral Voltage	0.0000 V	0.0000 V	0.0000 V
Voltage Vab	519.60 V	519.60 V	519.60 V
Voltage Vbc	519.63 V	519.63 V	519.63 V
Voltage Vca	519.63 V	519.63 V	519.63 V
Average Line Voltage	519.62 V	519.62 V	519.62 V
3 Phase Active Power	4.5000 kW	4.5000 kW	4.4998 kW
3 Phase Reactive Power	0.0000 Var	0.0000 Var	0.0000 Var
3Phase Apparent Power	4.5000 kVA	4.5002 kVA	4.5000 kVA
3 Phase Power Factor	1.0000 LG	0.9999 LG	0.9999 LG
Frequency	50.002 Hz	50.002 Hz	50.002 Hz

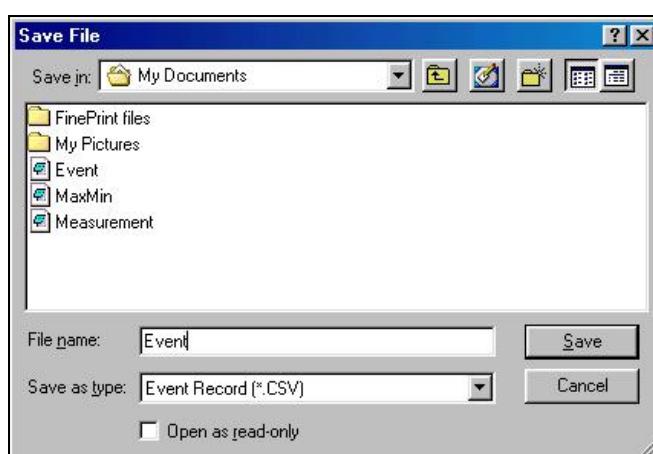
4.2 System Event Log

Click **Event Log** : The function displays event values.

Total Number: The numbers of event.

Press **Save Event Log** to save all the event records.

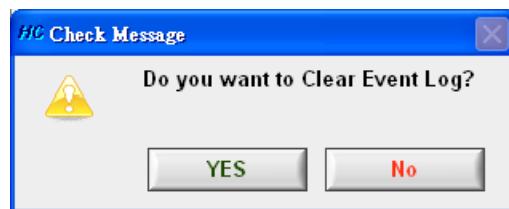
Press **Clear Event Log** to clear all the event records.



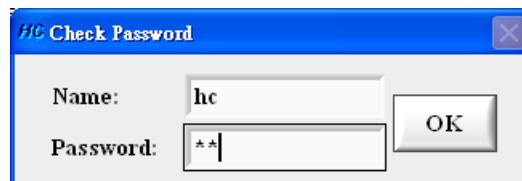
Click **Save Event Log** to save event log, and then enter the file name. The format is Excel test file (CSV).

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Press **Clear Event Log** to confirm if clear all the event logs. Click **YES** to confirm or click **No** to refuse the execution.



Please enter user name and password, and then click  to finish. If user enters correct data, then the setup is complete. Otherwise, user will be request to do it again.

After clearing all the event logs, the System Event Log will record all the cleared event records.

4.3 Alarm Event Log

Click **Alarm Event Log** : The function displays alarm event log.

Alarm event log is including:

Phase Overvoltage Alarm : Over voltage alarm

Phase Undervoltage Alarm : Under voltage alarm

OverFrequency Alarm : Over frequency alarm

UnderFrequency Alarm : Under Frequency Alarm

Unbalance Zero Voltage Alarm(Option) : Zero Sequence Voltage Unbalance

Unbalance Negative Voltage Alarm(Option) : Negative Sequence Voltage Unbalance

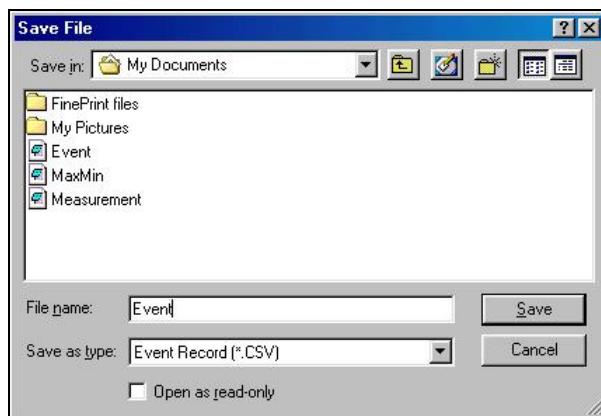
Voltage Flicker Alarm(Option) : Voltage Flicker Alarm

Total Number : The numbers of alarm event log

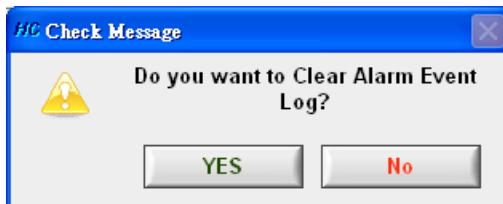
Press **Save Alarm Event Log** to save all alarm event log.

Clear Alarm Event Log

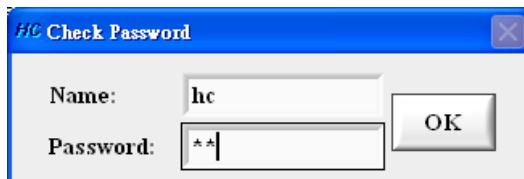
Press **Clear Alarm Event Log** to clear all alarm event logs.



Click **Save Alarm Event Log** to save alarm event log, and then enter the file name. The format is Excel test file (CSV).



Click **Clear Alarm Event Log** to confirm if to clear all alarm event logs. Click **YES** to confirm or click **No** to refuse the execution.



Please enter user name and password, and then click **OK** to finish setup. If user enters correct data, then the setup is complete. Otherwise, user will be request to do it again.

After clearing all the alarm event logs, the Alarm Event Log will record all the cleared alarm event records.

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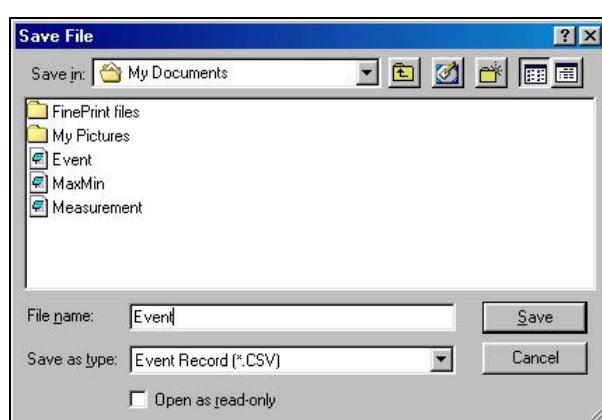
4.4 SAG Event Log (Option)

Click **Sag Event Log** : The function displays SAG event values.

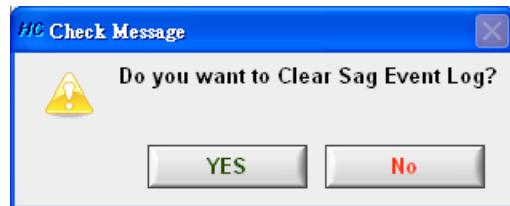
Total Number : The numbers of Sag event.

Press **Save Sag Event Log** to save all the SAG event records.

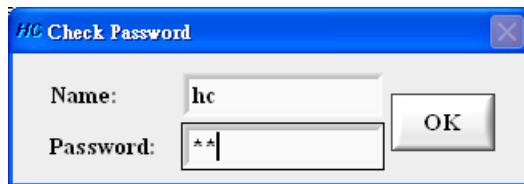
Press **Clear Sag Event Log** to clear all the SAG event records.



Click **Save Sag Event Log** to save Sag event log, and then enter the file name. The format is Excel test file (CSV).



Click to confirm if clear all Sag event logs. Click to confirm or click to refuse the execution.



Please enter user name and password, and then click to finish setup. If user enters correct data, then the setup is complete. Otherwise, user will be request to do it again.

After clearing all the Sag event logs, the Sag Event Log will record all the cleared Sag event records.

4.5 Power Quality (OPTION)



Click **Power Quality** : The function is including

Harmonic : Harmonic

Unbalance : Unbalance

SAG : Voltage Sag

Flicker : Voltage Flicker

The detail instruction is as following

4.5.1 Harmonic



Calculate DM (H01), H02.....H17 for each phase

Current - : select Feeder1 – 8

$$\text{THD} - F = \frac{\text{rms of harmonics}}{\text{rms of fundamental}} = \sqrt{\frac{H_2^2 + H_3^2 + H_4^2 + \dots + H_{15}^2}{\text{Fundamental}}}$$

4.5.2 Unbalance

	Data
Positive Sequence Voltage	300.02 V
Negative Sequence Voltage	0.0300 V
Zero Sequence Voltage	0.0600 V
Negative Sequence Unbalance	0.0 %
Zero Sequence Unbalance	0.0 %

Display some data including Positive sequence voltage, Negative sequence voltage, Zero Sequence Voltage and Negative Sequence unbalance, Zero Sequence unbalance.

4.5.3 SAG (Option)

Flexible Curve A		Curve B	
99.00V(90%)	10000 ms	10000 ms	
88.00V(80%)	500 ms	500 ms	
77.00V(70%)	200 ms	200 ms	
66.00V(60%)	200 ms	200 ms	
55.00V(50%)	50 ms	50 ms	
44.00V(40%)	50 ms	50 ms	
33.00V(30%)	50 ms	50 ms	
22.00V(20%)	50 ms	50 ms	

0=Disable

|--|--|--|--|

This Page for SAG Setting:

Function : On or Off Voltage Sag function

Min. Threshold : When voltage SAG unders min. threshold, it is determined as non sag.

Flexible Curve Selection : Select curve of Sag (A/B)

Curve of Sag Setting (A/B):

Set up flexible curve from 90% to 20%; meter will monitor the voltage sag according to the curve.

4.5.4 Waveform Record (OPTION)

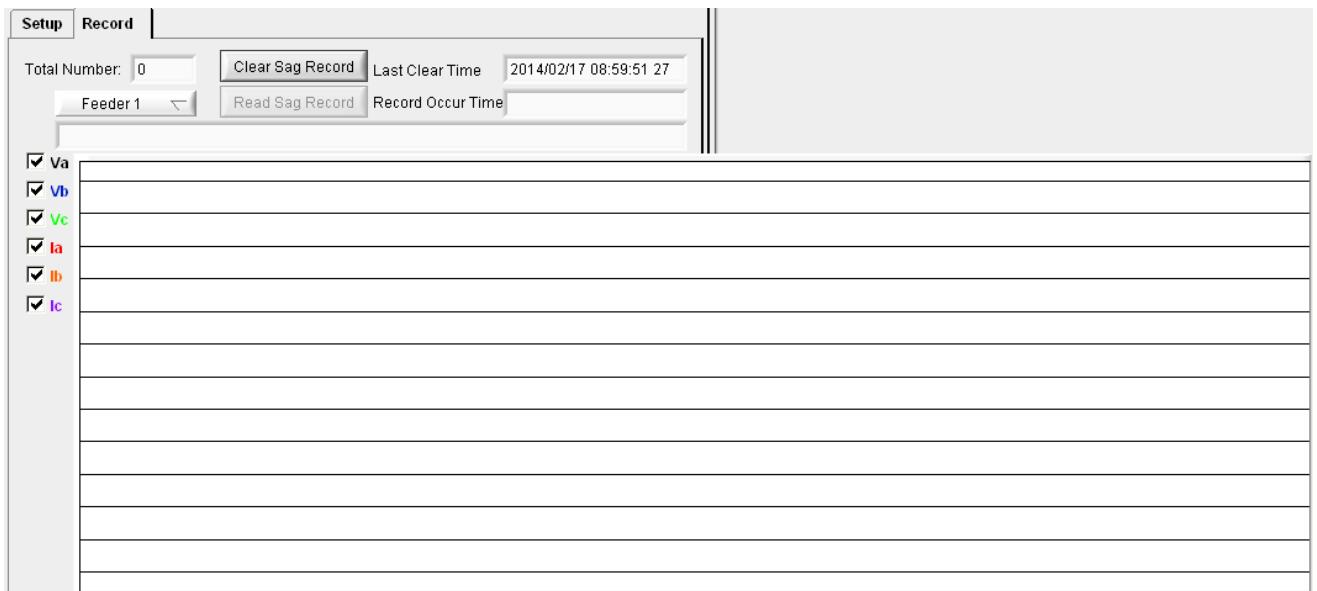
This Page for Waveform Setting :

Function : Turn off record function or trigger voltage sag or trigger command

Data Type : Select to record Waveform or RMS value

Recorder Type : Record the location of waveform few weeks before and after the event occurred.

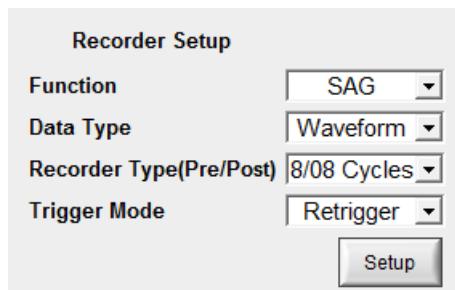
Trigger Mode : Select to record the first time (One-Shot) or the news time (Retrigger)



Trigger cause by Voltage sag

This Page for Voltage SAG Setting :

Function : Select to trigger voltage sag (SAG), shown as following



Record Page: When SAG function and Record function are triggered, the screen will display as following if SAG occurred.

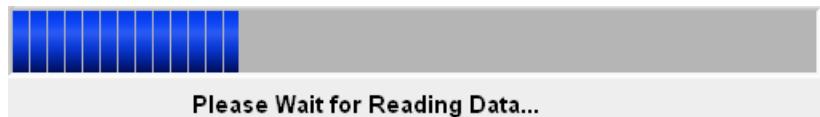


Read Sag Record is capable to read SAG Recorder data

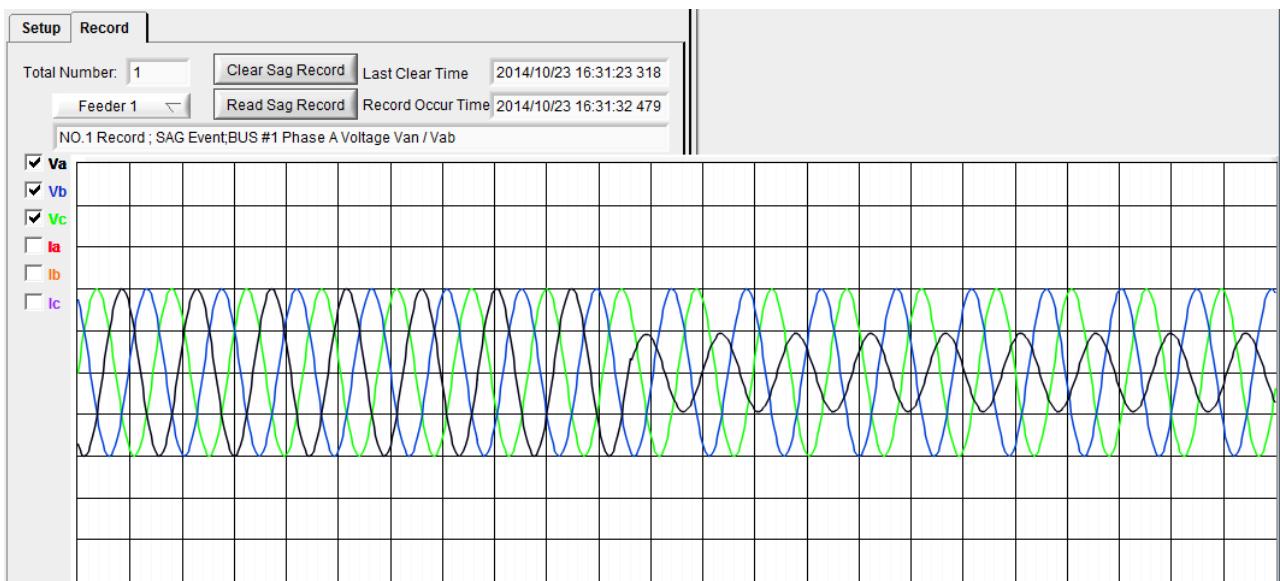
Click **Read Sag Record**, the message box as following will pop up.



Note: User has to notice the time for reading waveform record is long.



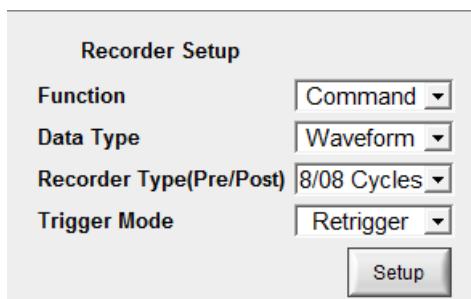
User has to wait until the waveform record display after data reading process is completed.



User can select Va、Vb、Vc、Ia、Ib and Ic data on Waveform record. Only Va, Vb, and Vc are checked on the waveform record as above sampling figure.

Trigger command :

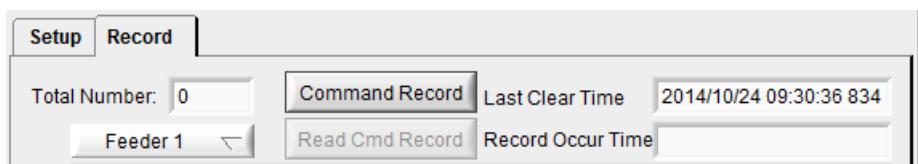
Function : User can select “Command” to trigger the waveform record function, shown as follow:



Record Page: Command bar will turn into options for command trigger function, shown as follow:

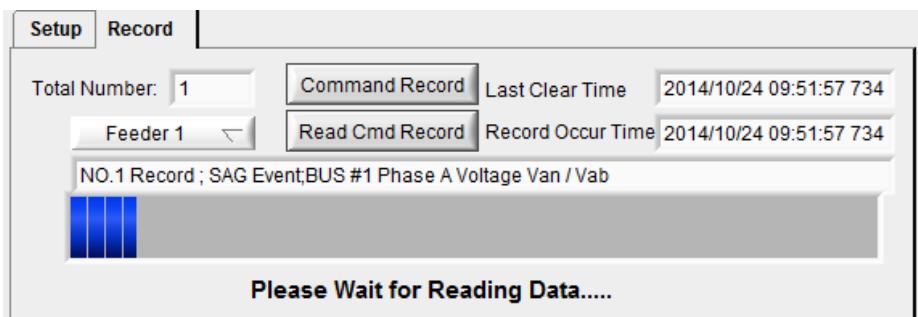
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Click **Command Record** to make **Total Number: 1** and **Read Cmd Record** emerge

Click **Read Cmd Record**, the reading data message will display, shown as following



The waveform records will display on the window after the reading data process is completed, shown as following:



4.5.5 Voltage Flicker

3 Phase $\Delta V10$ (%)		0.00	
	V1(%)	V2(%)	V3(%)
$\Delta V10$	0.01	0.01	0.01
ΔV	0.02	0.02	0.02
0.5 Hz	0.00	0.00	0.00
1 Hz	0.00	0.00	0.00
2 Hz	0.00	0.00	0.00
3 Hz	0.00	0.00	0.00
4 Hz	0.00	0.00	0.00
5 Hz	0.00	0.00	0.00
6 Hz	0.00	0.00	0.00
7 Hz	0.00	0.00	0.00
8 Hz	0.00	0.00	0.00
9 Hz	0.00	0.00	0.00
10 Hz	0.00	0.00	0.00
11 Hz	0.00	0.00	0.00
12 Hz	0.00	0.00	0.00
13 Hz	0.00	0.00	0.00
14 Hz	0.00	0.00	0.00
15 Hz	0.00	0.00	0.00
16 Hz	0.00	0.00	0.00
17 Hz	0.00	0.00	0.00
18 Hz	0.00	0.00	0.00
19 Hz	0.00	0.00	0.00
20 Hz	0.00	0.00	0.00
21 Hz	0.00	0.00	0.00
22 Hz	0.00	0.00	0.00

Flicker Simulation

Flicker Simulation Function

SEG#1 Hz V(%)

SEG#2 Hz V(%)

SEG#3 Hz V(%)

SEG#4 Hz V(%)

SEG#5 Hz V(%)

SEG#6 Hz V(%)

SEG#7 Hz V(%)

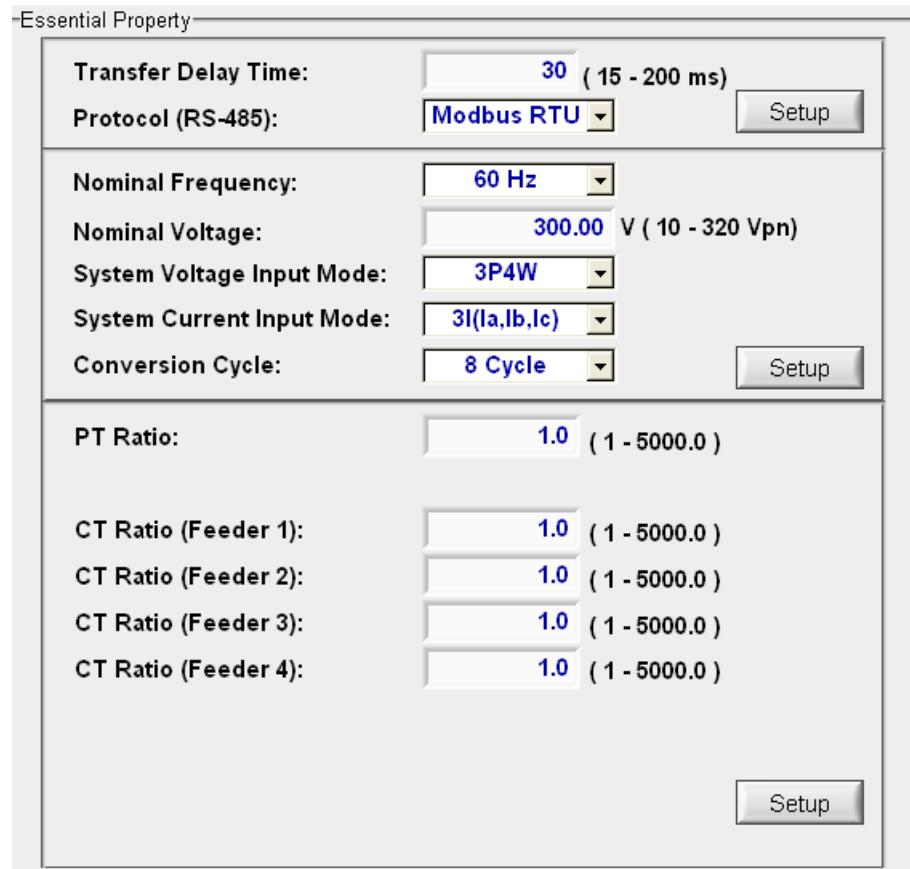
SEG#8 Hz V(%)

Simulation $\Delta V10$ (%) =

The left part of above page display the flicker data, including three phase $\Delta V10$, each phase $\Delta V10$, ΔV and 0.5-30Hz Vn. amplitude ratio

The right part of above page display the simulation flicker data, and is capable to set simulation for 8 different frequencies.

4.6 Essential Property



Click **Essential Property** : The function displays basic system configuration and setting

Essential property include in this function:

Transfer Delay Time (ms): Transfer Delay Time (ms): Communication response time, unit: ms (15-200). The transfer delay time is computed after meter receiving command from PC. The transfer delay time for meter can be setup from 15ms~200ms, and the ideal transfer delay time is from 20 ms to 150 ms. Since different processing time for different command and the delay time for conversion time of PC is not necessarily fixed.

Protocol (RS-485): Modbus RTU

Nominal Frequency: 50Hz or 60Hz.

Usually, the frequency is measured from voltage. If the voltage is unavailable, the PM2218 will use the nominal frequency.

Nominal Voltage: The reference voltage setting on BUS, and as the basis for voltage sag.

System Voltage Input Mode: 3P4W/3P3W

System Current Input Mode: 3I(Ia,Ib,Ic) and 2I(Ia,Ic)

Conversion Cycle : 1, 2, 4, 8, 16, 32

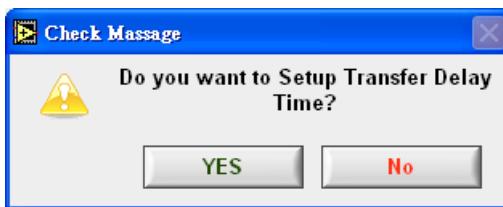
PT Ratio: Range from 1 to 5000.

Voltage transformer ratio (Default is 1.0)

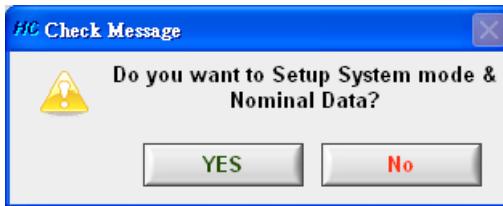
CT Ratio (Feeder1~8): Range from 1 to 5000.0

Current transformer ratio. (Default is 1.0)

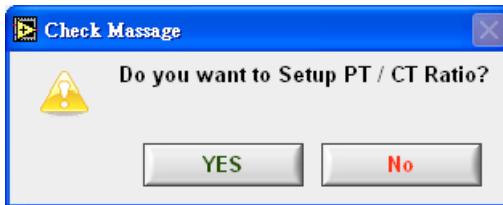
Click **Setup** button to setup system parameters.



Confirmation window: Setup transfer delay time.

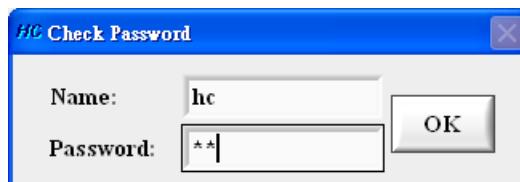


Confirmation window: Setup system mode and nominal data.



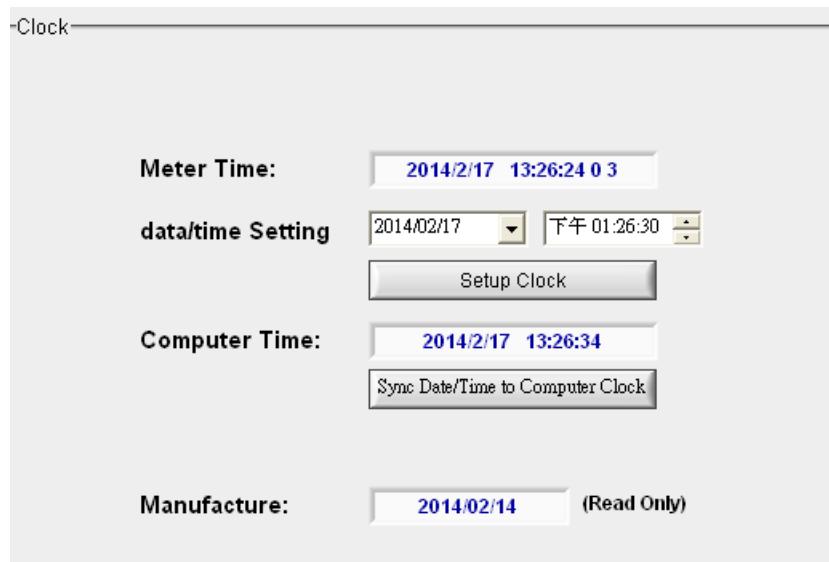
Confirmation window: Setup PT/CT ratio.

Click **Setup** to confirm if setup the system parameter. Click **YES** to confirm or click **No** to refuse the execution.



Please enter user name and password, and then click **OK** to finish setup. If user enters correct data, then the setup is complete. Otherwise, user will be request to do it again.

4.7 Clock

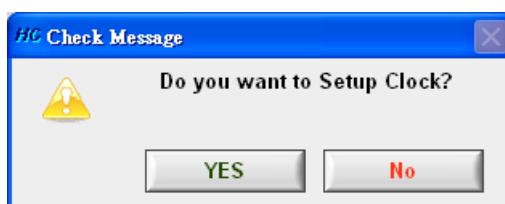


Click : **Clock** This function allows user to set the time/date for the system's clock and manufacture date.

Manufacture: It displays for products with calibration date.

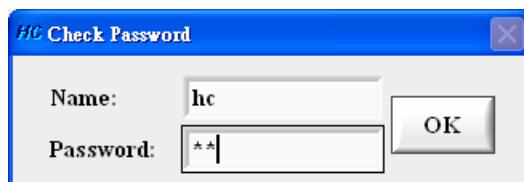
Enter the desired time/date for meter, then click **Setup Clock** to complete setting.

Click to synchronize the meter's date/time to computer clock, then simply click **Sync Date/Time to Computer Clock**.



Confirmation window: setup the date/time for the meter

Click **Setup Clock** or **Sync Date/Time to Computer Clock** to confirm if setup time/date. Click **YES** to confirm or click **No** to refuse the execution.



Please enter user name and password, and then click **OK** to finish setup. If user enters correct data, then the setup is complete. Otherwise, user will be request to do it again.

4.8 User Map

User Map				
Mapping 1		Save Mapping		Download Mapping File
Index	User Definable Register (Hex)	Index	User Definable Register Description	User Definable Data
8340	0000	0040	Reserved	2214
8341	0000	0041	Reserved	2214
8342	0000	0042	Reserved	2214
8343	0000	0043	Reserved	2214
8344	0000	0044	Reserved	2214
8345	0000	0045	Reserved	2214
8346	0000	0046	Reserved	2214
8347	0000	0047	Reserved	2214
8348	0000	0048	Reserved	2214
8349	0000	0049	Reserved	2214
834A	0000	004A	Reserved	2214
834B	0000	004B	Reserved	2214
834C	0000	004C	Reserved	2214
834D	0000	004D	Reserved	2214
834E	0000	004E	Reserved	2214
834F	0000	004F	Reserved	2214
8350	0000	0050	Reserved	2214
8351	0000	0051	Reserved	2214
8352	0000	0052	Reserved	2214
8353	0000	0053	Reserved	2214
8354	0000	0054	Reserved	2214
8355	0000	0055	Reserved	2214
8356	0000	0056	Reserved	2214
8357	0000	0057	Reserved	2214
8358	0000	0058	Reserved	2214
.....

Click **User Map** : The function displays user mapping parameter settings and user mapping values.

The data stored in the meter is grouped as Setpoints and Actual Values. Setpoints can be read and written by a computer. Actual values can be read only. All Setpoints and Actual Values are stored as two byte values. Each register address is the address of a two byte value. Addresses are listed in Hexadecimal.

The meter has a user definable area and this area allows the user to remap the addresses of all Setpoints registers and Actual Values. The User definable area has two sections:

User Definable Register (map addresses 8340H – 839FH; 8340H – 83FFH): Two Mapping It includes 90*2 Actual Values or Setpoints register addresses.

User Definable Data (map addresses 0040H – 009FH; 00A0H – 00FFH): It includes the data at addresses in the User Definable Register.

Register data that is separated in the rest of the map may be remapped to adjacent register addresses in the User Definable Data section. This is accomplished by writing to register addresses in the User Definable Register section. It allows for improved throughput of data and can eliminate the need for multiple read command sequences.

For example, if the values of Phase A Current and Phase A Power Factor are requested to be read, their addresses may be remapped as follows:

Write 0130H to address 8340H (User Definable Register 0) by using function code 06 (06h) or 16 (10h).

Power Measurement Unit

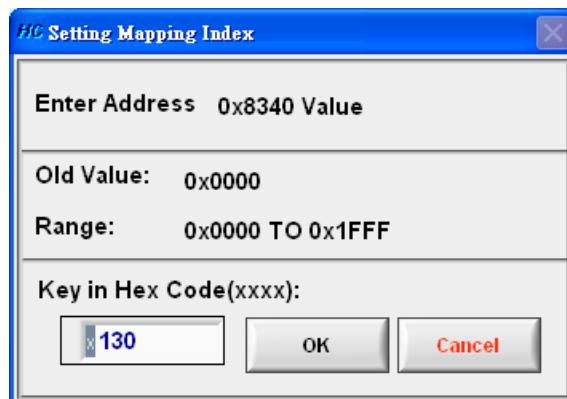
PM2218

Write 0148H to address 8341H (User Definable Register 1) by using function code 06 (06h) or 16 (10h).

To read (function code 03 (03h)) of register 0040H (User Definable Data 0) and 0041H (User Definable Data 1), meter will return Phase A Current and Phase A power factor.

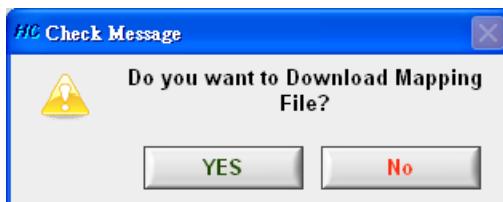
If user wants to backup data in the User Definable Register section, click button.

If the massive data in the User Definable Register section needs to be set, click button.

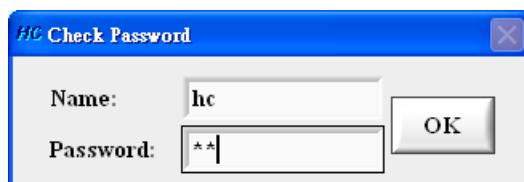


If user wants the values in the User Definable Register section to be changed, simply left-click the mouse. The dialogue box will be displayed to allow the user to key in Hex Code. Only hexadecimal (Hex) is

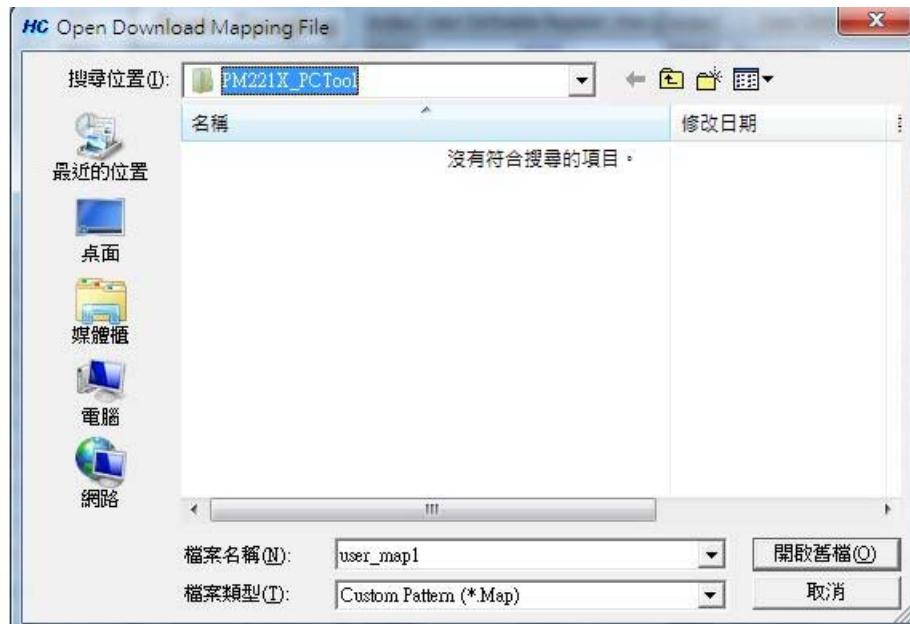
acceptable when the value is entered. Click to proceed.



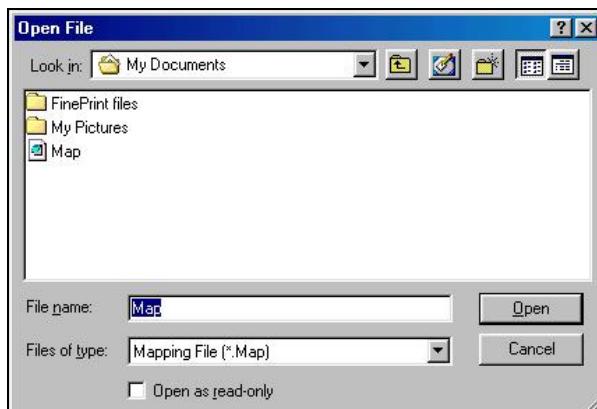
If user has backup file (The instruction for backuping file is in the following) in the User Definable Register section for other meters, and the data in the User Definable Register section for currently connecting meters is as same as its backup file. User can quickly setup data in the User Definable Register section by applying the backup file. Click to confirm if setup massive data in the User Definable Register section. Click to continue or to exit.



Please enter user name and password, and then click to finish setup. If user enters correct data, then the setup is complete. Otherwise, user will be request to do it again.



The Open File window is displayed for selecting a Mapping file, and click **Open** then the PCTool will be automatically doing the setting in User Definable Register accordingly.



After setting, all data in User Definable Register section can be saved as backup Mapping file and used for other meters, which have identical setting as the first one.

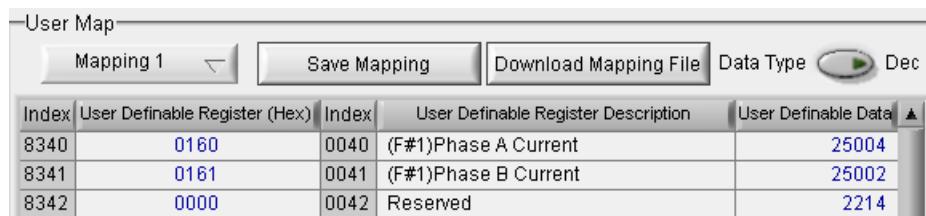
After selecting **Save Mapping**, the Open File window will display. Enter a Mapping file name, then click **Save** to save the file under a desired directory.

Power Measurement Unit

PM2218

Click  Data Type  Hex to display DATA in Decimal or Hexadecimal.

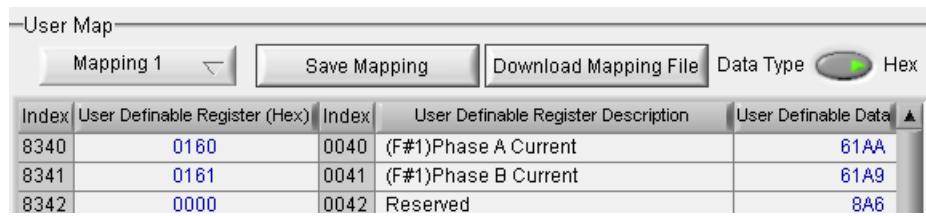
User Map



This screenshot shows the User Map interface with the 'Data Type' set to 'Dec'. The table displays three entries:

Index	User Definable Register (Hex)	Index	User Definable Register Description	User Definable Data
8340	0160	0040	(F#1)Phase A Current	25004
8341	0161	0041	(F#1)Phase B Current	25002
8342	0000	0042	Reserved	2214

User Map



This screenshot shows the User Map interface with the 'Data Type' set to 'Hex'. The table displays the same three entries as the previous screenshot, but the data values are shown in hexadecimal format:

Index	User Definable Register (Hex)	Index	User Definable Register Description	User Definable Data
8340	0160	0040	(F#1)Phase A Current	61AA
8341	0161	0041	(F#1)Phase B Current	61A9
8342	0000	0042	Reserved	8A6

4.9 Alarm (Option)

Alarm	
Alarm	
	Alarm Status
Phase Overvoltage Alarm	Off
Phase Undervoltage Alarm	Off
OverFrequency Alarm	Off
UnderFrequency Alarm	Off
Unbalance Zero Voltage Alarm	Off
Unbalance Neg. Voltage Alarm	Off
Voltage Flicker Alarm	Off
Voltage SAG Alarm	Off

	Function	Pickup	Delay (sec)	
Phase Overvoltage	Off <input type="button" value="▼"/>	130.0 V	2.0	<input type="button" value="Setup"/>
Phase Undervoltage	Off <input type="button" value="▼"/>	90.0 V	2.0	
Overfrequency	Off <input type="button" value="▼"/>	51.0 Hz	2.0	
Underfrequency	Off <input type="button" value="▼"/>	49.0 Hz	2.0	
Unbalance Zero Voltage	Off <input type="button" value="▼"/>	2.0 %	2.0	
Unbalance Neg. Voltage	Off <input type="button" value="▼"/>	2.0 %	2.0	
Flicker Over	Off <input type="button" value="▼"/>	0.20 %	2.0	

Click **Alarm** : The function displays maximum value and minimum value.

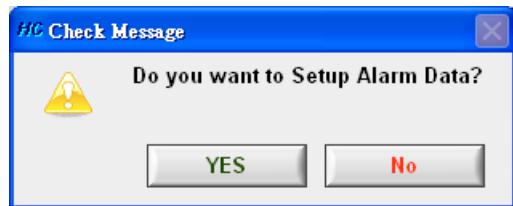
This page has separate into two parts, the up section is eight types of Alarm status; the lower section is to set alarm data for seven types Alarm. The detail has indicated below:

The status for eight types Alarm are Phase Overvoltage, Phase Undervoltage (Bus, Line), OverFrequency, UnderFrequency, Unbalance Zero Voltage, Unbalance Neg. Voltage, Voltage Flicker, and Voltage SAG.

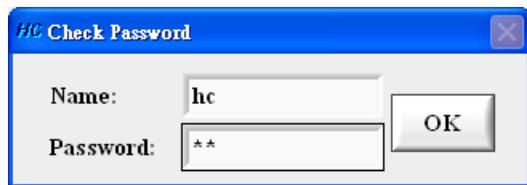
	Function	Pickup	Delay (sec)	
Phase Overvoltage	Off <input type="button" value="▼"/>	130.0 V	2.0	<input type="button" value="Setup"/>
Phase Undervoltage	Off <input type="button" value="▼"/>	90.0 V	2.0	
Overfrequency	Off <input type="button" value="▼"/>	51.0 Hz	2.0	
Underfrequency	Off <input type="button" value="▼"/>	49.0 Hz	2.0	
Unbalance Zero Voltage	Off <input type="button" value="▼"/>	2.0 %	2.0	
Unbalance Neg. Voltage	Off <input type="button" value="▼"/>	2.0 %	2.0	
Flicker Over	Off <input type="button" value="▼"/>	0.20 %	2.0	

This setting is for Function, Pickup, and Delay (sec) for seven types of alarm, select or enter the setting.

Click **Setup** for setting.



Click button to confirm if setup Alarm data. Click to setup or to cancel.



Please enter user name and password, and then click to finish setup. If user enters correct data, then the setup is complete. Otherwise, user will be request to do it again.

5. System Function

PCTool provides data of system function for review, backup, and restore. User can backup entire data of meter according to requirements and restore entire data to meter by backup data. This function is ONLY available for the engineer who has high level authority to do so.

This chapter describes how to review, backup, and restore the data of System Function. Please make sure PM2218 is working accurately and properly before start using those functions.

5.1 System Testing

System Function										
	0	1	2	3	4	5	6	7	8	9
800^	0001	0004	001E	0000	003C	0000	0000	0000	0000	00
801^	0000	0000	A8C0	0300	FFFF	00FF	A8C0	0100	0000	01
802^	0000	0000	0000	0000	0000	0000	0000	0000	0000	00
803^	0001	0001	7530	0000	0001	0003	0000	0000	0005	00
804^	000A	0000	00							
805^	0000	0000	0000	0000	0000	0000	0000	0000	0000	00
806^	0003	0000	0E33	0000	0000	0000	0025	0000	0000	00
807^	0000	0000	0000	0001	0000	0000	0000	0000	0000	00
808^	0000	0000	0064	0001	001E	012C	0000	0000	0000	00
809^	0000	0000	0064	0001	001E	0C4E	0000	0000	0000	00
80A^	0000	0000	0064	0001	001E	012C	0000	0000	0000	00
80B^	0000	0000	0064	0001	001E	0C4E	0000	0000	0000	00
80C^	0000	0000	0064	0001	001E	012C	0000	0000	0000	00
80D^	0000	0000	0064	0001	001E	0C4E	0000	0000	0000	00
80E^	0000	0000	0064	0001	001E	012C	0000	0000	0000	00
80F^	0000	0000	0064	0001	001E	0C4E	0000	0000	0000	00
810^	0000	0000	0064	0001	001E	012C	0000	0000	0000	00
811^	0000	0000	0064	0001	001E	0C4E	0000	0000	0000	00
812^	0000	0000	0064	0001	001E	012C	0000	0000	0000	00
813^	0000	0000	0064	0001	001E	0C4E	0000	0000	0000	00
814^	0000	0000	0064	0001	001E	012C	0000	0000	0000	00
815^	0000	0000	0064	0001	001E	0C4E	0000	0000	0000	00
816^	0000	0000	0064	0001	001E	012C	0000	0000	0000	00
817^	0000	0000	0064	0001	001E	0C4E	0000	0000	0000	00
818^	0000	0000	0000	0000	0000	0000	0000	0000	0000	00
819^	0000	0000	0000	0000	0000	0000	0000	0000	0000	00

Click **System Function** : This function displays System Function.

After the setpoints of PM2218 (PT/CT ratio...etc.) are properly configured, the data of setpoints will be stored in system parameter.

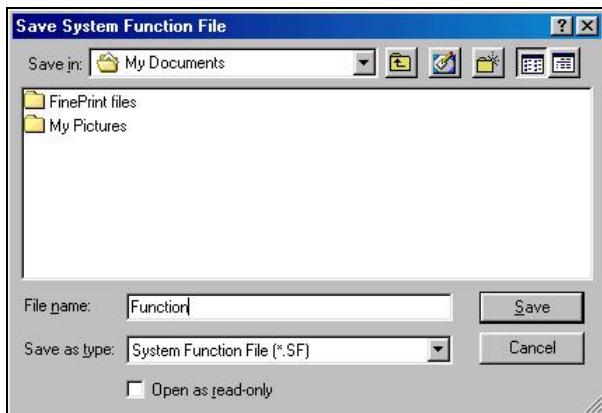
The data stored in this section is System function value, and the accuracy of meter directly affected by data. This function is ONLY available for expert engineers who have high level authority to do so. User can take the backup file in system function to maintain when PM2218 does not function properly or update/copy same data of setpoint to other PM2218 at one time.

Click **Save System Function File** button to save all system function data of meters as System Parameter backup file.

Click **Download System Function File** button to configure the system function data by using System Parameter backup file.

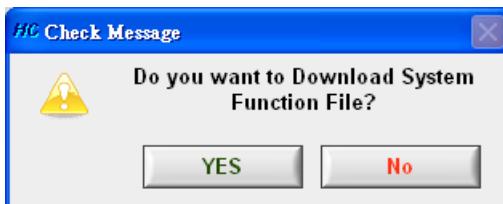
Click **Check System Function File** button to compare if backup file of System Parameter and system parameter data of PM2218 are the same.

※ Note: The system testing is location for system function value. User has to confirm before setting; otherwise, it will affect the accuracy and operation of meter.



Since meter has to comply with on-site requirements in general, user must setup system function of meter completely, (ex. the PT/CT ratio... etc.) When authorized engineer complete the setup, the engineer can save all system function data of meters as backup file for System Parameter. Click

Save System Function File button, the Save System Function File message box will pop up. Enter the backup file name of System Parameter, and click **Save** to continue.

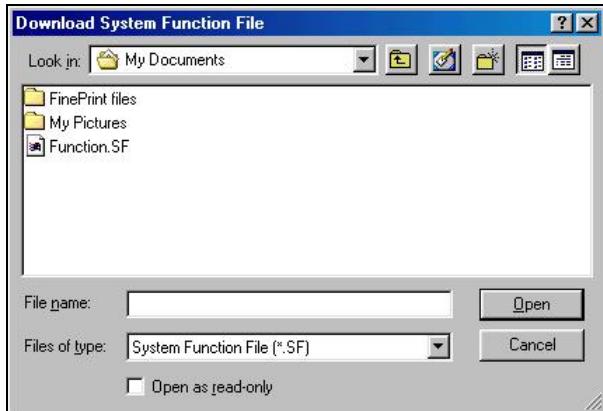


When authorized engineer find it is necessary to maintain the system function of PM2218 or setup other meters with same system functions, it is requested to configure backup file of System Parameter into meters. Click **Download System Function File**, the message box will pop up and confirm if configure data of System Parameter. Click **YES** to continue or **No** to exit.

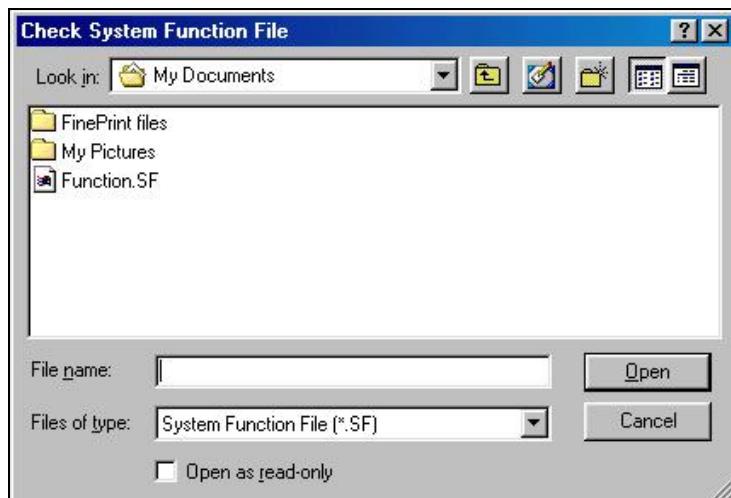


Please enter user name and password, and then click **OK** button to finish setup. If users enter

correct data, then the setup is complete. Otherwise, user will be requested to enter username and password again.



The Download System Function File message box will pop up. User needs to select a backup file of System Parameter, and click **Open** to continue. PCTool will automatically configure data of System Parameter one by one.



Click **Check System Function File** button if authorized engineer wants to compare data between PM2218 and backup file of System Parameter. The Check System Function File window will pop up and select the file you want to compare. Click **Open** button and PCTool will start comparing data between PM2218 and backup file of System Parameter one by one.

System Function											
	6	7	8	9	A	B	C	D	E	F	▲
800 [*]	0000	0000	0000	0000	0000	0000	000A	0000	0000	00	
801 [*]	000A	000A	0000	01F6	0000	0000	0000	0000	0000	00	
802 [*]	0000	0000	0000	0000	0000	0000	0000	0000	0000	00	
803 [*]	0000	0000	0005	0000	0000	000A	000A	0001	0001	00	
804 [*]	000A	000A	0000	0000	0000	0000	0000	0000	0000	00	
805 [*]	0000	0000	0000	0000	0000	0000	0000	0000	0000	00	
806 [*]	0025	0000	0000	0000	0498	0000	0489	0000	0512	00	
807 [*]	0000	0000	0000	0000	0000	0000	0000	0000	0000	00	
808 [*]	0000	0000	0000	0000	0000	0000	0000	0000	0000	00	
809 [*]	0000	0000	0000	0000	0000	0000	0000	0000	0000	00	
80A [*]	0000	0000	0000	0000	0000	0000	0000	0000	0000	00	
80B [*]	0000	0000	0000	0000	0000	0000	0000	0000	0000	00	
80C [*]	0000	0000	0000	0000	0000	0000	0000	0000	0000	00	
80D [*]	0000	0000	0000	0000	0000	0000	0000	0000	0000	00	
80E [*]	0000	0000	0000	0000	0000	0000	0000	0000	0000	00	
80F [*]	0000	0000	0000	0000	0000	0000	0000	0000	0000	00	
810 [*]	0000	0000	0000	0000	0000	0000	0000	0000	0000	00	
811 [*]	0000	0000	0000	0000	0000	0000	0000	0000	0000	00	
812 [*]	0000	0000	0000	0000	0000	0000	0000	0000	0000	00	
813 [*]	0000	0000	0000	0000	0000	0000	0000	0000	0000	00	
814 [*]	0000	0000	0000	0000	0000	0000	0000	0000	0000	00	
815 [*]	0000	0000	0000	0000	0000	0000	0000	0000	0000	00	
816 [*]	0000	0000	0000	0000	0000	0000	0000	0000	0000	00	
817 [*]	0000	0000	0000	0000	0000	0000	0000	0000	0000	00	
818 [*]	0000	0000	0000	0000	0000	0000	0000	0000	0000	00	
819 [*]	0000	0000	0000	0000	0000	0000	0000	0000	0000	00	▼

The data highlighted with color shows the difference after been compared. As shown on above window, for example, one log of data (000A at column 803Ch) is colored and confirmed. Therefore, you could restore or copy saved data and backup file of Download System Function to PM2218 again.

※ Note: The system testing is location for system function value. User has to confirm before setting; otherwise, it will affect the accuracy and operation of meter.

VI 、 Protocol and communication

1. PLC ModBus Compatible

The Modbus® communications protocol allows information and data to be efficiently transferred between the PM2200 series and modicon programmable logic controller (PLC) or other third party Modbus® compatible monitoring and control system. The PM2200 series also can establish a monitoring system simply to adopt an IPC-based centralized master running software.

Comprehensive System Integration

The PM2200 Series Power Measurement Unit provides theModbus® compatible as a standard feature for comprehensive system integration. The PLC compatible RS485 / RS232C Modbus® communication protocol allows information and data to be transferred efficiently between Distributed Terminal Unit and PLC, existing RTU Power SCADA system, DCS system, IPC running software.

Transmission Mode

The mode of transmission is the structure of the individual units of information within a message, and the numbering system used to transmit the data. The mode is defined in the following which is compatible with Modbus® protocol - RTU Mode.

Coding System	8-bits binary
Start bit	1 bit
Data bits	8 bits
Parity	No Parity
Stop bit	1 bit
Error Checking	CRC (cyclical redundancy check)

Start of frame = silence on line for time ≥ 4 characters

Slave Address = 1 character

Function Code = 1 character

Date Field = N character

Error Checking = 16 bits CRC code

End of frame = silence on line for time ≥ 4 characters

Slave Address

This is the first byte of every transmission. This byte response the user assigned address of the slave device that is to receive the message sent by the master. Each slave device has its own slave address and all start with its address to response and transmit.

The slave address transmitted by master device represents address of the slave device receiving the message, and the slave address transmitted by slave device represents address of the slave device returning the message.

Function Code

Function code is the second byte during every communication transmission. The Modbus® communication protocol defines the function codes from 1 to 127. The PM2200 series implements some of these function codes. The master device can inform slave device to perform action by transmit function codes to slave device. As a reference for the response from slave device, the returning function codes responded by slave device can conform the function codes transmitted by master device, and can represent the slave device completely perform the action requested by master device. If the function code transmitted from the slave device is 1 (i.e. The function code > 127), then it represents the slave device did not perform the action as requested or transmit in error.

Data

Data will be different according to different function codes. The Data can be actual values, setpoints, or addresses sent from master device to slave device or from slave device to master device.

CRC

CRC is a two-byte error checking code.

Protocol

When the communication command sent to the assigned instrument, the device with corresponding slave address will accept the command, remove the slave address, and read the message. If no errors occurred, the device will execute the corresponding task; and then return the executing result back to sender. The returning information is including slave address, function code for execution, result after execution, and code for error checking. No response is transmitted if any error has occurred.

Framing

Address	Function	Data	Check
8 bits	8 bits	N * 8 bits	16-Bits

Message Frame Format: Modbus® is the registered trademark of Modicon Inc.

Slave Address

The slave address is the starting byte (8 bits) of the message. The byte from address 1 to 254 represents slave device assigned address by user receive message sent by master device.

Each slave must be assigned a unique address and only the addressed slave will respond to query that contains its address. When slave device sends a response, the slave address represents where the message is sent.

00H is the default checking address of factory. Slave device do not response to the message.

Function Code

The function codes transmitted by master device inform slave device what task to perform. Table lists the function code, user can find meaning and action for function code 03, 05, 06, and 16.

Function Code Table

Code	Meaning	Action
03	Read Data	Read one or more binary value for current registers
05	Execute operation	Setup specific action mode
06	Preset single register	Write setting binary value into single register
16	Preset multiple register	Write setting binary value into multiple registers

Data Field

The data field contains information needed by the slave to perform the specific function or contains data collected by the slave response to query. This information may be values, address references, or limits. For example, the function code tells the slave to read a register, and the data field is needed to indicated which register to start at and how many to read. The imbedded address and data information varied with the type and capacity of slave associated with the slave.

Error Checking Field

The cyclical redundancy check (CRC) contains two bytes. The CRC is calculated by transmission equipment, and stored at the rear of transmitted data. The equipment receiving data will recalculate the CRC of data being received. After checking the CRC by calculating and CRC by receiving, it represents error when they are different.

CRC-16 Algorithm

→ Data transfer
 A 16 bit working register
 AL Low order byte of A
 AH High order byte of A
 CRC 16 bit CRC-16 value
 i, j Loop counters
 (+) Logical exclusion-or operator
 Di i-th data byte ($i = 0$ to $N - 1$)
 G Exclusion-or operator for CRC register and polynominal A001
 shr(x) shift right (the LSbit of the low order byte of x shifts into a carry flag, a "0" is shifted into the MSbit of the high order byte of x, and all other bits shift right one location.)

Algorithm :

1. FFFF hex → A
2. 0 → i
3. 0 → j
4. DI (+) AL → AL
5. $j + 1 \rightarrow j$
6. Shr (A)
7. Is there a carry ? No : go to 8.
Yes : G (+) A → A
8. Is $j = 8$? No : go to 5.
Yes : go to 9.
9. $i + 1 \rightarrow i$
10. Is $i = N$? No : go to 3.
Yes : go to 11.
11. A → CRC

Function Code 03 - Read Setpoints & Actual Values

The PM2200 series meter adopt Modbus communication protocol; these communication commands can be used to read any setpoint ("holding registers") or actual value ("input registers"). Holding and input registers are both 16 bits (two bytes) values transmitted for high order byte first. Thus all PM2200 series setpoints and actual values are sent as two bytes. The maximum number of registers that can be read in one transmission is 60. Function code 03 is configured to read setpoints or actual values because some PLCs do not support function code 03. The order format that slave device response are the slave address, function code, data and CRC. Each item of data is sent in two-byte format, and the high byte sent first.

Example for Message format :

The address of slave device is 01, and 3 registers starting at address 0032. For this example, the addresses of 3 register data are:

<u>Address</u>	<u>Data</u>
0032	EA60
0033	C350
0034	DB6C

Master device transmission	Bytes	Example (Hex)	
Slave device address	1	01	Message for slave device 01
Function code	1	03	Read registers
Data Starting Address	2	00	Data starting address is 0032
		32	
Number of setpoints	2	00	3 registers (6 bytes total)
		03	
CRC	2	A4	CRC calculated by the master device
		04	

Slave device Response	Bytes	Example (Hex)	
Slave device address	1	01	Message from slave 01
Function code	1	03	Read registers
Byte Count	1	06	3 registers = 6 bytes
Data 1	2	EA	Data starting at 0032
		60	
Data 2	2	C3	Data starting at 0033
		50	
Data 3	2	DB	Data starting at 0034
		6C	
CRC	2	D1	CRC calculated by the slave device
		3F	

Function Code 05 : Execute operation

This function code allows the master to request PM2200 series to perform specific command operations. The command numbers listed in the commands area of the memory map correspond to operation code for function code 05. The operation commands can also be initiated by writing to the commands area of the memory map data format using function code F12.

Operation and Format

The address of slave device is 01, and operation function is to clear all energy.

Master device transmission	Bytes	Example (Hex)	
Slave device address	1	01	Message for slave device 01
Function code	1	05	Execute operation
Operation code	2	00	Clear all energy
		0B	Operation code 11 (Dec)
Code value	2	FF	Perform function
		00	
CRC	2	FD	CRC calculated by the master device
		F8	

Slave device Response	Bytes	Example (Hex)	
Slave device address	1	01	Message from slave 01
Function code	1	05	Received Function code
Operation code	2	00	Received Operation code 11 (Dec)
		0B	
Code value	2	FF	Received perform function code
		00	
CRC	2	FD	CRC calculated by the slave device
		F8	

Function Code 06 : Store Single Setpoint

This function code 06 allows master device to store a single setpoint into memory of PM2200 series meter. The slave device also response to this function code to return message to the master device.

Example for Message format :

The address of slave device is 01, and store starting address 8030H as value 0002. For this case, when data is completely stored, the value of slave device address 8030H is 0002.

Master device transmission	Bytes	Example (Hex)	
Slave device address	1	01	Message for slave device 01
Function code	1	06	Store Single Setpoint
Data Starting address	2	80 30	Setpoint starting address is 8030
Data	2	00 02	Data for address is 0002
CRC	2	21 C4	CRC calculated by the master device

Slave device Response	Bytes	Example (Hex)	
Slave device address	1	01	Message from slave 01
Function code	1	06	Store Single Setpoint
Data Starting Address	2	80 30	Setpoint starting address is 8030
Data	2	00 02	Data for address is 0002
CRC	2	21 C4	CRC calculated by the slave device

Function Code 16 : store multiple setpoints

This function code 16 allows master device to store multiple setpoints into memory of PM2200 series meter. The “registers” in Modbus communication protocol are 16 bit (two bytes) values transmitted for high order byte first.

Each setpoint (Address) of PM2200 series is sent as two-byte format. The setpoint with maximum number that can be stored in one command is depending on the slave device.

Modbus communication protocol allows to store up to 60 registers. Thus, PM2200 series allows 60 registers to be stored in one transmission.

The order format that PM2200 series response are the slave address, function code, data and CRC.

Example for Message format :

The address of slave device is 01, and respectively store value 0002 to address 8030 and value 0001 to address 8031. In this case, when data is completely stored, the PM2200 series with address 0001 will have the following setpoints message:

Address	Data
8030	0002
8031	0001

Master device transmission	Bytes	Example (Hex)	
Slave device address	1	01	Message for slave device 01
Function code	1	10	Store multiple setpoints
Data Starting address	2	80	Setpoint Starting address is 8030
		30	
Number of setpoints	2	00	2 setpoints (4 bytes total)
		02	
Byte Count	1	04	4 bytes of data
Data 1	2	00	Data for address 8030
		02	
Data 2	2	00	Data for address 8031
		01	
CRC	2	F1	CRC calculated by the master device
		7D	

Slave device Response	Bytes	Example (Hex)	
Slave device address	1	01	Message from slave 01
Function code	1	10	Store multiple setpoints
Data Starting address	2	80	Setpoint starting address is 8030
		30	
Number of setpoints	2	00	2 setpoints (4 bytes total)
		02	
CRC	2	68	CRC calculated by the slave device
		07	

Error Responses

When PM2218 detects an error other than CRC error, a response will be sent to the master device, and MSBit of the function code byte will be set to 1 (i.e. the function code sent from the slave device will be equal to the function code sent from the master device plus 128). The following exception codes indicate the type of error that occurred. Message received from the master device with CRC errors, it will be ignored by PM2218 meter.

The formats of exception codes sent by slave device (Except CRC code) are as following:

Slave Address: 1 byte

Function Code: 1 byte (with MSbit set to 1)

Exception Code: 1 byte

CRC Code: 2 bytes

The exception codes responded by PM2200 series are as following:

01 - Illegal function code

The function code transmitted is not one of the function supported by the PM2200 series.

02 - Illegal data Address

The Address referenced in the data field exceed the addresses are defined for the PM2200 series.

03 - Illegal data value

The data value transmitted by the master is not within the range for the data of corresponding addresses.

Appendix : data conversion (for current input 5A)

Data conversion : all response of measured data from PM2218 to be shown by 16-bits (Rx), except the energy by 32-bit

No	Item	Formula		Note
1	Voltage (V)	$U = Rx * UU * \text{Voltage Ratio (PT)}$ $0 \leq Rx \leq 65535$	Unsigned Char (16 bits)	Ua, Ub, Uc, Up_av, Uab, Ubc, Uca, Ul_av, V0
2	Current (A)	$I = Rx * AU * \text{Current Ratio (CT)}$ $0 \leq Rx \leq 65535$	Unsigned Char (16 bits)	Ia, Ib, Ic, Iav, IO
3	Frequency (Hz)	$F = Rx * 0.002$ $0 \leq Rx \leq 65535$	Unsigned Char (16 bits)	F
4	Power factor	$PF = Rx * 0.0001$ $-10000 \leq Rx \leq 10000$	Signed Char (16 bits)	PFa, PFb, PFc, PF
5	Active power	$W = Rx * \text{Power_unit} * PT * CT$ $-32768 \leq Rx \leq 32767$	Signed Char (16 bits)	Pa, Pb, Pc, Psum
6	Reactive power	$Q = Rx * \text{Power_unit} * PT * CT$ $-32768 \leq Rx \leq 32767$	Signed Char (16 bits)	Qa, Qb, Qc, Qsum
7	Apparent power	$VA = Rx * \text{Power_unit} * PT * CT$ $0 \leq Rx \leq 65535$	Unsigned Char (16 bits)	Sa, Sb, Sc, Ssum
8	Phase sequence	0 : positive sequence 1 : negative sequence	Unsigned Char (16 bits)	
9	Energy	$1^{\text{st}} \text{ Energy} = Rx * PT * CT$ $0 \leq Rx \leq 4294967295(0xFFFFFFFF)$	Unsigned Char (32 bits)	WH - forward WH - reverse +VarH, -VarH
Remark	Voltage Unit (UU) = 0.01 Current Unit (AU) = 0.0002 Power Unit (Power_unit) = 0.2 Voltage Waveform Unit (UADC) = 0.03 (Corresponding RMS voltage for 1 count voltage waveform) Current Waveform Unit (IADC) = 0.0006 (Corresponding RMS current for 1 count current waveform)			

Appendix : data conversion (for current input 1A)

Data conversion : all response of measured data from PM2218 to be shown by 16-bits (Rx), except the energy by 32-bit

No	Item	Formula		Note
1	Voltage (V)	$U = Rx * UU * \text{Voltage Ratio (PT)}$ $0 \leq Rx \leq 65535$	Unsigned Char (16 bits)	Ua, Ub, Uc, Up_av, Uab, Ubc, Uca, Ul_av, Vneu
2	Current (A)	$I = Rx * AU * \text{Current Ratio (CT)}$ $0 \leq Rx \leq 65535$	Unsigned Char (16 bits)	la, Ib, Ic, lav, Ineu
3	Frequency (Hz)	$F = Rx * 0.002$ $0 \leq Rx \leq 65535$	Unsigned Char (16 bits)	F
4	Power factor	$PF = Rx * 0.0001$ $-10000 \leq Rx \leq 10000$	Signed Char (16 bits)	PFa, PFb, PFc, PF
5	Active power	$W = Rx * \text{Power_unit} * PT * CT$ $-32768 \leq Rx \leq 32767$	Signed Char (16 bits)	Pa, Pb, Pc, Psum
6	Reactive power	$Q = Rx * \text{Power_unit} * PT * CT$ $-32768 \leq Rx \leq 32767$	Signed Char (16 bits)	Qa, Qb, Qc, Qsum
7	Apparent power	$VA = Rx * \text{Power_unit} * PT * CT$ $0 \leq Rx \leq 65535$	Unsigned Char (16 bits)	Sa, Sb, Sc, Ssum
8	Phase sequence	0 : positive sequence 1 : negative sequence	Unsigned Char (16 bits)	
9	Energy	$1^{\text{st}} \text{ Energy} = Rx * PT * CT$ $0 \leq Rx \leq 4294967295(0xFFFFFFFF)$	Unsigned Char (32 bits)	WH - forward WH - reverse +VarH, -VarH
Remark	Voltage Unit (UU) = 0.01 Current Unit (AU) = 0.00004 Power Unit (Power_unit) = 0.04 Voltage Waveform Unit (UADC) = 0.03 (Corresponding RMS voltage for 1 count voltage waveform) Current Waveform Unit (IADC) = 0.00012 (Corresponding RMS current for 1 count current waveform)			

2. Memory Map

REG ADDR (Hex)	GROUP	DESCRIPTION	REGISTER VALUE RANGE	UNIT VALUE	SCALE FACTO R	FOR- MAT	FACTORY DEFAULT VALUE (CONVERTED)
Product Information (Input Registers) Address - 0000 - 002F							READ
0000	PRODUCT	Reserved					
0001	ID	Product Options	---	---	---	F100	From order code
0002		Hardware Version Code	---	---	---	F5	Current version
0003		Main Software Version Code	---	x 0.01	---	F1	Current version
0004		Boot Software Version Code	---	x 0.01	---	F1	Current version
0005		Reserved					
0006		Reserved					
0007		Reserved					
0008		Reserved					
0009		Current Range	0 - 50	---	---	F1	0=5A, 50= 50A
000A		Voltage Range	0 - 1	---	---	F27	0= 300V
000B		Reserved					
000C		Reserved					
000D		Reserved					
000E		Reserved					
000F		Reserved	---	---	---		
0010		Serial Number Character 1 and 2	---	---	ASCII	F6	1 st ,2 nd char.
0011		Serial Number Character 3 and 4	---	---	ASCII	F6	3 rd ,4 th char
0012		Serial Number Character 5 and 6	---	---	ASCII	F6	5 th ,6 th char
0013		Serial Number Character 7 and 8	---	---	ASCII	F6	7 th ,8 th char
0014		Reserved					
0015		Reserved					
0016		Reserved					
0017		Reserved					
0018		Manufacture Day/None	---	---	---	F10	manf. day/none
0019		Manufacture Year/Month	---	---	---	F9	manf. year/month
001A		Reserved					
001B		Reserved					
001C		Reserved					
001D		Reserved					
001E		Reserved					
001F		Reserved					
0020		Reserved					
0021		Reserved					
0022		Reserved					
0023		Reserved					
0024		Reserved					
0025		Reserved					
0026		Reserved					
0027		Reserved					
0028		Reserved					
0029		Reserved					
002A		Reserved					
002B		Reserved					
002C		Reserved					
002D		Reserved					
002E		Reserved					
002F		Reserved					

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REG ADDR (Hex)	GROUP	DESCRIPTION	REGISTER VALUE RANGE	UNIT VALUE	SCALE FACTO R	FOR- MAT	FACTORY DEFAULT VALUE (CONVERTED)
Product Information (Input Registers) Address – 0030 - 003F							READ/WRITE
0030	CLOCK	Minutes/Seconds	59 / 59	---	---	F7	N/A
0031	SETUP	Day/Hours	31 / 23	---	---	F8	N/A
0032		Year/Month	99 / 12	---	---	F9	N/A
0033		Reserved					
0034		Reserved					
0035		Reserved					
0036		Reserved					
0037		Reserved					
0038		Reserved					
0039		Reserved					
003A		Reserved					
003B		Reserved					
003C		Reserved					
003D		Reserved					
003E		Reserved					
003F		Reserved					

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REG ADDR (Hex)	GROUP	DESCRIPTION	REGISTER VALUE RANGE	UNIT VALUE	SCALE FACTO R	FOR- MAT	FACTORY DEFAULT VALUE (CONVERTED)
User Definable Register (Input Registers) Address - 0040 - 009F							
0040	USER	User Definable Data 0000	---	---	---	---	---
0041	DEFINABLE	User Definable Data 0001	---	---	---	---	---
0042	REGISTERS	User Definable Data 0002	---	---	---	---	---
0043	1	User Definable Data 0003	---	---	---	---	---
0034		User Definable Data 0004	---	---	---	---	---
0045		User Definable Data 0005	---	---	---	---	---
0046		User Definable Data 0006	---	---	---	---	---
0047		User Definable Data 0007	---	---	---	---	---
0048		User Definable Data 0008	---	---	---	---	---
0049		User Definable Data 0009	---	---	---	---	---
004A		User Definable Data 000A	---	---	---	---	---
004B		User Definable Data 000B	---	---	---	---	---
To		↓	↓	↓	↓	↓	↓
009F		User Definable Data 005F	---	---	---	---	---
User Definable Register (Input Registers) Address – 00A0 – 00FF							
00A0	USER	User Definable Data 0000	---	---	---	---	---
00A1	DEFINABLE	User Definable Data 0001	---	---	---	---	---
00A2	REGISTERS	User Definable Data 0002	---	---	---	---	---
00A3	2	User Definable Data 0003	---	---	---	---	---
00A4		User Definable Data 0004	---	---	---	---	---
00A5		User Definable Data 0005	---	---	---	---	---
00A6		User Definable Data 0006	---	---	---	---	---
00A7		User Definable Data 0007	---	---	---	---	---
00A8		User Definable Data 0008	---	---	---	---	---
00A9		User Definable Data 0009	---	---	---	---	---
00AA		User Definable Data 000A	---	---	---	---	---
00AB		User Definable Data 000B	---	---	---	---	---
To		↓	↓	↓	↓	↓	↓
00FF		User Definable Data 005F	---	---	---	---	---

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REG ADDR (Hex)	GROUP	DESCRIPTION	REGISTER VALUE RANGE	UNIT VALUE	SCALE FACTOR	FOR- MAT
Actual Value (Input Registers) Address - 0100 – 012F						READ
0100	STATUS	General Status	---	---	---	F101
0101		Reserved				
0102		Reserved				
0103		Reserved				
0104		Reserved				
0105		Reserved				
0106		Reserved				
0107		Reserved				
0108		Reserved				
0109		Bus #1 Alarm status	---	---	---	F104
010A		Reserved				
010B		Reserved				
010C		Reserved				
010D		Reserved				
010E		Reserved				
010F		Reserved				
0110		Reserved				
0111		Reserved				
0112		Reserved				
0113		Reserved				
0114		Reserved				
0115		Reserved				
0116		Reserved				
0117		Reserved				
0118		Reserved				
0119		Reserved				
011A		Reserved				
011B		Reserved				
011C		Reserved				
011D		Reserved				
011E		Reserved				
011F		Reserved				
0120	UNIT	Voltage Input Range Scale	1-300	1V	PTR	F1
0121		Voltage Input Range Scale Count	1-30000	1	---	F1
0122		Current Input Range Scale	1-200	1A	CTR	F1
0123		Current Input Range Scale Count	1-50000	1	---	F1
0124		Power Input Range Scale(High)	32 Bit	1 W	PTR x CTR	F3
0125		Power Input Range Scale(Low)	---	---	---	---
0126		Power Input Range Scale Count	1-10000	1	---	F1
0127		Reserved				
0128		Voltage Input Range scale ADC Count	1 - 10000	1	PTR	F1
0129		Current Input Range scale ADC Count	1-8333	1	CTR	F1
012A		Reserved				
012B		Reserved				
012C		Reserved				
012D		Reserved				
012E		Reserved				
012F		Reserved				

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REG ADDR (Hex)	GROUP	DESCRIPTION	REGISTER VALUE RANGE	UNIT VALUE	SCALE FACTOR	FOR- MAT
Actual Value (Input Registers) Address - 0130 – 015F						READ
0130		Reserved				
0131		Reserved				
0132		Reserved				
0133		Reserved				
0134		Reserved				
0135		Reserved				
0136		Reserved				
0137		Reserved				
0138		Reserved				
0139		Reserved				
013A		Reserved				
013B		Reserved				
013C		Reserved				
013D		Reserved				
013E		Reserved				
013F		Reserved				
0140	CLOCK1	Minutes/Seconds	59 / 59	---	---	F7
0141		Day/Hours	31 / 23	---	---	F8
0142		Year/Month	99 / 12	---	---	F9
0143		millisecond				
0144		Reserved				
0145		Reserved				
0146		Reserved				
0147		Reserved				
0148	FREEZE	Minutes/Seconds of Last Freeze	59 / 59	---	---	F7
0149	TIME	Day/Hours of Last Freeze	31 / 23	---	---	F8
014A		Year/Month of Last Freeze	99 / 12	---	---	F9
014B		millisecond				
014C		Reserved				
014D		Reserved				
014E		Reserved				
014F		Reserved				
0150		Reserved				
0151		Reserved				
0152		Reserved				
0153		Reserved				
0154		Reserved				
0155		Reserved				
0156		Reserved				
0157		Reserved				
0158		Reserved				
0159		Reserved				
015A		Reserved				
015B		Reserved				
015C		Reserved				
015D		Reserved				
015E		Reserved				
015F		Reserved				

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REG ADDR (Hex)	GROUP	DESCRIPTION	REGISTER VALUE RENGE	UNIT VALUE	SCALE FACTOR	FOR- MAT
Actual Value (Input Registers) Address - 0160 – 018F						READ
FEEDER #1						
0160	CURRENT	Phase A Current	0 - 65535	AU	CTR	F1
0161		Phase B Current	0 - 65535	AU	CTR	F1
0162		Phase C Current	0 - 65535	AU	CTR	F1
0163		Average Current	0 - 65535	AU	CTR	F1
0164		Neutral Current	0 - 65535	AU	CTR	F1
0165	POWER	3 Phase Real Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
0166		3 Phase Reactive Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
0167		3 Phase Apparent Power	0 - 65535	Power_unit	PTR x CTR	F1
0168		3 Phase Power Factor	-10000 ~ +10000	0.0001	1	F2
0169	POWER	Phase A Active Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
016A	PHASE	Phase A Reactive Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
016B		Phase A Apparent Power	0 - 65535	Power_unit	PTR x CTR	F1
016C		Phase A Power Factor	-10000 ~ +10000	0.0001	1	F2
016D		Phase B Active Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
016E		Phase B Reactive Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
016F		Phase B Apparent Power	0 - 65535	Power_unit	PTR x CTR	F1
0170		Phase B Power Factor	-10000 ~ +10000	0.0001	1	F2
0171		Phase C Active Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
0172		Phase C Reactive Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
0173		Phase C Apparent Power	0 - 65535	Power_unit	PTR x CTR	F1
0174		Phase C Power Factor	-10000 ~ +10000	0.0001	1	F2
0175	ANGLE	3 Phase Angle (I – V)	0 - 3599	0.1	1	F1
0176		Phase A Angle (I – V)	0 - 3599	0.1	1	F1
0177		Phase B Angle (I – V)	0 - 3599	0.1	1	F1
0178		Phase C Angle (I – V)	0 - 3599	0.1	1	F1
0179		Reserved				
017A		Reserved				
017B		Reserved				
017C		Reserved				
017D		Reserved				
017E		Reserved				
017F		Reserved				
0180		Reserved				
0181		Reserved				
0182		Reserved				
0183		Reserved				
0184		Reserved				
0185		Reserved				
0186		Reserved				
0187		Reserved				
0188		Reserved				
0189		Reserved				
018A		Reserved				
018B		Reserved				
018C		Reserved				
018D		Reserved				
018E		Reserved				
018F		Reserved				

Power Measurement Unit

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REG ADDR (Hex)	GROUP	DESCRIPTION	REGISTER VALUE RANGE	UNIT VALUE	SCALE FACTOR	FOR- MAT
Actual Value (Input Registers) Address - 0190 – 01AF						READ
FEEDER #1						
0190	ENERGY	3 Phase Positive Active Energy Used (high)	32 Bit	+1 WH	PTR x CTR	F3
0191	SECONDARY	3 Phase Positive Active Energy Used (Low)	---	---	---	F3
0192		3 Phase Negative Active Energy Used (high)	32 Bit	-1 WH	PTR x CTR	F3
0193		3 Phase Negative Active Energy Used (Low)	---	---	---	F3
0194		3 Phase Positive Reactive Energy Used (high)	32 Bit	+1 VarH	PTR x CTR	F3
0195		3 Phase Positive Reactive Energy Used (Low)	---	---	---	F3
0196		3 Phase Negative Reactive Energy Used (high)	32 Bit	-1 VarH	PTR x CTR	F3
0197		3 Phase Negative Reactive Energy Used (Low)	---	---	---	F3
0198		Phase A Positive Active Energy Used (high)	32 Bit	+1 WH	PTR x CTR	F3
0199		Phase A Positive Active Energy Used (Low)	---	---	---	F3
019A		Phase B Positive Active Energy Used (high)	32 Bit	+1 WH	PTR x CTR	F3
019B		Phase B positive Active Energy Used (Low)	---	---	---	F3
019C		Phase C Positive Active Energy Used (high)	32 Bit	+1 WH	PTR x CTR	F3
019D		Phase C Positive Active Energy Used (Low)	---	---	---	F3
019E		Reserved				
019F		Reserved				
01A0	ENERGY	3 Phase Positive Active Energy Used (high)	32 Bit	+1 WH	PTR x CTR	F3
01A1	SECONDARY	3 Phase Positive Active Energy Used (Low)	---	---	---	F3
01A2	FREEZE	3 Phase Negative Active Energy Used (high)	32 Bit	-1 WH	PTR x CTR	F3
01A3		3 Phase Negative Active Energy Used (Low)	---	---	---	F3
01A4		3 Phase Positive Reactive Energy Used (high)	32 Bit	+1 VarH	PTR x CTR	F3
01A5		3 Phase Positive Reactive Energy Used (Low)	---	---	---	F3
01A6		3 Phase Negative Reactive Energy Used (high)	32 Bit	-1 VarH	PTR x CTR	F3
01A7		3 Phase Negative Reactive Energy Used (Low)	---	---	---	F3
01A8		Phase A Positive Active Energy Used (high)	32 Bit	+1 WH	PTR x CTR	F3
01A9		Phase A Positive Active Energy Used (Low)	---	---	---	F3
01AA		Phase B Positive Active Energy Used (high)	32 Bit	+1 WH	PTR x CTR	F3
01AB		Phase B positive Active Energy Used (Low)	---	---	---	F3
01AC		Phase C Positive Active Energy Used (high)	32 Bit	+1 WH	PTR x CTR	F3
01AD		Phase C Positive Active Energy Used (Low)	---	---	---	F3
01AE		Reserved				
01AF		Reserved				

Power Measurement Unit

PM2218

REG ADDR (Hex)	GROUP	DESCRIPTION	REGISTER VALUE RANGE	UNIT VALUE	SCALE FACTOR	FOR- MAT
Actual Value (Input Registers) Address – 01B0 – 01DF						READ
FEEDER #2						
01B0	CURRENT	Phase A Current	0 - 65535	AU	CTR	F1
01B1		Phase B Current	0 - 65535	AU	CTR	F1
01B2		Phase C Current	0 - 65535	AU	CTR	F1
01B3		Average Current	0 - 65535	AU	CTR	F1
01B4		Neutral Current	0 - 65535	AU	CTR	F1
01B5	POWER	3 Phase Real Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
01B6		3 Phase Reactive Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
01B7		3 Phase Apparent Power	0 - 65535	Power_unit	PTR x CTR	F1
01B8		3 Phase Power Factor	-10000 ~ +10000	0.0001	1	F2
01B9	POWER	Phase A Active Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
01BA	PHASE	Phase A Reactive Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
01BB		Phase A Apparent Power	0 - 65535	Power_unit	PTR x CTR	F1
01BC		Phase A Power Factor	-10000 ~ +10000	0.0001	1	F2
01BD		Phase B Active Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
01BE		Phase B Reactive Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
01BF		Phase B Apparent Power	0 - 65535	Power_unit	PTR x CTR	F1
01C0		Phase B Power Factor	-10000 ~ +10000	0.0001	1	F2
01C1		Phase C Active Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
01C2		Phase C Reactive Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
01C3		Phase C Apparent Power	0 - 65535	Power_unit	PTR x CTR	F1
01C4		Phase C Power Factor	-10000 ~ +10000	0.0001	1	F2
01C5	ANGLE	3 Phase Angle (I – V)	0 - 3599	0.1	1	F1
01C6		Phase A Angle (I – V)	0 - 3599	0.1	1	F1
01C7		Phase B Angle (I – V)	0 - 3599	0.1	1	F1
01C8		Phase C Angle (I – V)	0 - 3599	0.1	1	F1
01C9		Reserved				
01CA		Reserved				
01CB		Reserved				
01CC		Reserved				
01CD		Reserved				
01CE		Reserved				
01CF		Reserved				
01D0		Reserved				
01D1		Reserved				
01D2		Reserved				
01D3		Reserved				
01D4		Reserved				
01D5		Reserved				
01D6		Reserved				
01D7		Reserved				
01D8		Reserved				
01D9		Reserved				
01DA		Reserved				
01DB		Reserved				
01DC		Reserved				
01DD		Reserved				
01DE		Reserved				
01DF		Reserved				

Power Measurement Unit

PM2218

REG ADDR (Hex)	GROUP	DESCRIPTION	REGISTER VALUE RANGE	UNIT VALUE	SCALE FACTOR	FOR- MAT
Actual Value (Input Registers) Address – 01E0 – 01FF						READ
FEEDER #2						
01E0	ENERGY	3 Phase Positive Active Energy Used (high)	32 Bit	+1 WH	PTR x CTR	F3
01E1	SECONDARY	3 Phase Positive Active Energy Used (Low)	---	---	---	F3
01E2		3 Phase Negative Active Energy Used (high)	32 Bit	-1 WH	PTR x CTR	F3
01E3		3 Phase Negative Active Energy Used (Low)	---	---	---	F3
01E4		3 Phase Positive Reactive Energy Used (high)	32 Bit	+1 VarH	PTR x CTR	F3
01E5		3 Phase Positive Reactive Energy Used (Low)	---	---	---	F3
01E6		3 Phase Negative Reactive Energy Used (high)	32 Bit	-1 VarH	PTR x CTR	F3
01E7		3 Phase Negative Reactive Energy Used (Low)	---	---	---	F3
01E8		Phase A Positive Active Energy Used (high)	32 Bit	+1 WH	PTR x CTR	F3
01E9		Phase A Positive Active Energy Used (Low)	---	---	---	F3
01EA		Phase B Positive Active Energy Used (high)	32 Bit	+1 WH	PTR x CTR	F3
01EB		Phase B positive Active Energy Used (Low)	---	---	---	F3
01EC		Phase C Positive Active Energy Used (high)	32 Bit	+1 WH	PTR x CTR	F3
01ED		Phase C Positive Active Energy Used (Low)	---	---	---	F3
01EE		Reserved				
01EF		Reserved				
01F0	ENERGY	3 Phase Positive Active Energy Used (high)	32 Bit	+1 WH	PTR x CTR	F3
01F1	SECONDARY	3 Phase Positive Active Energy Used (Low)	---	---	---	F3
01F2	FREEZE	3 Phase Negative Active Energy Used (high)	32 Bit	-1 WH	PTR x CTR	F3
01F3		3 Phase Negative Active Energy Used (Low)	---	---	---	F3
01F4		3 Phase Positive Reactive Energy Used (high)	32 Bit	+1 VarH	PTR x CTR	F3
01F5		3 Phase Positive Reactive Energy Used (Low)	---	---	---	F3
01F6		3 Phase Negative Reactive Energy Used (high)	32 Bit	-1 VarH	PTR x CTR	F3
01F7		3 Phase Negative Reactive Energy Used (Low)	---	---	---	F3
01F8		Phase A Positive Active Energy Used (high)	32 Bit	+1 WH	PTR x CTR	F3
01F9		Phase A Positive Active Energy Used (Low)	---	---	---	F3
01FA		Phase B Positive Active Energy Used (high)	32 Bit	+1 WH	PTR x CTR	F3
01FB		Phase B positive Active Energy Used (Low)	---	---	---	F3
01FC		Phase C Positive Active Energy Used (high)	32 Bit	+1 WH	PTR x CTR	F3
01FD		Phase C Positive Active Energy Used (Low)	---	---	---	F3
01FE		Reserved				
01FF		Reserved				

Power Measurement Unit

PM2218

REG ADDR (Hex)	GROUP	DESCRIPTION	REGISTER VALUE RANGE	UNIT VALUE	SCALE FACTOR	FOR- MAT
Actual Value (Input Registers) Address – 0200 – 022F						READ
FEEDER #3						
0200	CURRENT	Phase A Current	0 - 65535	AU	CTR	F1
0201		Phase B Current	0 - 65535	AU	CTR	F1
0202		Phase C Current	0 - 65535	AU	CTR	F1
0203		Average Current	0 - 65535	AU	CTR	F1
0204		Neutral Current	0 - 65535	AU	CTR	F1
0205	POWER	3 Phase Real Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
0206		3 Phase Reactive Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
0207		3 Phase Apparent Power	0 - 65535	Power_unit	PTR x CTR	F1
0208		3 Phase Power Factor	-10000 ~ +10000	0.0001	1	F2
0209	POWER	Phase A Active Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
020A	PHASE	Phase A Reactive Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
020B		Phase A Apparent Power	0 - 65535	Power_unit	PTR x CTR	F1
020C		Phase A Power Factor	-10000 ~ +10000	0.0001	1	F2
020D		Phase B Active Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
020E		Phase B Reactive Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
020F		Phase B Apparent Power	0 - 65535	Power_unit	PTR x CTR	F1
0210		Phase B Power Factor	-10000 ~ +10000	0.0001	1	F2
0211		Phase C Active Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
0212		Phase C Reactive Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
0213		Phase C Apparent Power	0 - 65535	Power_unit	PTR x CTR	F1
0214		Phase C Power Factor	-10000 ~ +10000	0.0001	1	F2
0215	ANGLE	3 Phase Angle (I – V)	0 - 3599	0.1	1	F1
0216		Phase A Angle (I – V)	0 - 3599	0.1	1	F1
0217		Phase B Angle (I – V)	0 - 3599	0.1	1	F1
0218		Phase C Angle (I – V)	0 - 3599	0.1	1	F1
0219		Reserved				
021A		Reserved				
021B		Reserved				
021C		Reserved				
021D		Reserved				
021E		Reserved				
021F		Reserved				
0220		Reserved				
0221		Reserved				
0222		Reserved				
0223		Reserved				
0224		Reserved				
0225		Reserved				
0226		Reserved				
0227		Reserved				
0228		Reserved				
0229		Reserved				
022A		Reserved				
022B		Reserved				
022C		Reserved				
022D		Reserved				
022E		Reserved				
022F		Reserved				

Power Measurement Unit

PM2218

REG ADDR (Hex)	GROUP	DESCRIPTION	REGISTER VALUE RANGE	UNIT VALUE	SCALE FACTOR	FOR- MAT
Actual Value (Input Registers) Address - 0230 – 024F						READ
FEEDER #3						
0230	ENERGY	3 Phase Positive Active Energy Used (high)	32 Bit	+1 WH	PTR x CTR	F3
0231	SECONDARY	3 Phase Positive Active Energy Used (Low)	---	---	---	F3
0232		3 Phase Negative Active Energy Used (high)	32 Bit	-1 WH	PTR x CTR	F3
0233		3 Phase Negative Active Energy Used (Low)	---	---	---	F3
0234		3 Phase Positive Reactive Energy Used (high)	32 Bit	+1 VarH	PTR x CTR	F3
0235		3 Phase Positive Reactive Energy Used (Low)	---	---	---	F3
0236		3 Phase Negative Reactive Energy Used (high)	32 Bit	-1 VarH	PTR x CTR	F3
0237		3 Phase Negative Reactive Energy Used (Low)	---	---	---	F3
0238		Phase A Positive Active Energy Used (high)	32 Bit	+1 WH	PTR x CTR	F3
0239		Phase A Positive Active Energy Used (Low)	---	---	---	F3
023A		Phase B Positive Active Energy Used (high)	32 Bit	+1 WH	PTR x CTR	F3
023B		Phase B positive Active Energy Used (Low)	---	---	---	F3
023C		Phase C Positive Active Energy Used (high)	32 Bit	+1 WH	PTR x CTR	F3
023D		Phase C Positive Active Energy Used (Low)	---	---	---	F3
023E		Reserved				
023F		Reserved				
0240	ENERGY	3 Phase Positive Active Energy Used (high)	32 Bit	+1 WH	PTR x CTR	F3
0241	SECONDARY	3 Phase Positive Active Energy Used (Low)	---	---	---	F3
0242	FREEZE	3 Phase Negative Active Energy Used (high)	32 Bit	-1 WH	PTR x CTR	F3
0243		3 Phase Negative Active Energy Used (Low)	---	---	---	F3
0244		3 Phase Positive Reactive Energy Used (high)	32 Bit	+1 VarH	PTR x CTR	F3
0245		3 Phase Positive Reactive Energy Used (Low)	---	---	---	F3
0246		3 Phase Negative Reactive Energy Used (high)	32 Bit	-1 VarH	PTR x CTR	F3
0247		3 Phase Negative Reactive Energy Used (Low)	---	---	---	F3
0248		Phase A Positive Active Energy Used (high)	32 Bit	+1 WH	PTR x CTR	F3
0249		Phase A Positive Active Energy Used (Low)	---	---	---	F3
024A		Phase B Positive Active Energy Used (high)	32 Bit	+1 WH	PTR x CTR	F3
024B		Phase B positive Active Energy Used (Low)	---	---	---	F3
024C		Phase C Positive Active Energy Used (high)	32 Bit	+1 WH	PTR x CTR	F3
024D		Phase C Positive Active Energy Used (Low)	---	---	---	F3
024E		Reserved				
024F		Reserved				

Power Measurement Unit

PM2218

REG ADDR (Hex)	GROUP	DESCRIPTION	REGISTER VALUE RANGE	UNIT VALUE	SCALE FACTOR	FOR- MAT
Actual Value (Input Registers) Address - 0250 - 027F						READ
FEEDER #4						
0250	CURRENT	Phase A Current	0 - 65535	AU	CTR	F1
0251		Phase B Current	0 - 65535	AU	CTR	F1
0252		Phase C Current	0 - 65535	AU	CTR	F1
0253		Average Current	0 - 65535	AU	CTR	F1
0254		Neutral Current	0 - 65535	AU	CTR	F1
0255	POWER	3 Phase Real Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
0256		3 Phase Reactive Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
0257		3 Phase Apparent Power	0 - 65535	Power_unit	PTR x CTR	F1
0258		3 Phase Power Factor	-10000 ~ +10000	0.0001	1	F2
0259	POWER	Phase A Active Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
025A	PHASE	Phase A Reactive Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
025B		Phase A Apparent Power	0 - 65535	Power_unit	PTR x CTR	F1
025C		Phase A Power Factor	-10000 ~ +10000	0.0001	1	F2
025D		Phase B Active Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
025E		Phase B Reactive Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
025F		Phase B Apparent Power	0 - 65535	Power_unit	PTR x CTR	F1
0260		Phase B Power Factor	-10000 ~ +10000	0.0001	1	F2
0261		Phase C Active Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
0262		Phase C Reactive Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
0263		Phase C Apparent Power	0 - 65535	Power_unit	PTR x CTR	F1
0264		Phase C Power Factor	-10000 ~ +10000	0.0001	1	F2
0265	ANGLE	3 Phase Angle (I – V)	0 - 3599	0.1	1	F1
0266		Phase A Angle (I – V)	0 - 3599	0.1	1	F1
0267		Phase B Angle (I – V)	0 - 3599	0.1	1	F1
0268		Phase C Angle (I – V)	0 - 3599	0.1	1	F1
0269		Reserved				
026A		Reserved				
026B		Reserved				
026C		Reserved				
026D		Reserved				
026E		Reserved				
026F		Reserved				
0270		Reserved				
0271		Reserved				
0272		Reserved				
0273		Reserved				
0274		Reserved				
0275		Reserved				
0276		Reserved				
0277		Reserved				
0278		Reserved				
0279		Reserved				
027A		Reserved				
027B		Reserved				
027C		Reserved				
027D		Reserved				
027E		Reserved				
027F		Reserved				

Power Measurement Unit

PM2218

REG ADDR (Hex)	GROUP	DESCRIPTION	REGISTER VALUE RANGE	UNIT VALUE	SCALE FACTOR	FOR- MAT
Actual Value (Input Registers) Address - 0280 – 029F						READ
FEEDER #4						
0280	ENERGY	3 Phase Positive Active Energy Used (high)	32 Bit	+1 WH	PTR x CTR	F3
0281	SECONDARY	3 Phase Positive Active Energy Used (Low)	---	---	---	F3
0282		3 Phase Negative Active Energy Used (high)	32 Bit	-1 WH	PTR x CTR	F3
0283		3 Phase Negative Active Energy Used (Low)	---	---	---	F3
0284		3 Phase Positive Reactive Energy Used (high)	32 Bit	+1 VarH	PTR x CTR	F3
0285		3 Phase Positive Reactive Energy Used (Low)	---	---	---	F3
0286		3 Phase Negative Reactive Energy Used (high)	32 Bit	-1 VarH	PTR x CTR	F3
0287		3 Phase Negative Reactive Energy Used (Low)	---	---	---	F3
0288		Phase A Positive Active Energy Used (high)	32 Bit	+1 WH	PTR x CTR	F3
0289		Phase A Positive Active Energy Used (Low)	---	---	---	F3
028A		Phase B Positive Active Energy Used (high)	32 Bit	+1 WH	PTR x CTR	F3
028B		Phase B positive Active Energy Used (Low)	---	---	---	F3
028C		Phase C Positive Active Energy Used (high)	32 Bit	+1 WH	PTR x CTR	F3
028D		Phase C Positive Active Energy Used (Low)	---	---	---	F3
028E		Reserved				
028F		Reserved				
0290	ENERGY	3 Phase Positive Active Energy Used (high)	32 Bit	+1 WH	PTR x CTR	F3
0291	SECONDARY	3 Phase Positive Active Energy Used (Low)	---	---	---	F3
0292	FREEZE	3 Phase Negative Active Energy Used (high)	32 Bit	-1 WH	PTR x CTR	F3
0293		3 Phase Negative Active Energy Used (Low)	---	---	---	F3
0294		3 Phase Positive Reactive Energy Used (high)	32 Bit	+1 VarH	PTR x CTR	F3
0295		3 Phase Positive Reactive Energy Used (Low)	---	---	---	F3
0296		3 Phase Negative Reactive Energy Used (high)	32 Bit	-1 VarH	PTR x CTR	F3
0297		3 Phase Negative Reactive Energy Used (Low)	---	---	---	F3
0298		Phase A Positive Active Energy Used (high)	32 Bit	+1 WH	PTR x CTR	F3
0299		Phase A Positive Active Energy Used (Low)	---	---	---	F3
029A		Phase B Positive Active Energy Used (high)	32 Bit	+1 WH	PTR x CTR	F3
029B		Phase B positive Active Energy Used (Low)	---	---	---	F3
029C		Phase C Positive Active Energy Used (high)	32 Bit	+1 WH	PTR x CTR	F3
029D		Phase C Positive Active Energy Used (Low)	---	---	---	F3
029E		Reserved				
029F		Reserved				

Power Measurement Unit

PM2218

REG ADDR (Hex)	GROUP	DESCRIPTION	REGISTER VALUE RANGE	UNIT VALUE	SCALE FACTOR	FOR- MAT
Actual Value (Input Registers) Address – 02A0 – 02CF						READ
FEEDER #5						
02A0	CURRENT	Phase A Current	0 - 65535	AU	CTR	F1
02A1		Phase B Current	0 - 65535	AU	CTR	F1
02A2		Phase C Current	0 - 65535	AU	CTR	F1
02A3		Average Current	0 - 65535	AU	CTR	F1
02A4		Neutral Current	0 - 65535	AU	CTR	F1
02A5	POWER	3 Phase Real Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
02A6		3 Phase Reactive Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
02A7		3 Phase Apparent Power	0 - 65535	Power_unit	PTR x CTR	F1
02A8		3 Phase Power Factor	-10000 ~ +10000	0.0001	1	F2
02A9	POWER	Phase A Active Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
02AA	PHASE	Phase A Reactive Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
02AB		Phase A Apparent Power	0 - 65535	Power_unit	PTR x CTR	F1
02AC		Phase A Power Factor	-10000 ~ +10000	0.0001	1	F2
02AD		Phase B Active Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
02AE		Phase B Reactive Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
02AF		Phase B Apparent Power	0 - 65535	Power_unit	PTR x CTR	F1
02B0		Phase B Power Factor	-10000 ~ +10000	0.0001	1	F2
02B1		Phase C Active Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
02B2		Phase C Reactive Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
02B3		Phase C Apparent Power	0 - 65535	Power_unit	PTR x CTR	F1
02B4		Phase C Power Factor	-10000 ~ +10000	0.0001	1	F2
02B5	ANGLE	3 Phase Angle (I – V)	0 - 3599	0.1	1	F1
02B6		Phase A Angle (I – V)	0 - 3599	0.1	1	F1
02B7		Phase B Angle (I – V)	0 - 3599	0.1	1	F1
02B8		Phase C Angle (I – V)	0 - 3599	0.1	1	F1
02B9		Reserved				
02BA		Reserved				
02BB		Reserved				
02BC		Reserved				
02BD		Reserved				
02BE		Reserved				
02BF		Reserved				
02C0		Reserved				
02C1		Reserved				
02C2		Reserved				
02C3		Reserved				
02C4		Reserved				
02C5		Reserved				
02C6		Reserved				
02C7		Reserved				
02C8		Reserved				
02C9		Reserved				
02CA		Reserved				
02CB		Reserved				
02CC		Reserved				
02CD		Reserved				
02CE		Reserved				
02CF		Reserved				

Power Measurement Unit

PM2218

REG ADDR (Hex)	GROUP	DESCRIPTION	REGISTER VALUE RENGE	UNIT VALUE	SCALE FACTOR	FORMAT
Actual Value (Input Registers) Address – 02D0 – 02EF						READ
FEEDER #5						
02D0	ENERGY	3 Phase Positive Active Energy Used (high)	32 Bit	+1 WH	PTR x CTR	F3
02D1	SECONDARY	3 Phase Positive Active Energy Used (Low)	---	---	---	F3
02D2		3 Phase Negative Active Energy Used (high)	32 Bit	-1 WH	PTR x CTR	F3
02D3		3 Phase Negative Active Energy Used (Low)	---	---	---	F3
02D4		3 Phase Positive Reactive Energy Used (high)	32 Bit	+1 VarH	PTR x CTR	F3
02D5		3 Phase Positive Reactive Energy Used (Low)	---	---	---	F3
02D6		3 Phase Negative Reactive Energy Used(high)	32 Bit	-1 VarH	PTR x CTR	F3
02D7		3 Phase Negative Reactive Energy Used (Low)	---	---	---	F3
02D8		Reserved				
02D9		Reserved				
02DA		Reserved				
02DB		Reserved				
02DC		Reserved				
02DD		Reserved				
02DE		Reserved				
02DF		Reserved				
02E0	ENERGY	3 Phase Positive Active Energy Used (high)	32 Bit	+1 WH	PTR x CTR	F3
02E1	SECONDARY	3 Phase Positive Active Energy Used (Low)	---	---	---	F3
02E2	FREEZE	3 Phase Negative Active Energy Used (high)	32 Bit	-1 WH	PTR x CTR	F3
02E3		3 Phase Negative Active Energy Used (Low)	---	---	---	F3
02E4		3 Phase Positive Reactive Energy Used (high)	32 Bit	+1 VarH	PTR x CTR	F3
02E5		3 Phase Positive Reactive Energy Used (Low)	---	---	---	F3
02E6		3 Phase Negative Reactive Energy Used(high)	32 Bit	-1 VarH	PTR x CTR	F3
02E7		3 Phase Negative Reactive Energy Used (Low)	---	---	---	F3
02E8		Reserved				
02E9		Reserved				
02EA		Reserved				
02EB		Reserved				
02EC		Reserved				
02ED		Reserved				
02EE		Reserved				
02EF		Reserved				

Power Measurement Unit

PM2218

REG ADDR (Hex)	GROUP	DESCRIPTION	REGISTER VALUE RENGE	UNIT VALUE	SCALE FACTOR	FORMAT
Actual Value (Input Registers) Address – 02F0 - 031F						READ
FEEDER #6						
02F0	CURRENT	Phase A Current	0 - 65535	AU	CTR	F1
02F1		Phase B Current	0 - 65535	AU	CTR	F1
02F2		Phase C Current	0 - 65535	AU	CTR	F1
02F3		Average Current	0 - 65535	AU	CTR	F1
02F4		Neutral Current	0 - 65535	AU	CTR	F1
02F5	POWER	3 Phase Real Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
02F6		3 Phase Reactive Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
02F7		3 Phase Apparent Power	0 - 65535	Power_unit	PTR x CTR	F1
02F8		3 Phase Power Factor	-10000 ~ +10000	0.0001	1	F2
02F9	POWER	Phase A Active Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
02FA	PHASE	Phase A Reactive Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
02FB		Phase A Apparent Power	0 - 65535	Power_unit	PTR x CTR	F1
02FC		Phase A Power Factor	-10000 ~ +10000	0.0001	1	F2
02FD		Phase B Active Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
02FE		Phase B Reactive Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
02FF		Phase B Apparent Power	0 - 65535	Power_unit	PTR x CTR	F1
0300		Phase B Power Factor	-10000 ~ +10000	0.0001	1	F2
0301		Phase C Active Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
0302		Phase C Reactive Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
0303		Phase C Apparent Power	0 - 65535	Power_unit	PTR x CTR	F1
0304		Phase C Power Factor	-10000 ~ +10000	0.0001	1	F2
0305	ANGLE	3 Phase Angle (I – V)	0 - 3599	0.1	1	F1
0306		Phase A Angle (I – V)	0 - 3599	0.1	1	F1
0307		Phase B Angle (I – V)	0 - 3599	0.1	1	F1
0308		Phase C Angle (I – V)	0 - 3599	0.1	1	F1
0309		Reserved				
030A		Reserved				
030B		Reserved				
030C		Reserved				
030D		Reserved				
030E		Reserved				
030F		Reserved				
0310		Reserved				
0311		Reserved				
0312		Reserved				
0313		Reserved				
0314		Reserved				
0315		Reserved				
0316		Reserved				
0317		Reserved				
0318		Reserved				
0319		Reserved				
031A		Reserved				
031B		Reserved				
031C		Reserved				
031D		Reserved				
031E		Reserved				
031F		Reserved				

Power Measurement Unit

PM2218

REG ADDR (Hex)	GROUP	DESCRIPTION	REGISTER VALUE RENGE	UNIT VALUE	SCALE FACTOR	FORMAT
Actual Value (Input Registers) Address - 0320 - 033F						READ
FEEDER #6						
0320	ENERGY	3 Phase Positive Active Energy Used (high)	32 Bit	+1 WH	PTR x CTR	F3
0321	SECONDARY	3 Phase Positive Active Energy Used (Low)	---	---	---	F3
0322		3 Phase Negative Active Energy Used (high)	32 Bit	-1 WH	PTR x CTR	F3
0323		3 Phase Negative Active Energy Used (Low)	---	---	---	F3
0324		3 Phase Positive Reactive Energy Used (high)	32 Bit	+1 VarH	PTR x CTR	F3
0325		3 Phase Positive Reactive Energy Used (Low)	---	---	---	F3
0326		3 Phase Negative Reactive Energy Used(high)	32 Bit	-1 VarH	PTR x CTR	F3
0327		3 Phase Negative Reactive Energy Used (Low)	---	---	---	F3
0328		Reserved				
0329		Reserved				
032A		Reserved				
032B		Reserved				
032C		Reserved				
032D		Reserved				
032E		Reserved				
032F		Reserved				
0330	ENERGY	3 Phase Positive Active Energy Used (high)	32 Bit	+1 WH	PTR x CTR	F3
0331	SECONDARY	3 Phase Positive Active Energy Used (Low)	---	---	---	F3
0332	FREEZE	3 Phase Negative Active Energy Used (high)	32 Bit	-1 WH	PTR x CTR	F3
0333		3 Phase Negative Active Energy Used (Low)	---	---	---	F3
0334		3 Phase Positive Reactive Energy Used (high)	32 Bit	+1 VarH	PTR x CTR	F3
0335		3 Phase Positive Reactive Energy Used (Low)	---	---	---	F3
0336		3 Phase Negative Reactive Energy Used(high)	32 Bit	-1 VarH	PTR x CTR	F3
0337		3 Phase Negative Reactive Energy Used (Low)	---	---	---	F3
0338		Reserved				
0339		Reserved				
033A		Reserved				
033B		Reserved				
033C		Reserved				
033D		Reserved				
033E		Reserved				
033F		Reserved				

Power Measurement Unit

PM2218

REG ADDR (Hex)	GROUP	DESCRIPTION	REGISTER VALUE RENGE	UNIT VALUE	SCALE FACTOR	FORMAT
Actual Value (Input Registers) Address - 0340 - 036F						READ
FEEDER #7						
0340	CURRENT	Phase A Current	0 - 65535	AU	CTR	F1
0341		Phase B Current	0 - 65535	AU	CTR	F1
0342		Phase C Current	0 - 65535	AU	CTR	F1
0343		Average Current	0 - 65535	AU	CTR	F1
0344		Neutral Current	0 - 65535	AU	CTR	F1
0345	POWER	3 Phase Real Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
0346		3 Phase Reactive Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
0347		3 Phase Apparent Power	0 - 65535	Power_unit	PTR x CTR	F1
0348		3 Phase Power Factor	-10000 ~ +10000	0.0001	1	F2
0349	POWER	Phase A Active Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
034A	PHASE	Phase A Reactive Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
034B		Phase A Apparent Power	0 - 65535	Power_unit	PTR x CTR	F1
034C		Phase A Power Factor	-10000 ~ +10000	0.0001	1	F2
034D		Phase B Active Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
034E		Phase B Reactive Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
034F		Phase B Apparent Power	0 - 65535	Power_unit	PTR x CTR	F1
0350		Phase B Power Factor	-10000 ~ +10000	0.0001	1	F2
0351		Phase C Active Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
0352		Phase C Reactive Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
0353		Phase C Apparent Power	0 - 65535	Power_unit	PTR x CTR	F1
0354		Phase C Power Factor	-10000 ~ +10000	0.0001	1	F2
0355	ANGLE	3 Phase Angle (I – V)	0 - 3599	0.1	1	F1
0356		Phase A Angle (I – V)	0 - 3599	0.1	1	F1
0357		Phase B Angle (I – V)	0 - 3599	0.1	1	F1
0358		Phase C Angle (I – V)	0 - 3599	0.1	1	F1
0359		Reserved				
035A		Reserved				
035B		Reserved				
035C		Reserved				
035D		Reserved				
035E		Reserved				
035F		Reserved				
0360		Reserved				
0361		Reserved				
0362		Reserved				
0363		Reserved				
0364		Reserved				
0365		Reserved				
0366		Reserved				
0367		Reserved				
0368		Reserved				
0369		Reserved				
036A		Reserved				
036B		Reserved				
036C		Reserved				
036D		Reserved				
036E		Reserved				
036F		Reserved				

Power Measurement Unit

PM2218

REG ADDR (Hex)	GROUP	DESCRIPTION	REGISTER VALUE RENGE	UNIT VALUE	SCALE FACTOR	FORMAT
Actual Value (Input Registers) Address – 0370 – 038F						READ
FEEDER #7						
0370	ENERGY	3 Phase Positive Active Energy Used (high)	32 Bit	+1 WH	PTR x CTR	F3
0371	SECONDARY	3 Phase Positive Active Energy Used (Low)	---	---	---	F3
0372		3 Phase Negative Active Energy Used (high)	32 Bit	-1 WH	PTR x CTR	F3
0373		3 Phase Negative Active Energy Used (Low)	---	---	---	F3
0374		3 Phase Positive Reactive Energy Used (high)	32 Bit	+1 VarH	PTR x CTR	F3
0375		3 Phase Positive Reactive Energy Used (Low)	---	---	---	F3
0376		3 Phase Negative Reactive Energy Used(high)	32 Bit	-1 VarH	PTR x CTR	F3
0377		3 Phase Negative Reactive Energy Used (Low)	---	---	---	F3
0378		Reserved				
0379		Reserved				
037A		Reserved				
037B		Reserved				
037C		Reserved				
037D		Reserved				
037E		Reserved				
037F		Reserved				
0380	ENERGY	3 Phase Positive Active Energy Used (high)	32 Bit	+1 WH	PTR x CTR	F3
0381	SECONDARY	3 Phase Positive Active Energy Used (Low)	---	---	---	F3
0382	FREEZE	3 Phase Negative Active Energy Used (high)	32 Bit	-1 WH	PTR x CTR	F3
0383		3 Phase Negative Active Energy Used (Low)	---	---	---	F3
0384		3 Phase Positive Reactive Energy Used (high)	32 Bit	+1 VarH	PTR x CTR	F3
0385		3 Phase Positive Reactive Energy Used (Low)	---	---	---	F3
0386		3 Phase Negative Reactive Energy Used(high)	32 Bit	-1 VarH	PTR x CTR	F3
0387		3 Phase Negative Reactive Energy Used (Low)	---	---	---	F3
0388		Reserved				
0389		Reserved				
038A		Reserved				
038B		Reserved				
038C		Reserved				
038D		Reserved				
038E		Reserved				
038F		Reserved				

Power Measurement Unit

PM2218

REG ADDR (Hex)	GROUP	DESCRIPTION	REGISTER VALUE RENGE	UNIT VALUE	SCALE FACTOR	FORMAT
Actual Value (Input Registers) Address – 0390 – 03BF						READ
FEEDER #8						
0390	CURRENT	Phase A Current	0 - 65535	AU	CTR	F1
0391		Phase B Current	0 - 65535	AU	CTR	F1
0392		Phase C Current	0 - 65535	AU	CTR	F1
0393		Average Current	0 - 65535	AU	CTR	F1
0394		Neutral Current	0 - 65535	AU	CTR	F1
0395	POWER	3 Phase Real Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
0396		3 Phase Reactive Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
0397		3 Phase Apparent Power	0 - 65535	Power_unit	PTR x CTR	F1
0398		3 Phase Power Factor	-10000 ~ +10000	0.0001	1	F2
0399	POWER	Phase A Active Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
039A	PHASE	Phase A Reactive Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
039B		Phase A Apparent Power	0 - 65535	Power_unit	PTR x CTR	F1
039C		Phase A Power Factor	-10000 ~ +10000	0.0001	1	F2
039D		Phase B Active Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
039E		Phase B Reactive Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
039F		Phase B Apparent Power	0 - 65535	Power_unit	PTR x CTR	F1
03A0		Phase B Power Factor	-10000 ~ +10000	0.0001	1	F2
03A1		Phase C Active Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
03A2		Phase C Reactive Power	-32768 ~ +32767	Power_unit	PTR x CTR	F2
03A3		Phase C Apparent Power	0 - 65535	Power_unit	PTR x CTR	F1
03A4		Phase C Power Factor	-10000 ~ +10000	0.0001	1	F2
03A5	ANGLE	3 Phase Angle (I – V)	0 - 3599	0.1	1	F1
03A6		Phase A Angle (I – V)	0 - 3599	0.1	1	F1
03A7		Phase B Angle (I – V)	0 - 3599	0.1	1	F1
03A8		Phase C Angle (I – V)	0 - 3599	0.1	1	F1
03A9		Reserved				
03AA		Reserved				
03AB		Reserved				
03AC		Reserved				
03AD		Reserved				
03AE		Reserved				
03AF		Reserved				
03B0		Reserved				
03B1		Reserved				
03B2		Reserved				
03B3		Reserved				
03B4		Reserved				
03B5		Reserved				
03B6		Reserved				
03B7		Reserved				
03B8		Reserved				
03B9		Reserved				
03BA		Reserved				
03BB		Reserved				
03BC		Reserved				
03BD		Reserved				
03BE		Reserved				
03BF		Reserved				

Power Measurement Unit

PM2218

REG ADDR (Hex)	GROUP	DESCRIPTION	REGISTER VALUE RANGE	UNIT VALUE	SCALE FACTOR	FOR- MAT
Actual Value (Input Registers) Address – 03E0 –040F						READ
03E0	FREQUENCY	Frequency	0 - 65000	0.002Hz	1	F1
03E1	VOLTAGE	Voltage Van	0 - 65535	UU	PTR	F1
03E2		Voltage Vbn	0 - 65535	UU	PTR	F1
03E3		Voltage Vcn	0 - 65535	UU	PTR	F1
03E4		Average Phase Voltage	0 - 65535	UU	PTR	F1
03E5		Neutral Voltage	0 - 65535	UU	PTR	F1
03E6		Voltage Vab	0 - 65535	UU	PTR	F1
03E7		Voltage Vbc	0 - 65535	UU	PTR	F1
03E8		Voltage Vca	0 - 65535	UU	PTR	F1
03E9		Average Line Voltage	0 - 65535	UU	PTR	F1
03EA		Phase Rotation	0 - 1	---	---	F1
03EB		Reserved				
03EC		Reserved				
03ED		Reserved				
03EE		Reserved				
03EF		Reserved				

Power Measurement Unit

PM2218

REG ADDR (Hex)	GROUP	DESCRIPTION	REGISTER VALUE RANGE	UNIT VALUE	SCALE FACTOR	FOR- MAT
Actual Value (Input Registers) Address – 03E0 – 040F (Option)						READ
03F0	FAST	Voltage V1	0 - 65535	UU	PTR	
03F1	VOLTAGE	Voltage V2	0 - 65535	UU	PTR	F1
03F2		Voltage V3	0 - 65535	UU	PTR	F1
03F3		Reserved				
03F4	SEQUENCE	Positive Sequence Voltage	0 - 65535	UU	PTR	F1
03F5	VOLTAGE	Negative Sequence Voltage	0 - 65535	UU	PTR	F1
03F6		Zero Sequence Voltage	0 - 65535	UU	PTR	F1
03F7		Negative Sequence Unbalance	0 - 1000	0.1%	1	F1
03F8		Zero Sequence Unbalance	0 - 1000	0.1%	1	F1
03F9		Reserved				
03FA		Reserved				
03FB		Reserved				
03FC		Reserved				
03FD		Reserved				
03FE		Reserved				
03FF		Reserved				
0400	FLICKER	Phase A Flicker($\Delta V10\%$)	0 - 10000	0.01%	1	F1
0401	(OPTION)	Phase B Flicker($\Delta V10\%$)	0 - 10000	0.01%	1	F1
0402		Phase C Flicker($\Delta V10\%$)	0 - 10000	0.01%	1	F1
0403		3 Phase Flicker($\Delta V10\%$)	0 - 10000	0.01%	1	F1
0404		Reserved				
0405		Reserved				
0406		Reserved				
0407		Reserved				
0408		Reserved				
0409		Reserved				
040A		Reserved				
040B		Reserved				
040C		Reserved				
040D		Reserved				
040E		Reserved				
040F		Reserved				

Power Measurement Unit

PM2218

REG ADDR (Hex)	GROUP	DESCRIPTION	REGISTER VALUE RANGE	UNIT VALUE	SCALE FACTOR	FOR- MAT
Actual Value (Input Registers) Address - 0500 – 057F(OPTION)						READ
BUS #1 VOLTAGE HARMONIC						
0500	HARMONIC	V1 Harmonic THD	0 – 10000	0.01%	1	F1
0501	V1 VALUE	V1 Fundamental	0 – 10000	0.01%	1	F1
0502		V1 Harmonic 2 nd	0 – 10000	0.01%	1	F1
TO		↓	↓	↓	↓	↓
0510		V1 Harmonic 16 th	0 – 10000	0.01%	1	F1
0511		V1 Harmonic 17 th	0 – 10000	0.01%	1	F1
0512		Reserved				
0513		Reserved				
0514		Reserved				
TO		↓				
051E		Reserved				
051F		Reserved				
0520	HARMONIC	V2 Harmonic THD	0 - 10000	0.01%	1	F1
0521	V2 VALUE	V2 Fundamental	0 - 10000	0.01%	1	F1
0522		V2 Harmonic 2 nd	0 - 10000	0.01%	1	F1
TO		↓	↓	↓	↓	↓
0530		V2 Harmonic 16 th	0 - 10000	0.01%	1	F1
0531		V2 Harmonic 17 th	0 - 10000	0.01%	1	F1
0532		Reserved				
0533		Reserved				
0534		Reserved				
TO		↓	↓	↓	↓	↓
053E		Reserved				
053F		Reserved				
0540	HARMONIC	V3 Harmonic THD	0 - 10000	0.01%	1	F1
0541	V3 VALUE	V3 Fundamental	0 - 10000	0.01%	1	F1
0542		V3 Harmonic 2 nd	0 - 10000	0.01%	1	F1
TO		↓				
0550		V3 Harmonic 16 th	0 - 10000	0.01%	1	F1
0551		V3 Harmonic 17 th	0 - 10000	0.01%	1	F1
0552		Reserved				
0553		Reserved				
0554		Reserved				
TO		↓	↓	↓	↓	↓
055E		Reserved				
055F		Reserved				
0560		Reserved				
0561		Reserved				
0562		Reserved				
TO		↓				
0570		Reserved				
0571		Reserved				
0572		Reserved				
0573		Reserved				
0574		Reserved				
TO		↓				
057E		Reserved				
057F		Reserved				

Power Measurement Unit

PM2218

REG ADDR (Hex)	GROUP	DESCRIPTION	REGISTER VALUE RANGE	UNIT VALUE	SCALE FACTOR	FOR- MAT
Actual Value (Input Registers) Address - 0600 – 067F (Option)						READ
FEEDER #1 CURRENT HARMONIC						
0600	HARMONIC	Ia Harmonic THD	0 - 10000	0.01%	1	F1
0601	IA VALUE	Ia Fundamental	0 - 10000	0.01%	1	F1
0602		Ia HARMONIC 2 nd	0 - 10000	0.01%	1	F1
TO		↓				
0610		Ia HARMONIC 16 th	0 - 10000	0.01%	1	F1
0611		Ia HARMONIC 17 th	0 - 10000	0.01%	1	F1
0612		Reserved				
0613		Reserved				
0614		Reserved				
TO		↓				
061E		Reserved				
061F		Reserved				
0620	HARMONIC	Ib Harmonic THD	0 - 10000	0.01%	1	F1
0621	IB VALUE	Ib Fundamental	0 - 10000	0.01%	1	F1
0622		Ib HARMONIC 2 nd	0 - 10000	0.01%	1	F1
TO		↓				
0630		Ib HARMONIC 16 th	0 - 10000	0.01%	1	F1
0631		Ib HARMONIC 17 th	0 - 10000	0.01%	1	F1
0632		Reserved				
0633		Reserved				
0634		Reserved				
TO		↓				
063E		Reserved				
063F		Reserved				
0640	HARMONIC	Ic Harmonic THD	0 - 10000	0.01%	1	F1
0641	IC VALUE	Ic Fundamental	0 - 10000	0.01%	1	F1
0642		Ic HARMONIC 2 nd	0 - 10000	0.01%	1	F1
TO		↓				
0650		Ic HARMONIC 16 th	0 - 10000	0.01%	1	F1
0651		Ic HARMONIC 17 th	0 - 10000	0.01%	1	F1
0652		Reserved				
0653		Reserved				
0654		Reserved				
TO		↓				
065E		Reserved				
065F		Reserved				
0660		Reserved				
0661		Reserved				
0662		Reserved				
TO		↓				
0670		Reserved				
0671		Reserved				
0672		Reserved				
0673		Reserved				
0674		Reserved				
TO		↓				
067E		Reserved				
067F		Reserved				

Power Measurement Unit

PM2218

REG ADDR (Hex)	GROUP	DESCRIPTION	REGISTER VALUE RANGE	UNIT VALUE	SCALE FACTOR	FOR- MAT
Actual Value (Input Registers) Address - 0680 – 06FF(Option)						READ
FEEDER #2 CURRENT HARMONIC						
0680	HARMONIC	Ia Harmonic THD	0 - 10000	0.01%	1	F1
0681	IA VALUE	Ia Fundamental	0 - 10000	0.01%	1	F1
0682		Ia HARMONIC 2 nd	0 - 10000	0.01%	1	F1
TO		↓				
0690		Ia HARMONIC 16 th	0 - 10000	0.01%	1	F1
0691		Ia HARMONIC 17 th	0 - 10000	0.01%	1	F1
0692		Reserved				
0693		Reserved				
0694		Reserved				
TO		↓				
069E		Reserved				
069F		Reserved				
06A0	HARMONIC	Ib Harmonic THD	0 - 10000	0.01%	1	F1
06A1	IB VALUE	Ib Fundamental	0 - 10000	0.01%	1	F1
06A2		Ib HARMONIC 2 nd	0 - 10000	0.01%	1	F1
TO		↓				
06B0		Ib HARMONIC 16 th	0 - 10000	0.01%	1	F1
06B1		Ib HARMONIC 17 th	0 - 10000	0.01%	1	F1
06B2		Reserved				
06B3		Reserved				
06B4		Reserved				
TO		↓				
06BE		Reserved				
06BF		Reserved				
06C0	HARMONIC	Ic Harmonic THD	0 - 10000	0.01%	1	F1
06C1	IC VALUE	Ic Fundamental	0 - 10000	0.01%	1	F1
06C2		Ic HARMONIC 2 nd	0 - 10000	0.01%	1	F1
TO		↓				
06D0		Ic HARMONIC 16 th	0 - 10000	0.01%	1	F1
06D1		Ic HARMONIC 17 th	0 - 10000	0.01%	1	F1
06D2		Reserved				
06D3		Reserved				
06D4		Reserved				
TO		↓				
06DE		Reserved				
06DF		Reserved				
06E0		Reserved				
06E1		Reserved				
06E2		Reserved				
TO		↓				
06F0		Reserved				
06F1		Reserved				
06F2		Reserved				
06F3		Reserved				
06F4		Reserved				
TO		↓				
06FE		Reserved				
06FF		Reserved				

Power Measurement Unit

PM2218

REG ADDR (Hex)	GROUP	DESCRIPTION	REGISTER VALUE RENGE	UNIT VALUE	SCALE FACTOR	FOR-MAT
Actual Value (Input Registers) Address - 0700 – 077F(Option)						READ
FEEDER #3 CURRENT HARMONIC						
0700	HARMONIC	Ia Harmonic THD	0 - 10000	0.01%	1	F1
0701	IA VALUE	Ia Fundamental	0 - 10000	0.01%	1	F1
0702		Ia HARMONIC 2 nd	0 - 10000	0.01%	1	F1
TO		↓				
0710		Ia HARMONIC 16 th	0 - 10000	0.01%	1	F1
0711		Ia HARMONIC 17 th	0 - 10000	0.01%	1	F1
0712		Reserved				
0713		Reserved				
0714		Reserved				
TO		↓				
071E		Reserved				
071F		Reserved				
0720	HARMONIC	Ib Harmonic THD	0 - 10000	0.01%	1	F1
0721	IB VALUE	Ib Fundamental	0 - 10000	0.01%	1	F1
0722		Ib HARMONIC 2 nd	0 - 10000	0.01%	1	F1
TO		↓				
0730		Ib HARMONIC 16 th	0 - 10000	0.01%	1	F1
0731		Ib HARMONIC 17 th	0 - 10000	0.01%	1	F1
0732		Reserved				
0733		Reserved				
0734		Reserved				
TO		↓				
073E		Reserved				
073F		Reserved				
0740	HARMONIC	Ic Harmonic THD	0 - 10000	0.01%	1	F1
0741	IC VALUE	Ic Fundamental	0 - 10000	0.01%	1	F1
0742		Ic HARMONIC 2 nd	0 - 10000	0.01%	1	F1
TO		↓				
0750		Ic HARMONIC 16 th	0 - 10000	0.01%	1	F1
0751		Ic HARMONIC 17 th	0 - 10000	0.01%	1	F1
0752		Reserved				
0753		Reserved				
0754		Reserved				
TO		↓				
075E		Reserved				
075F		Reserved				
0760		Reserved				
0761		Reserved				
0762		Reserved				
TO		↓				
0670		Reserved				
0771		Reserved				
0772		Reserved				
0773		Reserved				
0774		Reserved				
TO		↓				
077E		Reserved				
077F		Reserved				

Power Measurement Unit

PM2218

REG ADDR (Hex)	GROUP	DESCRIPTION	REGISTER VALUE RENGE	UNIT VALUE	SCALE FACTOR	FOR-MAT
Actual Value (Input Registers) Address - 0780 – 07FF(Option)						READ
FEEDER #4 CURRENT HARMONIC						
0780	HARMONIC	Ia Harmonic THD	0 - 10000	0.01%	1	F1
0781	IA VALUE	Ia Fundamental	0 - 10000	0.01%	1	F1
0782		Ia HARMONIC 2 nd	0 - 10000	0.01%	1	F1
TO		↓				
0790		Ia HARMONIC 16 th	0 - 10000	0.01%	1	F1
0791		Ia HARMONIC 17 th	0 - 10000	0.01%	1	F1
0792		Reserved				
0793		Reserved				
0794		Reserved				
TO		↓				
079E		Reserved				
079F		Reserved				
07A0	HARMONIC	Ib Harmonic THD	0 - 10000	0.01%	1	F1
07A1	IB VALUE	Ib Fundamental	0 - 10000	0.01%	1	F1
07A2		Ib HARMONIC 2 nd	0 - 10000	0.01%	1	F1
TO		↓				
07B0		Ib HARMONIC 16 th	0 - 10000	0.01%	1	F1
07B1		Ib HARMONIC 17 th	0 - 10000	0.01%	1	F1
07B2		Reserved				
07B3		Reserved				
07B4		Reserved				
TO		↓				
07BE		Reserved				
07BF		Reserved				
07C0	HARMONIC	Ic Harmonic THD	0 - 10000	0.01%	1	F1
07C1	IC VALUE	Ic Fundamental	0 - 10000	0.01%	1	F1
07C2		Ic HARMONIC 2 nd	0 - 10000	0.01%	1	F1
TO		↓				
07D0		Ic HARMONIC 16 th	0 - 10000	0.01%	1	F1
07D1		Ic HARMONIC 17 th	0 - 10000	0.01%	1	F1
07D2		Reserved				
07D3		Reserved				
07D4		Reserved				
TO		↓				
07DE		Reserved				
07DF		Reserved				
07E0		Reserved				
07E1		Reserved				
07E2		Reserved				
TO		↓				
07F0		Reserved				
07F1		Reserved				
07F2		Reserved				
07F3		Reserved				
07F4		Reserved				
TO		↓				
07FE		Reserved				
07FF		Reserved				

Power Measurement Unit

PM2218

REG ADDR (Hex)	GROUP	DESCRIPTION	REGISTER VALUE RENGE	UNIT VALUE	SCALE FACTOR	FOR-MAT
Actual Value (Input Registers) Address - 0700 – 077F(Option)						READ
FEEDER #5 CURRENT HARMONIC						
0800	HARMONIC	Ia Harmonic THD	0 - 10000	0.01%	1	F1
0801	IA VALUE	Ia Fundamental	0 - 10000	0.01%	1	F1
0802		Ia HARMONIC 2 nd	0 - 10000	0.01%	1	F1
TO		↓				
0810		Ia HARMONIC 16 th	0 - 10000	0.01%	1	F1
0811		Ia HARMONIC 17 th	0 - 10000	0.01%	1	F1
0812		Reserved				
0813		Reserved				
0814		Reserved				
TO		↓				
081E		Reserved				
081F		Reserved				
0820	HARMONIC	Ib Harmonic THD	0 - 10000	0.01%	1	F1
0821	IB VALUE	Ib Fundamental	0 - 10000	0.01%	1	F1
0822		Ib HARMONIC 2 nd	0 - 10000	0.01%	1	F1
TO		↓				
0830		Ib HARMONIC 16 th	0 - 10000	0.01%	1	F1
0831		Ib HARMONIC 17 th	0 - 10000	0.01%	1	F1
0832		Reserved				
0833		Reserved				
0834		Reserved				
TO		↓				
083E		Reserved				
083F		Reserved				
0840	HARMONIC	Ic Harmonic THD	0 - 10000	0.01%	1	F1
0841	IC VALUE	Ic Fundamental	0 - 10000	0.01%	1	F1
0842		Ic HARMONIC 2 nd	0 - 10000	0.01%	1	F1
TO		↓				
0850		Ic HARMONIC 16 th	0 - 10000	0.01%	1	F1
0851		Ic HARMONIC 17 th	0 - 10000	0.01%	1	F1
0852		Reserved				
0853		Reserved				
0854		Reserved				
TO		↓				
085E		Reserved				
085F		Reserved				
0860		Reserved				
0861		Reserved				
0862		Reserved				
TO		↓				
0870		Reserved				
0871		Reserved				
0872		Reserved				
0873		Reserved				
0874		Reserved				
TO		↓				
087E		Reserved				
087F		Reserved				

Power Measurement Unit

PM2218

REG ADDR (Hex)	GROUP	DESCRIPTION	REGISTER VALUE RENGE	UNIT VALUE	SCALE FACTOR	FORMAT
Actual Value (Input Registers) Address - 0780 – 07FF(Option)						READ
FEEDER #6 CURRENT HARMONIC						
0880	HARMONIC	Ia Harmonic THD	0 - 10000	0.01%	1	F1
0881	IA VALUE	Ia Fundamental	0 - 10000	0.01%	1	F1
0882		Ia HARMONIC 2 nd	0 - 10000	0.01%	1	F1
TO		↓				
0890		Ia HARMONIC 16 th	0 - 10000	0.01%	1	F1
0891		Ia HARMONIC 17 th	0 - 10000	0.01%	1	F1
0892		Reserved				
0893		Reserved				
0894		Reserved				
TO		↓				
089E		Reserved				
089F		Reserved				
08A0	HARMONIC	Ib Harmonic THD	0 - 10000	0.01%	1	F1
08A1	IB VALUE	Ib Fundamental	0 - 10000	0.01%	1	F1
08A2		Ib HARMONIC 2 nd	0 - 10000	0.01%	1	F1
TO		↓				
08B0		Ib HARMONIC 16 th	0 - 10000	0.01%	1	F1
08B1		Ib HARMONIC 17 th	0 - 10000	0.01%	1	F1
08B2		Reserved				
08B3		Reserved				
08B4		Reserved				
TO		↓				
08BE		Reserved				
08BF		Reserved				
08C0	HARMONIC	Ic Harmonic THD	0 - 10000	0.01%	1	F1
08C1	IC VALUE	Ic Fundamental	0 - 10000	0.01%	1	F1
08C2		Ic HARMONIC 2 nd	0 - 10000	0.01%	1	F1
TO		↓				
08D0		Ic HARMONIC 16 th	0 - 10000	0.01%	1	F1
08D1		Ic HARMONIC 17 th	0 - 10000	0.01%	1	F1
08D2		Reserved				
08D3		Reserved				
08D4		Reserved				
TO		↓				
08DE		Reserved				
08DF		Reserved				
08E0		Reserved				
08E1		Reserved				
08E2		Reserved				
TO		↓				
08F0		Reserved				
08F1		Reserved				
08F2		Reserved				
08F3		Reserved				
08F4		Reserved				
TO		↓				
08FE		Reserved				
08FF		Reserved				

Power Measurement Unit

PM2218

REG ADDR (Hex)	GROUP	DESCRIPTION	REGISTER VALUE RENGE	UNIT VALUE	SCALE FACTOR	FORMAT
Actual Value (Input Registers) Address - 0700 – 077F(Option)						READ
FEEDER #7 CURRENT HARMONIC						
0900	HARMONIC	Ia Harmonic THD	0 - 10000	0.01%	1	F1
0901	IA VALUE	Ia Fundamental	0 - 10000	0.01%	1	F1
0902		Ia HARMONIC 2 nd	0 - 10000	0.01%	1	F1
TO		↓				
0910		Ia HARMONIC 16 th	0 - 10000	0.01%	1	F1
0911		Ia HARMONIC 17 th	0 - 10000	0.01%	1	F1
0912		Reserved				
0913		Reserved				
0914		Reserved				
TO		↓				
091E		Reserved				
091F		Reserved				
0920	HARMONIC	Ib Harmonic THD	0 - 10000	0.01%	1	F1
0921	IB VALUE	Ib Fundamental	0 - 10000	0.01%	1	F1
0922		Ib HARMONIC 2 nd	0 - 10000	0.01%	1	F1
TO		↓				
0930		Ib HARMONIC 16 th	0 - 10000	0.01%	1	F1
0931		Ib HARMONIC 17 th	0 - 10000	0.01%	1	F1
0932		Reserved				
0933		Reserved				
0934		Reserved				
TO		↓				
093E		Reserved				
093F		Reserved				
0940	HARMONIC	Ic Harmonic THD	0 - 10000	0.01%	1	F1
0941	IC VALUE	Ic Fundamental	0 - 10000	0.01%	1	F1
0942		Ic HARMONIC 2 nd	0 - 10000	0.01%	1	F1
TO		↓				
0950		Ic HARMONIC 16 th	0 - 10000	0.01%	1	F1
0951		Ic HARMONIC 17 th	0 - 10000	0.01%	1	F1
0952		Reserved				
0953		Reserved				
0954		Reserved				
TO		↓				
095E		Reserved				
095F		Reserved				
0960		Reserved				
0961		Reserved				
0962		Reserved				
TO		↓				
0970		Reserved				
0971		Reserved				
0972		Reserved				
0973		Reserved				
0974		Reserved				
TO		↓				
097E		Reserved				
097F		Reserved				

Power Measurement Unit

PM2218

REG ADDR (Hex)	GROUP	DESCRIPTION	REGISTER VALUE RENGE	UNIT VALUE	SCALE FACTOR	FORMAT
Actual Value (Input Registers) Address - 0780 – 07FF(Option)						READ
FEEDER #8 CURRENT HARMONIC						
0980	HARMONIC	Ia Harmonic THD	0 - 10000	0.01%	1	F1
0981	IA VALUE	Ia Fundamental	0 - 10000	0.01%	1	F1
0982		Ia HARMONIC 2 nd	0 - 10000	0.01%	1	F1
TO		↓				
0990		Ia HARMONIC 16 th	0 - 10000	0.01%	1	F1
0991		Ia HARMONIC 17 th	0 - 10000	0.01%	1	F1
0992		Reserved				
0993		Reserved				
0994		Reserved				
TO		↓				
099E		Reserved				
099F		Reserved				
09A0	HARMONIC	Ib Harmonic THD	0 - 10000	0.01%	1	F1
09A1	IB VALUE	Ib Fundamental	0 - 10000	0.01%	1	F1
09A2		Ib HARMONIC 2 nd	0 - 10000	0.01%	1	F1
TO		↓				
09B0		Ib HARMONIC 16 th	0 - 10000	0.01%	1	F1
09B1		Ib HARMONIC 17 th	0 - 10000	0.01%	1	F1
09B2		Reserved				
09B3		Reserved				
09B4		Reserved				
TO		↓				
09BE		Reserved				
09BF		Reserved				
09C0	HARMONIC	Ic Harmonic THD	0 - 10000	0.01%	1	F1
09C1	IC VALUE	Ic Fundamental	0 - 10000	0.01%	1	F1
09C2		Ic HARMONIC 2 nd	0 - 10000	0.01%	1	F1
TO		↓				
09D0		Ic HARMONIC 16 th	0 - 10000	0.01%	1	F1
09D1		Ic HARMONIC 17 th	0 - 10000	0.01%	1	F1
09D2		Reserved				
09D3		Reserved				
09D4		Reserved				
TO		↓				
09DE		Reserved				
09DF		Reserved				
09E0		Reserved				
09E1		Reserved				
09E2		Reserved				
TO		↓				
09F0		Reserved				
09F1		Reserved				
09F2		Reserved				
09F3		Reserved				
09F4		Reserved				
TO		↓				
09FE		Reserved				
09FF		Reserved				

Power Measurement Unit

PM2218

REG ADDR (Hex)	GROUP	DESCRIPTION	REGISTER VALUE RENGE	UNIT VALUE	SCALE FACTOR	FOR- MAT
Actual Value (Input Registers) Address – 0A00 – 0104F						READ
0A00	SYSTEM	Total Number of Events Since Last Clear	---	---	---	F1
0A01	EVENT	Events Pointer	---	---	---	F1
0A02	RECORD	Last Clear Time Minutes/Seconds	mm / ss			F7
0A03		Last Clear Time Day/Hours	DD / hh			F8
0A04		Last Clear Time Year/Month	YY / MM			F9
0A05		Last Clear Time millisecond	1 - 999			F1
0A06		Reserved				
0A07		Reserved				
0A08		Record 1 Event Cause/Type	---	---	---	F24
0A09		Record 1 Event State/Unit	00/00			F107
0A0A		Record 1 Minutes/Seconds	mm / ss	---	---	F7
0A0B		Record 1 Day/Hours	DD / hh	---	---	F8
0A0C		Record 1 Year/Month	YY / MM	---	---	F9
0A0D		Record 1 millisecond	1 - 999	---	---	F1
0A0E		Record 1 Even Data 1	---	---	---	F1
0A0F		Record 1 Even Data 2	---	---	---	F1
0A10		Record 2 Event Cause/Type	---	---	---	
0A11		Record 2 Event State/Unit	00/00			
0A12		Record 2 Minutes/Seconds	mm / ss	---	---	F7
0A13		Record 2 Day/Hours	DD / hh	---	---	F8
0A14		Record 2 Year/Month	YY / MM	---	---	F9
0A15		Record 2 millisecond	1 - 999	---	---	F1
0A16		Record 2 Even Data 1	---	---	---	F1
0A17		Record 2 Even Data 2	---	---	---	F1
TO		↓	↓	↓	↓	↓
1039		Record 199 Event State/Unit	00/00			F107
103A		Record 199 Minutes/Seconds	mm / ss	---	---	F7
103B		Record 199 Day/Hours	DD / hh	---	---	F8
103C		Record 199 Year/Month	YY / MM	---	---	F9
103D		Record 199 millisecond	1 - 999	---	---	F1
103E		Record 199 Even Data 1	---	---	---	F1
103F		Record 199 Even Data 2	---	---	---	F1
1040		Record 200 Event Cause/Type	---	---	---	F24
1041		Record 200 Event State/Unit	00/00			F107
1042		Record 200 Minutes/Seconds	mm / ss	---	---	F7
1043		Record 200 Day/Hours	DD / hh	---	---	F8
1044		Record 200 Year/Month	YY / MM	---	---	F9
1045		Record 200 millisecond	1 - 999	---	---	F1
1046		Record 200 Even Data 1	---	---	---	F1
1047		Record 200 Even Data 2	---	---	---	F1
1048		Reserved				
1049		Reserved				
104A		Reserved				
104B		Reserved				
104C		Reserved				
104D		Reserved				
104E		Reserved				
104F		Reserved				

Power Measurement Unit

PM2218

REG ADDR (Hex)	GROUP	DESCRIPTION	REGISTER VALUE RENGE	UNIT VALUE	SCALE FACTOR	FOR- MAT
Actual Value (Input Registers) Address – 1050 – 18EF						READ
1050	ALARM	Total Number of Events Since Last Clear	---	---	---	F1
1051	EVENT	Events Pointer	---	---	---	F1
1052	RECORD	Last Clear Time Minutes/Seconds	mm / ss			F7
1053		Last Clear Time Day/Hours	DD / hh			F8
1054		Last Clear Time Year/Month	YY / MM			F9
1055		Last Clear Time millisecond	1 - 999			F1
1056		Reserved				
1057		Reserved				
1058		Record 1 Event Cause/Type	---	---	---	F24
1059		Record 1 Event State/Unit	0~255/0	---	---	F107
105A		Record 1 Minutes/Seconds	mm / ss	---	---	F7
105B		Record 1 Day/Hours	DD / hh	---	---	F8
105C		Record 1 Year/Month	YY / MM	---	---	F9
105D		Record 1 millisecond	1 – 999	---	---	F1
105E		Reserved				
105F		Record 1 Event Data	---	---	---	F1
1060		Reserved				
1061		Reserved				
1062		Reserved				
1063		Record 2 Event Cause/Type	---	---	---	F24
1064		Record 2 Event State/Unit	0~255/0	---	---	F107
1065		Record 2 Minutes/Seconds	mm / ss	---	---	F7
1066		Record 2 Day/Hours	DD / hh	---	---	F8
1067		Record 2 Year/Month	YY / MM	---	---	F9
1068		Record 2 millisecond	1 – 999	---	---	F1
1069		Reserved				
106A		Record 2 Event Data	---	---	---	F1
106B		Reserved				
106C		Reserved				
106D		Reserved				
TO		↓	↓	↓	↓	↓
18DF		Record 199 millisecond	1 – 999	---	---	F1
18E0		Record 199 Event Duration Times	0 – 65535	1ms		F1
18E1		Record 199 Event Data	---	---	---	F1
18E2		Reserved				
18E3		Reserved				
18E4		Reserved				
18E5		Record 200 Event Cause/Type	---	---	---	F24
18E6		Record 200 Event State/Unit	0~255/0	---	---	F107
18E7		Record 200 Minutes/Seconds	mm / ss	---	---	F7
18E8		Record 200 Day/Hours	DD / hh	---	---	F8
18E9		Record 200 Year/Month	YY / MM	---	---	F9
18EA		Record 200 millisecond	1 – 999	---	---	F1
18EB		Reserved				
18EC		Record 200 Event Data	---	---	---	F1
18ED		Reserved				
18EE		Reserved				
18EF		Reserved				

Power Measurement Unit

PM2218

REG ADDR (Hex)	GROUP	DESCRIPTION	REGISTER VALUE RENGE	UNIT VALUE	SCALE FACTOR	FOR- MAT
Actual Value (Input Registers) Address – 1900 – 1B87 (Option)						READ
1900	VOLTAGE	Total Number of SAG Since Last Clear	---	---	---	F1
1901	SAG	Events Pointer	---	---	---	F1
1902	RECORDER	Last Clear Time Minutes/Seconds	mm / ss			F7
1903		Last Clear Time Day/Hours	DD / hh			F8
1904		Last Clear Time Year/Month	YY / MM			F9
1905		Last Clear Time millisecond	1 – 999			F1
1906		Reserved				
1907		Reserved				
1908		Record 1 Event Cause/Type	---	---	---	F24
1909		Record 1 Event State/Unit	0~2/0	1	---	F107
190A		Record 1 Minutes/Seconds	mm / ss	---	---	F7
190B		Record 1 Day/Hours	DD / hh	---	---	F8
190C		Record 1 Year/Month	YY / MM	---	---	F9
190D		Record 1 millisecond	1 – 999	mS	---	F1
190E		Record 1 Duration	0 – 65535	mS	---	F1
190F		Record 1 minimum Voltage	65535	UU	PTR	F1
1910		Reserved				
1911		Reserved				
1912		Record 2 Event Cause/Type	---	---	---	F24
1913		Record 2 Event State/Unit	0~2/0	1	---	F107
1914		Record 2 Minutes/Seconds	mm / ss	---	---	F7
1915		Record 2 Day/Hours	DD / hh	---	---	F8
1916		Record 2 Year/Month	YY / MM	---	---	F9
1917		Record 2 millisecond	1 – 999	mS	---	F1
1918		Record 2 Duration	0 – 65535	mS	---	F1
1919		Record 2 minimum Voltage	65535	UU	PTR	F1
TO		↓	↓	↓	↓	↓
1B73		Reserved				
1B74		Record 63 Event Cause/Type	---	---	---	F24
1B75		Record 63 Event State/Unit	0~2/0	1	---	F107
1B76		Record 63 Minutes/Seconds	mm / ss	---	---	F7
1B77		Record 63 Day/Hours	DD / hh	---	---	F8
1B78		Record 63 Year/Month	YY / MM	---	---	F9
1B79		Record 63 millisecond	1 - 999	mS	---	F1
1B7A		Record 63 Duration	0 - 65535	mS	---	F1
1B7B		Record 63 minimum Voltage	65535	UU	PTR	F1
1B7C		Reserved				
1B7D		Reserved				
1B7E		Record 64 Event Cause/Type	---	---	---	F24
1B7F		Record 64 Event State/Unit	0~2/0	1	---	F107
1B80		Record 64 Minutes/Seconds	mm / ss	---	---	F7
1B81		Record 64 Day/Hours	DD / hh	---	---	F8
1B82		Record 64 Year/Month	YY / MM	---	---	F9
1B83		Record 64 millisecond	1 - 999	mS	---	F1
1B84		Record 64 Duration	0 - 65535	mS	---	F1
1B85		Record 64 minimum Voltage	65535	UU	PTR	F1
1B86		Reserved				
1B87		Reserved				

Power Measurement Unit

PM2218

REG ADDR (Hex)	GROUP	DESCRIPTION	REGISTER VALUE RANGE	UNIT VALUE	SCALE FACTOR	FOR- MAT
Actual Value (Input Registers) Address – 1C00 –1C7F(Option)						READ
BUS #1 VOLTAGE FLICKER						
1C00	FLICKER	V1 Flicker ΔV	0 - 10000	0.01%	1	F1
1C01	V1 VALUE	V1 Flicker ΔV0.5(Hz)	0 - 10000	0.01%	1	F1
1C02		V1 Flicker ΔV1(Hz)	0 - 10000	0.01%	1	F1
1C03		V1 Flicker ΔV2(Hz)	0 - 10000	0.01%	1	F1
TO		↓	↓	↓	↓	↓
1C11		V1 Flicker ΔV16(Hz)	0 - 10000	0.01%	1	F1
1C12		V1 Flicker ΔV17(Hz)	0 - 10000	0.01%	1	F1
1C13		V1 Flicker ΔV18(Hz)	0 - 10000	0.01%	1	F1
1C14		V1 Flicker ΔV19(Hz)	0 - 10000	0.01%	1	F1
TO		↓	↓	↓	↓	↓
1C1E		V1 Flicker ΔV29(Hz)	0 - 10000	0.01%	1	F1
1C1F		V1 Flicker ΔV30(Hz)	0 - 10000	0.01%	1	F1
1C20	FLICKER	V2 Flicker ΔV	0 - 10000	0.01%	1	F1
1C21	V2 VALUE	V2 Flicker ΔV0.5(Hz)	0 - 10000	0.01%	1	F1
1C22		V2 Flicker ΔV1(Hz)	0 - 10000	0.01%	1	F1
1C23		V2 Flicker ΔV2(Hz)	0 - 10000	0.01%	1	F1
TO		↓	↓	↓	↓	↓
1C31		V2 Flicker ΔV16(Hz)	0 - 10000	0.01%	1	F1
1C32		V2 Flicker ΔV17(Hz)	0 - 10000	0.01%	1	F1
1C33		V2 Flicker ΔV18(Hz)	0 - 10000	0.01%		
1C34		V2 Flicker ΔV19(Hz)	0 - 10000	0.01%		
TO		↓	↓	↓	↓	↓
1C3E		V2 Flicker ΔV29(Hz)	0 - 10000	0.01%		
1C3F		V2 Flicker ΔV30(Hz)	0 - 10000	0.01%		
1C40	FLICKER	V3 Flicker ΔV	0 - 10000	0.01%	1	F1
1C41	V3 VALUE	V3 Flicker ΔV0.5(Hz)	0 - 10000	0.01%	1	F1
1C42		V3 Flicker ΔV1(Hz)	0 - 10000	0.01%	1	F1
1C43		V3 Flicker ΔV2(Hz)	0 - 10000	0.01%	1	F1
TO		↓	↓	↓	↓	↓
1C51		V3 Flicker ΔV16(Hz)	0 - 10000	0.01%	1	F1
1C52		V3 Flicker ΔV17(Hz)	0 - 10000	0.01%	1	F1
1C53		V3 Flicker ΔV18(Hz)	0 - 10000	0.01%		
1C54		V3 Flicker ΔV19(Hz)	0 - 10000	0.01%		
TO		↓	↓	↓	↓	↓
1C5E		V3 Flicker ΔV29(Hz)	0 - 10000	0.01%		
1C5F		V3 Flicker ΔV30(Hz)	0 - 10000	0.01%		
1C60		Reserved				
1C61		Reserved				
1C62		Reserved				
1C63		Reserved				
1C64		Reserved				
1C65		Reserved				
1C76		Reserved				
1C77		Reserved				
1C78		Reserved				
TO		↓	↓	↓	↓	↓
1C7E		Reserved				
1C7F		Reserved				

Power Measurement Unit

PM2218

REG ADDR (Hex)	GROUP	DESCRIPTION	REGISTER VALUE RENGE	UNIT VALUE	SCALE FACTOR	FOR- MAT
Actual Value (Input Registers) Address – 2000 – 2917 (OPTION)						READ
2000	FAULT	Total Number of Records Since Last Clear	0 ~ 65535	---	---	F1
2001	RECORD	Reserved	---	---	---	F1
2002		Last Clear Time Minutes/Seconds	mm / ss			F7
2003		Last Clear Time Day/Hours	DD / hh			F8
2004		Last Clear Time Year/Month	YY / MM			F9
2005		Last Clear Time millisecond	1 - 999			F1
2006		Data Type	0 - 1	1	---	F34
2007		Trigger Usage	0 - 7	1	---	F35
2008		Trigger Mode	0 - 1	1	---	F36
2009		Reserved				
200A		Reserved				
200B		Reserved				
200C		Reserved				
200D		Reserved				
200E		Reserved				
200F		Reserved				
2010		Records None/Type	---	---	---	F24
2011		Records State/Unit	0~3/00	1	---	F107
2012		Records Occur Time Minutes/Seconds	mm / ss			F7
2013		Records Occur Time Day/Hours	DD / hh			F8
2014		Records Occur Time Year/Month	YY / MM			F9
2105		Records Occur Time millisecond	1 - 999			F1
2016		Records Sample Number	576			F1
2017		Records Frequency	0 ~ 35000			F1
2018	BUS	Bus #1 phase A Waveform	-32768 ~ +32767	ADC counts	---	F2
TO	#1	↓	↓	↓	↓	↓
2257		Bus #1 phase A Waveform	-32768 ~ +32767	ADC counts	---	F2
2258		Bus #1 phase B Waveform	-32768 ~ +32767	ADC counts	---	F2
TO		↓	↓	↓	↓	↓
2497		Bus #1 phase B Waveform	-32768 ~ +32767	ADC counts	---	F2
2498		Bus #1 phase C Waveform	-32768 ~ +32767	ADC counts	---	F2
TO		↓	↓	↓	↓	↓
26D7		Bus #1 phase C Waveform	-32768 ~ +32767	ADC counts	---	F2
26D8		Reserved	---	---	---	---
TO		↓	↓	↓	↓	↓
2917		Reserved	---	---	---	---

Power Measurement Unit

PM2218

REG ADDR (Hex)	GROUP	DESCRIPTION	REGISTER VALUE RENGE	UNIT VALUE	SCALE FACTOR	FORMAT
Actual Value (Input Registers) Address – 2918 – 4417 (OPTION)						READ
3218	FEEDER	phase A Waveform	-32768 ~ +32767	ADC counts	---	F2
TO	#1	↓	↓	↓	↓	F2
3457		phase A Waveform	-32768 ~ +32767	ADC counts	---	F2
3458		phase B Waveform	-32768 ~ +32767	ADC counts	---	F2
TO		↓	↓	↓	↓	↓
3697		phase B Waveform	-32768 ~ +32767	ADC counts	---	F2
3698		phase C Waveform	-32768 ~ +32767	ADC counts	---	F2
TO		↓	↓	↓	↓	↓
38D7		phase C Waveform	-32768 ~ +32767	ADC counts	---	F2
38D8		Reserved	---	---	---	---
TO		↓	↓	↓	↓	↓
3B17		Reserved	---	---	---	---
3B18	FEEDER	phase A Waveform	-32768 ~ +32767	---	---	F2
TO	#2		-32768 ~ +32767	---	---	F2
3D57		phase A Waveform	-32768 ~ +32767	---	---	F2
3D58		phase B Waveform	-32768 ~ +32767	---	---	F2
TO		↓	↓	↓	↓	↓
3F97		phase B Waveform	-32768 ~ +32767	---	---	F2
3F98		phase C Waveform	-32768 ~ +32767	---	---	F2
TO		↓	↓	↓	↓	↓
41D7		phase C Waveform	-32768 ~ +32767	---	---	F2
41D8		Reserved	---	---	---	---
TO		↓	↓	↓	↓	↓
4417		Reserved	---	---	---	---
4418	FEEDER	phase A Waveform	-32768 ~ +32767	ADC counts	---	F2
TO	#3	↓	↓	↓	↓	↓
4657		phase A Waveform	-32768 ~ +32767	ADC counts	---	F2
4658		phase B Waveform	-32768 ~ +32767	ADC counts	---	F2
TO		↓	↓	↓	↓	↓
4897		phase B Waveform	-32768 ~ +32767	ADC counts	---	F2
4898		phase C Waveform	-32768 ~ +32767	ADC counts	---	F2
TO		↓	↓	↓	↓	↓
4AD7		phase C Waveform	-32768 ~ +32767	ADC counts	---	F2
4AD8		Reserved	---	---	---	---
TO		↓	↓	↓	↓	↓
4D17		Reserved	---	---	---	---
4D18	FEEDER	phase A Waveform	-32768 ~ +32767	ADC counts	---	F2
TO	#4	↓	↓	↓	↓	↓
4F57		phase A Waveform	-32768 ~ +32767	ADC counts	---	F2
4F58		phase B Waveform	-32768 ~ +32767	ADC counts	---	F2
TO		↓	↓	↓	↓	↓
5197		phase B Waveform	-32768 ~ +32767	ADC counts	---	F2
5198		phase C Waveform	-32768 ~ +32767	ADC counts	---	F2
TO		↓	↓	↓	↓	↓
53D7		phase C Waveform	-32768 ~ +32767	ADC counts	---	F2
53D8		Reserved	---	---	---	---
TO		↓	↓	↓	↓	↓
5617		Reserved	---	---	---	---

Power Measurement Unit

PM2218

REG ADDR (Hex)	GROUP	DESCRIPTION	REGISTER VALUE RENGE	UNIT VALUE	SCALE FACTOR	FORMAT
Actual Value (Input Registers) Address – 2918 – 4417 (OPTION)						READ
5618	FEEDER	phase A Waveform 1	-32768 ~ +32767	ADC counts	---	F2
TO	#5	↓	↓	↓	↓	F2
5857		phase A Waveform 576	-32768 ~ +32767	ADC counts	---	F2
5858		phase B Waveform 1	-32768 ~ +32767	ADC counts	---	F2
TO		↓	↓	↓	↓	↓
5A97		phase B Waveform 576	-32768 ~ +32767	ADC counts	---	F2
5A98		phase C Waveform 1	-32768 ~ +32767	ADC counts	---	F2
TO		↓	↓	↓	↓	↓
5CD7		phase C Waveform 576	-32768 ~ +32767	ADC counts	---	F2
5CD8		Reserved	---	---	---	---
TO		↓	↓	↓	↓	↓
5F17		Reserved	---	---	---	---
5F18	FEEDER	phase A Waveform 1	-32768 ~ +32767	---	---	F2
TO	#6	↓	-32768 ~ +32767	---	---	F2
6157		phase A Waveform 576	-32768 ~ +32767	---	---	F2
6158		phase B Waveform 1	-32768 ~ +32767	---	---	F2
TO		↓	↓	↓	↓	↓
6397		phase B Waveform 576	-32768 ~ +32767	---	---	F2
6398		phase C Waveform 1	-32768 ~ +32767	---	---	F2
TO		↓	↓	↓	↓	↓
65D7		phase C Waveform 576	-32768 ~ +32767	---	---	F2
65D8		Reserved	---	---	---	---
TO		↓	↓	↓	↓	↓
6817		Reserved	---	---	---	---
6818	FEEDER	phase A Waveform 1	-32768 ~ +32767	ADC counts	---	F2
TO	#7	↓	↓	↓	↓	↓
6A57		phase A Waveform 576	-32768 ~ +32767	ADC counts	---	F2
6A58		phase B Waveform 1	-32768 ~ +32767	ADC counts	---	F2
TO		↓	↓	↓	↓	↓
6C97		phase B Waveform 576	-32768 ~ +32767	ADC counts	---	F2
6C98		phase C Waveform 1	-32768 ~ +32767	ADC counts	---	F2
TO		↓	↓	↓	↓	↓
6ED7		phase C Waveform 576	-32768 ~ +32767	ADC counts	---	F2
6ED8		Reserved	---	---	---	---
TO		↓	↓	↓	↓	↓
7117		Reserved	---	---	---	---
7118	FEEDER	phase A Waveform 1	-32768 ~ +32767	ADC counts	---	F2
TO	#8	↓	↓	↓	↓	↓
7357		phase A Waveform 576	-32768 ~ +32767	ADC counts	---	F2
7358		phase B Waveform 1	-32768 ~ +32767	ADC counts	---	F2
TO		↓	↓	↓	↓	↓
7597		phase B Waveform 576	-32768 ~ +32767	ADC counts	---	F2
7598		phase C Waveform 1	-32768 ~ +32767	ADC counts	---	F2
TO		↓	↓	↓	↓	↓
77D7		phase C Waveform 576	-32768 ~ +32767	ADC counts	---	F2
77D8		Reserved	---	---	---	---
TO		↓	↓	↓	↓	↓
7A17		Reserved	---	---	---	---

Power Measurement Unit

PM2218

REG ADDR (Hex)	GROUP	DESCRIPTION	REGISTER VALUE RANGE	UNIT VALUE	SCALE FACTO R	FOR- MAT	REG ADDR (Hex)
Programming Value (Holding Registers) Address - 8000 – 802F							READ / WRITE
8000	COMMUNICATION	Serial Communication Address	1 - 254	1	---	F1	1
8001	RS-485	Modbus Baud Rate	0 - 5	1	---	F15	4=19200
8002		Transfer Delay Time	15 - 200	1	---	F1	30
8003		Reserved					
8004		Reserved					
8005		Reserved					
8006		Reserved					
8007		Reserved					
8008		Reserved					
8009		Reserved					
800A		Reserved					
800B		Reserved					
800C		Reserved					
800D		Reserved					
800E		Reserved					
800F		Reserved					
8010	ETHERNET	Network Mode	1	---	---	F1	1 : TCP server
8011	SETUP	Reserved		---	---		
8012	(OPTION)	IP Address H	32 bit	---	---	F3	192.168.0.3
8013		IP Address L		---	---		= C0A80003
8014		Subnet Mask H	32 bit	---	---	F3	255.255.255.0
8015		Subnet Mask L		---	---		= FFFFFFFF00
8016		Gateway H	32 bit	---	---	F3	192.168.0.1
8017		Gateway L		---	---		= C0A80001
8018		Reserved		---	---		
8019		TCP Service Port	0 - 65535	---	---	F1	502
801A		Reserved					
801B		Reserved					
801C		Reserved					
801D		Reserved					
801E		Reserved					
801F		Host timeout Second	0-65535	1	SEC	F1	90
8020		Remote 1 IP H	32 bit	---	---	F3	0
8021		Remote 1 IP L		---	---		0
8022		Remote 1 IP PORT	0 - 65535	---	---	F1	0
8023		Remote 2 IP H	32 bit	---	---	F3	0
8024		Remote 2 IP L		---	---		0
8025		Remote 2 IP PORT	0 - 65535	---	---	F1	0
8026		Remote 3 IP H	32 bit	---	---	F3	0
8027		Remote 3 IP L		---	---		0
8028		Remote 3 IP PORT	0 - 65535	---	---	F1	0
8029		Reserved					
802A		Reserved					
802B		Reserved					
802C		Reserved					
802D		Reserved					
802E		Reserved					
802F		Reserved					

Power Measurement Unit

PM2218

REG ADDR (Hex)	GROUP	DESCRIPTION	REGISTER VALUE RANGE	UNIT VALUE	SCALE FACTO R	FOR- MAT	FACTORY DEFAULT VALUE (CONVERTED)
Programming Value (Holding Registers) Address - 8030 - 805F							READ / WRITE
8030	MEASURING	System Voltage Mode	1 - 2	1	---	F16	1=3P4W3PT
8031	SYSTEM	Nominal Frequency	0 - 1	---	---	F17	0=50HZ
8032		Nominal Voltage	32000	UU	PT	F1	11000=110V
8033		Reserved					
8034		System Current Mode	1 - 3	1	---	F47	1= 3I ;8 Feeder
8035		Conversion Cycle	0 - 5	1	Cycle	F30	3 = 2^3 = 8 Cycle
8036		Reserved					
8037		Reserved					
8038		Force Zero Current	1 - 50	0.1%	5A/1A	F1	5 = 0.5%
8039		Reserved					
803A		Reserved					
803B		Reserved					
803C		PT Ratio BUS #1	10 - 50000	0.1	PT x 0.1	F1	10
803D		Reserved					
803E		Reserved					
803F		Reserved					
8040		CT Ratio Feeder #1	10 - 50000	0.1	CT x 0.1	F1	10
8041		CT Ratio Feeder #2	10 - 50000	0.1	CT x 0.1	F1	10
8042		CT Ratio Feeder #3	10 - 50000	0.1	CT x 0.1	F1	10
8043		CT Ratio Feeder #4	10 - 50000	0.1	CT x 0.1	F1	10
8044		CT Ratio Feeder #5	10 - 50000	0.1	CT x 0.1	F1	10
8045		CT Ratio Feeder #6	10 - 50000	0.1	CT x 0.1	F1	10
8046		CT Ratio Feeder #7	10 - 50000	0.1	CT x 0.1	F1	10
8047		CT Ratio Feeder #8	10 - 50000	0.1	CT x 0.1	F1	10
8048		Reserved					
8049		Reserved					
804A		Reserved					
804B		Reserved					
804C		Reserved					
804D		Reserved					
804E		Reserved					
804F		Reserved					
8050	CLEAR DATA	Clear All Energy	0 - 1	1	---	F23	0=NO
8051		Clear System Event Log	0 - 1	1	---	F23	0=NO
8052		Clear Fault Event Log	0 - 1	1	---	F23	0=NO
8053		Clear SAGs Event Log	0 - 1	1	---	F23	0=NO
8054		Reserved					
8055		Freeze Energy	0 - 1	1	---	F23	0=NO
8056		Clear Fault Record	0 - 1	1	---	F23	0=NO
8057		Reserved					
8058		Reserved					
8059		Reserved					
805A		Reserved					
805B		Reserved					
805C		Reserved					
805D		Reserved					
805E		Reserved					
805F		Reserved					

Power Measurement Unit

PM2218

REG ADDR (Hex)	GROUP	DESCRIPTION	REGISTER VALUE RANGE	UNIT VALUE	SCALE FACTOR	FOR-MAT	FACTORY DEFAULT VALUE (CONVERTED)
Programming Value (Holding Registers) Address - 8060 - 807F							READ / WRITE
8060	ENERGY	Preset Energy Feeder Selection	0 – 7		1	F1	0 = FEEDER #1
8061	PRESET	Reserved					
8062		Reserved					
8063		3 Phase Negative Active Energy Used (high)	32 Bit	-1 WH	PTR x CTR	F3	
8064		3 Phase Negative Active Energy Used (Low)	---	---	---	F3	
8065		3 Phase Positive Reactive Energy Used (high)	32 Bit	+1 VarH	PTR x CTR	F3	
8066		3 Phase Positive Reactive Energy Used (Low)	---	---	---	F3	
8067		3 Phase Negative Reactive Energy Used (high)	32 Bit	-1 VarH	PTR x CTR	F3	
8068		3 Phase Negative Reactive Energy Used (Low)	---	---	---	F3	
8069		Phase A Positive Active Energy Used (high)	32 Bit	+1 WH	PTR x CTR	F3	
806A		Phase A Positive Active Energy Used (Low)	---	---	---	F3	
806B		Phase B Positive Active Energy Used (high)	32 Bit	+1 WH	PTR x CTR	F3	
806C		Phase B positive Active Energy Used (Low)	---	---	---	F3	
806D		Phase C Positive Active Energy Used (high)	32 Bit	+1 WH	PTR x CTR	F3	
806E		Phase C Positive Active Energy Used (Low)	---	---	---	F3	
806F		Reserved					
8070		Reserved					
8071		Reserved					
8072		Reserved					
8073		Reserved					
8074		Reserved					
8075		Reserved					
8076		Reserved					
8077		Reserved					
8078		Reserved					
8079		Reserved					
807A		Reserved					
807B		Reserved					
807C		Reserved					
807D		Reserved					
807E		Reserved					
807F		Reserved					

Power Measurement Unit

PM2218

REG ADDR (Hex)	GROUP	DESCRIPTION	REGISTER VALUE RANGE	UNIT VALUE	SCALE FACTOR	FOR-MAT	FACTORY DEFAULT VALUE (CONVERTED)
Programming Value (Holding Registers) Address –8200 – 821F							READ / WRITE
BUS #1 BUS ALARM							
8200	PHASE	Overtoltage Function	0 - 1	1	---	F23	0
8201	OVER	Overtoltage Pickup	0 - 65535	0.01V	---	F1	13000
8202	VOLTAGE	Overtoltage Delay	0 - 6000	0.1s	---	F1	20
8203		Reserved					
8204	PHASE	Phase Undervoltage Function	0 - 1	1	---	F23	0
8205	UNDER	Phase Undervoltage Pickup	0 - 65535	0.01 V	---	F1	9000
8206	VOLTAGE	Phase Undervoltage Delay	0 - 6000	0.1s	---	F1	20
8207		Reserved					
8208	OVER	Overfrequency Function	0 - 1	1	---	F23	0
8209	FREQUENCY	Overfrequency Pickup	400 - 700	0.1 Hz	---	F1	510
820A		Overfrequency Delay	0 - 6000	0.1s	---	F1	20
820B		Reserved					
820C	UNDER	Underfrequency Function	0 - 1	1	---	F23	0
820D	FREQUENCY	Underfrequency Pickup	400 - 700	0.1 Hz	---	F1	490
820E		Underfrequency Delay	0 - 6000	0.1s	---	F1	20
820F		Reserved					

REG ADDR (Hex)	GROUP	DESCRIPTION	REGISTER VALUE RANGE	UNIT VALUE	SCALE FACTOR	FOR-MAT	FACTORY DEFAULT VALUE (CONVERTED)
Programming Value (Holding Registers) Address –8200 – 821F (Option)							READ / WRITE
BUS #1 BUS ALARM							
8210	UNBALANCE	Zero Sequence Unbalance Function	0 - 1	1	---	F23	0
8211	ZERO	Zero Sequence Unbalance Pickup	0 - 1000	0.1 %	---	F1	20
8212	SEQUENCE	Zero Sequence Unbalance Delay	0 - 6000	0.1 s	---	F1	20
8213		Reserved					
8214	UNBALANCE	Negative Sequence Unbalance Function	0 - 1	1	---	F23	0
8215	NEGATIVE	Negative Sequence Unbalance Pickup	0 - 1000	0.1 %	---	F1	20
8216	SEQUENCE	Negative Sequence Unbalance Delay	0 - 6000	0.1 s	---	F1	20
8217		Reserved					
8218	FLICKER	Flicker Function	0 - 1	1	---	F23	0
8219	OVER	Flicker Pickup	0 - 10000	0.01 %	---	F1	20
821A		Flicker Delay	0 - 6000	0.1 s	---	F1	20
821B		Reserved					
821C		Reserved					
821D		Reserved					
821E		Reserved					
821F		Reserved					

Power Measurement Unit

PM2218

REG ADDR (Hex)	GROUP	DESCRIPTION	REGISTER VALUE RANGE	UNIT VALUE	SCALE FACTOR	FOR-MAT	FACTORY DEFAULT VALUE (CONVERTED)
Programming Value (Holding Registers) Address - 82D0 – 82EF(Option) READ / WRITE							
82D0	FLICKER	Flicker Simulation Function	0 - 1	1	---	F23	0
82D1	SIMULATION	SEG #1 Voltage Level $\Delta V_n/V$ (%)	0 - 2000	0.01%	1	F2	0
82D2		SEG #1 Frequency	1 – 30	1Hz	1	F2	1
82D3		SEG #2 Voltage Level $\Delta V_n/V$ (%)	0 - 2000	0.01%	1	F2	0
82D4		SEG #2 Frequency	1 – 30	1Hz	1	F2	1
82D5		SEG #3 Voltage Level $\Delta V_n/V$ (%)	0 - 2000	0.01%	1	F2	0
82D6		SEG #3 Frequency	1 – 30	1Hz	1	F2	1
82D7		SEG #4 Voltage Level $\Delta V_n/V$ (%)	0 - 2000	0.01%	1	F2	0
82D8		SEG #4 Frequency	1 – 30	1Hz	1	F2	1
82D9		SEG #5 Voltage Level $\Delta V_n/V$ (%)	0 - 2000	0.01%	1	F2	0
82DA		SEG #5 Frequency	1 – 30	1Hz	1	F2	1
82DB		SEG #6 Voltage Level $\Delta V_n/V$ (%)	0 - 2000	0.1%	1	F2	0
82DC		SEG #6 Frequency	1 – 30	1Hz	1	F2	1
82DD		SEG #7 Voltage Level $\Delta V_n/V$ (%)	0 - 2000	0.01%	1	F2	0
82DE		SEG #7 Frequency	1 – 30	1Hz	1	F2	1
82DF		SEG #8 Voltage Level $\Delta V_n/V$ (%)	0 - 2000	0.01%	1	F2	0
82E0		SEG #8 Frequency	1 – 30	1Hz	1	F2	1
82E1		Reserved					
82E2		Reserved					
82E3		Reserved					
82E4		Reserved					
82E5		Reserved					
82E6		Reserved					
82E7		Reserved					
82E8		Reserved					
82E9		Reserved					
82EA		Reserved					
82EB		Reserved					
82EC		Reserved					
82ED		Reserved					
82EE		Reserved					
82EF		Reserved					

Power Measurement Unit

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REG ADDR (Hex)	GROUP	DESCRIPTION	REGISTER VALUE RANGE	UNIT VALUE	SCALE FACTOR	FOR-MAT	FACTORY DEFAULT VALUE (CONVERTED)
Programming Value (Holding Registers) Address –8300 – 832F(Option)							READ / WRITE
8300	SAG	Sag Function	0 - 1	1	---	F23	0
8301		Minimum Threshold % Nominal Voltage	0 - 1000	0.1%	---	F1	100= 10.0%
8302		Flexible Curve Selection	0 - 1	1	---	F29	0
8303		Reset Time	1 – 200	0.1s	---	F1	30
8304		Reserved					
8305		Reserved					
8306		Reserved					
8307		Reserved					
8308		Reserved					
8309		Reserved					
830A		Reserved					
830B		Reserved					
830C		Reserved					
830D		Reserved					
830E		Reserved					
830F		Reserved					
8310		Reserved					
8311		Reserved					
8312		Reserved					
8313		Reserved					
8314		Reserved					
8315		Reserved					
8316		Reserved					
8317		Reserved					
8318		Reserved					
8319		Reserved					
831A		Reserved					
831B		Reserved					
831C		Reserved					
831D		Reserved					
831E		Reserved					
831F		Reserved					
8320	FLEXIBLE	Curve Trip Time at 90%	0 – 60000	1mS	---	F1	10000=10000mS
8321	CURVE	Curve Trip Time at 80%	0 – 60000	1mS	---	F1	500=500mS
8322	TRIP TIMES	Curve Trip Time at 70%	0 – 60000	1mS	---	F1	200=200mS
8323	A	Curve Trip Time at 60%	0 – 60000	1mS	---	F1	200=200mS
8324		Curve Trip Time at 50%	0 – 60000	1mS	---	F1	50=50ms
8325		Curve Trip Time at 40%	0 – 60000	1mS	---	F1	50=50ms
8326		Curve Trip Time at 30%	0 – 60000	1mS	---	F1	50=50ms
8327		Curve Trip Time at 20%	0 – 60000	1mS	---	F1	50=50ms
8328	FLEXIBLE	Curve Trip Time at 90%	0 – 60000	1mS	---	F1	10000=10000mS
8329	CURVE	Curve Trip Time at 80%	0 – 60000	1mS	---	F1	500=500mS
832A	TRIP TIMES	Curve Trip Time at 70%	0 – 60000	1mS	---	F1	200=200mS
832B	B	Curve Trip Time at 60%	0 – 60000	1mS	---	F1	200=200mS
832C		Curve Trip Time at 50%	0 – 60000	1mS	---	F1	50=50ms
832D		Curve Trip Time at 40%	0 – 60000	1mS	---	F1	50=50ms
832E		Curve Trip Time at 30%	0 – 60000	1mS	---	F1	50=50ms
832F		Curve Trip Time at 20%	0 – 60000	1mS	---	F1	50=50ms

Power Measurement Unit

PM2218

REG ADDR (Hex)	GROUP	DESCRIPTION	REGISTER VALUE RANGE	UNIT VALUE	SCALE FACTO R	FOR- MAT	FACTORY DEFAULT VALUE (CONVERTED)
User Definable Register Index (Holding Registers) Address - 8340 - 839F READ / WRITE							
8340	USER	Register address for User Data 0000		---	---	F1	0
8341	DEFINABLE	Register address for User Data 0001		---	---	F1	0
8342	REGISTERS	Register address for User Data 0002		---	---	F1	0
8343	INDEX	Register address for User Data 0003		---	---	F1	0
8344	1	Register address for User Data 0004		---	---	F1	0
8345		Register address for User Data 0005		---	---	F1	0
8346		Register address for User Data 0006		---	---	F1	0
8347		Register address for User Data 0007		---	---	F1	0
8348		Register address for User Data 0008		---	---	F1	0
8349		Register address for User Data 0009		---	---	F1	0
834A		Register address for User Data 000A		---	---	F1	0
834B		Register address for User Data 000B		---	---	F1	0
To		↓	↓	↓	↓	↓	↓
839F		Register address for User Data 005F		---	---	F1	0
User Definable Register Index (Holding Registers) Address – 83A0 - 83FF READ / WRITE							
83A0	USER	Register address for User Data 0000		---	---	F1	0
83A1	DEFINABLE	Register address for User Data 0001		---	---	F1	0
83A2	REGISTERS	Register address for User Data 0002		---	---	F1	0
83A3	INDEX	Register address for User Data 0003		---	---	F1	0
83A4	2	Register address for User Data 0004		---	---	F1	0
83A5		Register address for User Data 0005		---	---	F1	0
83A6		Register address for User Data 0006		---	---	F1	0
83A7		Register address for User Data 0007		---	---	F1	0
83A8		Register address for User Data 0008		---	---	F1	0
83A9		Register address for User Data 0009		---	---	F1	0
83AA		Register address for User Data 000A		---	---	F1	0
83AB		Register address for User Data 000B		---	---	F1	0
TO		↓	↓	↓	↓	↓	↓
83FF		Register address for User Data 005F		---	---	F1	0

3. Memory Map Data Formats

	DESCRIPTION	
F1	UNSIGNED INTEGER – NUMERICAL DATA (16 Bit)	FFFF
F2	SIGNED INTEGER – NUMERICAL DATA (16 Bit)	FFFF
F3	UNSIGNED LONG INTEGER – NUMERICAL DATA (32 Bit)	FFFFFF
F4	SIGNED LONG INTEGER – NUMRICAL DATA (32 Bit)	FFFFFF
F5	HARDWARE VERSION CODE	FFFF
	10 = A	---
	11 = A1	---
	20= B	---
F6	TWO ASCII CHARACTERS	FFFF
	32-127=ASCII CHARACTER	7F00
	32-127=ASCII CHARACTER	007F
F7	MINUTES/SECONDS	FFFF
	Minutes: 0 - 59 in steps of 1	---
	Seconds: 0 - 59 in steps of 1	---
F8	DAY/HOURS	FFFF
	Day: 1-31 in step of 1	---
	Hours: 0 = 12 am, 1 = 1 am, ..., 23 = 11 pm	---
F9	YEAR/MONTH	FFFF
	Year: 01=2001,02= 2002	---
	Month: 1=January, 2=February, ..., 12=December	---
F10	DAY/NONE	FFFF
	Day: 1-31 in step of 1	---
	None = 00	---
F11	HOURS/MINUTES	FFFF
	Hours: 0 = 12 am, 1 = 1 am, ..., 23 = 11 pm	---
	Minutes: 0 - 59 in steps of 1	---
F12	UNSIGNED INTEGER – COMMAND * FUNCTION CODE 05	FFFF
	1 = Reset	---
	2 = Reserved	---
	3 = Reserved	---
	4 = Reserved	---
	5 = Reserved	---
	6 = Reserved	---
	7 = Reserved	---
	8 = Reserved	---
	9 = Reserved	---
	10 = Reserved	---
	11 = Clear All Energy	---
	12 = Clear Event Record	---
	13 = Clear Fault Event Record	---
	14 = Clear SAG Event Record	---
	15 = Reserved	---
	16 = Freeze Energy	---
	17 = Clear Fault Record	---
	18 = Waveform Capture	---

	DESCRIPTION	
F13	UNSIGNED INTEGER – PHASE ROTATION	FFFF
	0 = Positive Sequence	---
	1 = Negative Sequence	---
F14	UNSIGNED INTEGER – ENERGY UNIT	FFFF
	0 = 1 WH	---
	1 = 10WH	---
	2 = 100WH	---
	3 = 1KWH	---
	4 = 10KWH	---
	5 = 100KWH	---
	6 = 1 MWH	---
F15	7 = 10 MWH	---
	UNSIGNED INTEGER – MODBUS BAUD RATE	FFFF
	0 = 1200	----
	1 = 2400	---
	2 = 4800	---
	3 = 9600	---
F16	4 = 19200	---
	5 = 38400	---
F17	UNSIGNED INTEGER – SYSTEM MODE	FFFF
	1 = 3P4W	---
	2 = 3P3W	---
F18	UNSIGNED INTEGER – NOMINAL FREQUENCY	FFFF
	0 = 50Hz	---
	1 = 60Hz	---
F23	UNSIGNED INTEGER – ENABLE/DISABLE	FFFF
	0 = Disable/OFF	---
	1 = Enable/ON	---

DESCRIPTION		
	UNSIGNED INTEGER – TYPE OF EVENT	00FF
	00 = None	---
	01 = System Event	
	02 = Pickup Event	
	03 = Trip Event	
	04 = Drop Event	
	05 = Alarm Event	
	10 = SAG Event	---
	UNSIGNED INTEGER – CAUSE OF SYSTEM EVENT	FF00
	00 = No Event	---
	01 = Power On / Reset	
	02 = Power Off	
	03 = Reserved	
	04 = Self Test Error	
	05 = Clear All Energy	
	06 = Clear System Event Record	
	07 = Time/Date set	
	08 = User's Map Parameter Changed	Data1: Address; Data2: Length
	09 = Fault Parameter changed	Data1: Address; Data2: Length
	10 = Alarms Parameter changed	Data1: Address; Data2: Length
	11 = Clear Fault Event Record	
	12 = Clear SAG Event Record	
F24	UNSIGNED INTEGER – CAUSE OF PICKUP/TRIP/DROPOUT EVENT	FF00
	00 = None	
	01 = Overcurrent	
	UNSIGNED INTEGER – CAUSE OF ALARM EVENT	FF00
	00 = None	
	01 = Over Voltage For 3 Phase, Phase to neutral Voltage	
	02 = Over Frequency	
	03 = Under 3 Phase, Phase To Neutral Voltage	
	04 = Under Frequency	
	05 = Zero Sequence Voltage Unbalance	
	06 = Negative Sequence Voltage Unbalance	
	07 = Flicker	
	08 = Sag	
	UNSIGNED INTEGER – CAUSE OF SAG EVENT	FF00
	00 = None	
	01 = Block (90% ~ 80.1%)	
	02 = Block (80% ~ 70.1%)	
	03 = Block (70% ~ 60.1%)	
	04 = Block (60% ~ 50.1%)	
	05 = Block (50% ~ 40.1%)	
	06 = Block (40% ~ 30.1%)	
	07 = Block (30% ~ 20.1%)	
	08 = Block (20% ~)	

	DESCRIPTION	
F26	UNSIGNED INTEGER – CURRENT RANGE	FFFF
	0 = 5 A	---
	1 = 1 A	---
F27	UNSIGNED INTEGER – VOLTAGE RANGE (Option)	FFFF
	0 = 300 V	---
F30	UNSIGNED INTEGER – Conversion Cycle	FFFF
	0 = 1 Cycle	---
	1 = 2 Cycle	---
	2 = 4 Cycle	---
	3 = 8 Cycle	---
	4 = 16 Cycle	---
	5 = 32 Cycle	---
F31	YEAR	FFFF
	Year: 01=2001,02= 2002	---
F32	MONTH / DAY	FFFF
	Month: 1=January, 2=February, ..., 12=December	---
	Day: 1-31 in step of 1	---
F33	HOURS / MINUTES	FFFF
	Hours: 0 = 12 am, 1 = 1 am, ..., 23 = 11 pm	---
	Minutes: 0 - 59 in steps of 1	---
F34	UNSIGNED INTEGER – FUNCTION OF FAULT RECOERDER	FFFF
	0 = Disable/OFF	---
	1 = Sag Trigger	---
	2 = Waveform Capture Trigger	---
F35	UNSIGNED INTEGER – DATA TYPE OF FAULT RECOERDER	FFFF
	0 = Waveform	---
	1 = RMS Data	---
F36	UNSIGNED INTEGER – USAGE OF FAULT RECOERDER	FFFF
	0 = 1/15 Cycles (Pre / Post)	---
	1 = 2/14 Cycles (Pre / Post)	---
	2 = 3/13 Cycles (Pre / Post)	---
	3 = 4/12 Cycles (Pre / Post)	---
	4 = 5/11 Cycles (Pre / Post)	---
	5 = 6/10 Cycles (Pre / Post)	---
	6 = 7/9 Cycles (Pre / Post)	---
F37	UNSIGNED INTEGER – MODE OF FAULT RECOERDER	FFFF
	0 = One Shot	---
	1 = Retrigger	---

DESCRIPTION	
F100	PRODUCT OPTIONS
	Not Used
	Waveform Capture
	Not Used
	Not Used
	Flicker
	Power Quality Function (Unbalance , SAG.)
	Not Used
F101	GENERAL STATUS
	In Service
	Pickup Status
	Trip Status
	Alarm Status
	Not Used

Power Measurement Unit

PM2218

DESCRIPTION	
F104	UNSIGNED INTEGER – STATUS OF ALARM
	Phase Overvoltage Alarm
	Phase Undervoltage Alarm
	Overfrequency
	Underfrequency Alarm
	Zero Sequence Unbalance Voltage Alarm
	Negative Sequence Unbalance Voltage Alarm
	Voltage Flicker Alarm
	Voltage SAG Alarm
	Not Used
	Bus Alarm General

DESCRIPTION		
	UNSIGNED INTEGER – STATUS/UNIT OF SYSTEM EVENT	FFFF
	Not Used	0001
	Not Used	0002
	Not Used	0004
	Not Used	0008
	Not Used	0010
	Not Used	0020
	Not Used	0040
	Not Used	0080
	Not Used	0100
	Not Used	0200
	Not Used	0400
	Not Used	0800
	Not Used	1000
	Not Used	2000
	Not Used	4000
	Not Used	8000
	UNSIGNED INTEGER – STATUS/UNIT OF SAG EVENT	FFFF
F107	Unit	0=BUS #1 ,..., 4=BUS #4
		00FF
		Phase A
		0100
		Phase B
		0200
		Phase C
		0400
		Not Used
		0800
		Not Used
		1000
		Not Used
		2000
		Not Used
		4000
		Not Used
		8000
	UNSIGNED INTEGER – STATUS/UNIT OF ALARM EVENT	FFFF
	Unit	0= NONE
		00FF
		0 = RECOVERY, 1 = ALARM
		0100
		Not Used
		0200
		Not Used
		0400
		Not Used
		0800
		Not Used
		1000
		Not Used
		2000
		Not Used
		4000
		Not Used
		8000