ICP DAS

Energy Management Solutions

Electricity infomation management
Logical control | Data backup record
Diversified I/O modules

IoTstar

Table of Contents

InduSoft Distributor (Taiwan, China)

InduSoft

Touch Screen

4G

Fieldbus Gateway

Intelligent Power Meter

EtherCAT

PROFINET

EtherNet/IP

6 True RMS Input Module

8-channel True RMS Input Module **P53**

7 Voltage Attenuator and Current Transformer: DN-800 Series **P55**

8 iWSN Solution

Wireless Data Concentrator、Wireless Signal Sensing Module、I/O Expansion Module **P56**

Wireless Data Concentrator:
iWSN-2200 Series

Wireless Signal Sensing Module:
iWSN-1100 Series

I/O Expansion Module:
iWSN-700 Series

9 Portable Power Monitoring Suitcase **P63**

Ch1. Introduction

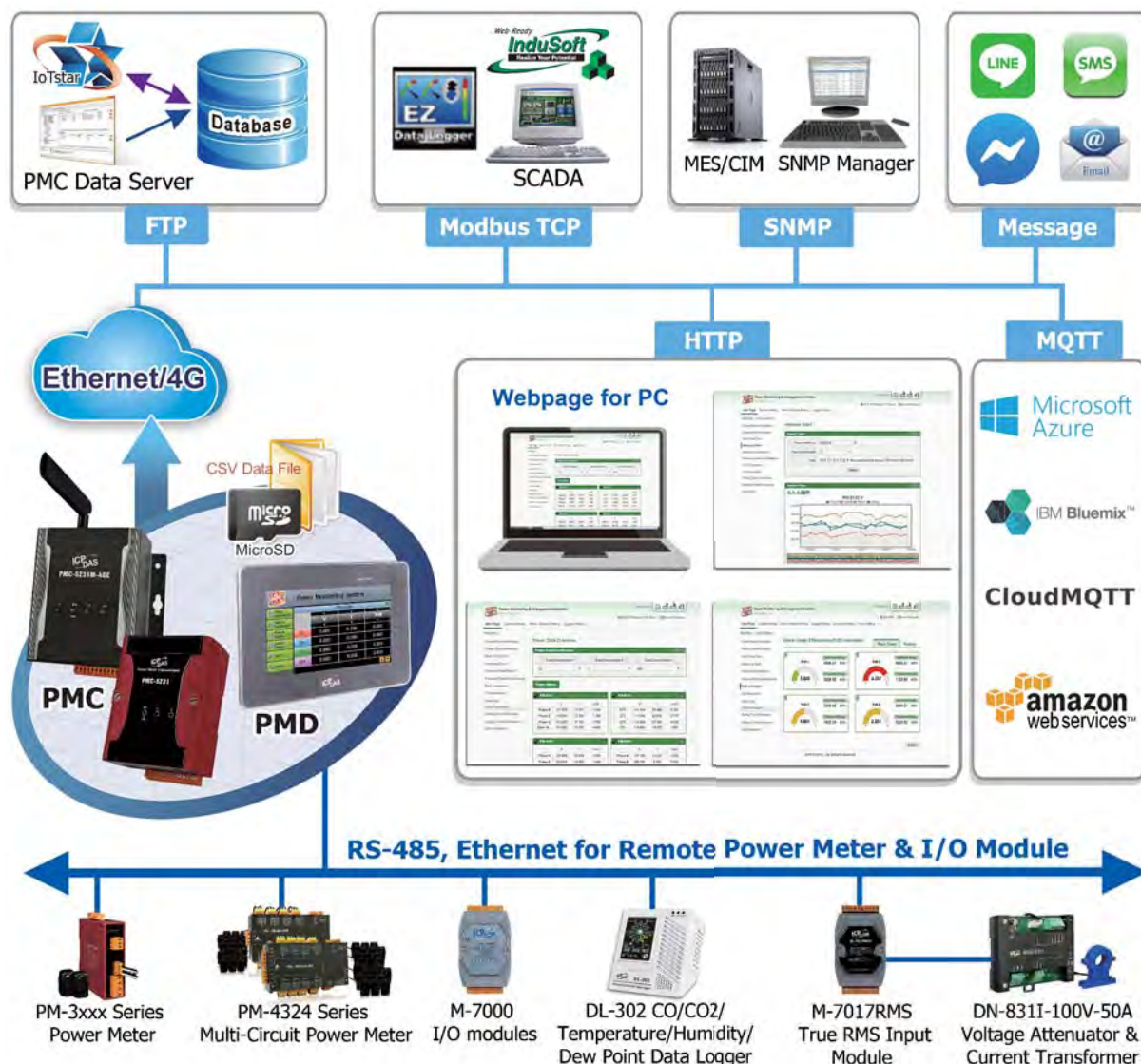## 1.1 Energy Management Solutions

▲ System Architecture

This innovative total solution for energy management includes: front-end Power Meter, Power Meter Concentrator, backend software tool for database import operation (PMC Data Server), InduSoft SCADA software and IoTstar Cloud Management software. In addition to hardware devices, ICP DAS also provides total solution so that the user could easily view power data by their mobile phones or PC, the administrator could set up the system quickly and the data can be recorded in real time for energy consumption inquiry to achieve effective energy management. During the early stage, if the scale of the application is small, the user could simply use Power Meter and PMC/PMD to set up a simple power monitoring system, once the scale of the application is expanded, the user could get the back-end software tool involved and build an easy-to-expand power monitoring system via blocks stacked structure. By this way, the system will be highly flexible and could be implemented in phases to meet various requirements.

1.2 Management System Software Features

SCADA Software Solution: InduSoft

InduSoft Web Studio® is a software product distributed by ICP DAS. It is a powerful collection of automation tools that provide all the automation building blocks to develop HMIs, SCADA systems and embedded instrumentation solutions. It supports 32/64-bit Windows operating systems, including embedded versions such as Windows CE. Platforms other than windows such as Linux operating systems is also supported.

Features:

- Graphics and Animation design Tools
- Connect to any SQL database (MS SQL, MySQL, Sybase, Oracle), MS Access, or Excel, and ERP/ MES systems.
- Alarms, Events, Trends, Recipes, and Reports management tools
- Supports web server, database and overall system redundancy

EZ Data Logger Software

EZ Data Logger is a small data logger software. It can be applied to small remote I/O system. With its user-friendly interface, users can quickly and easily build a data logger software without any programming skill.

Features:

- Support multiple communication protocols
  - DCON
  - Modbus RTU, Modbus ASCII and Modbus TCP
  - M2M RTU
- Support mutiple COM Ports and TCP/IP connections
- Support Control Logic (VB Script)
- Support Alarm Notifier (by sending SMS or E-Mail)
- Real time data trend (with zoom in and zoom out)
- IP Camera Viewer
- Access database supported (The database also can be exported to Excel file or CVS file)
- Reporter Can print the trend line or data from the database.
- High/Low alarm with audio warning
- Can search ICP DAS serial modules (I-7000/M-7000/8000/87K)
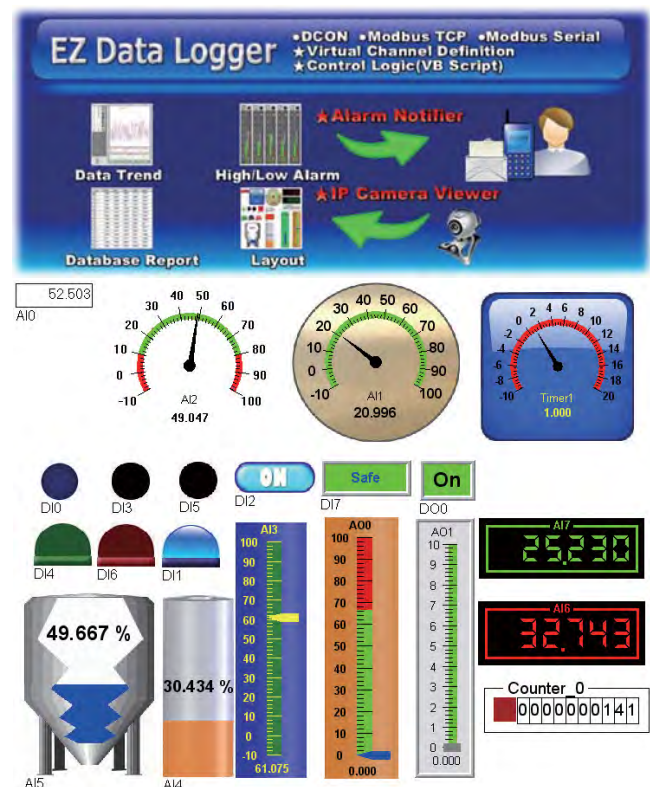
1.3 Power Meter Concentrator

PMC/PMD Features:

PMC   **PMD**

### ■ No extra software tool, using browsers to perform system operations

Featuring web-based HMI for easy operations, the user could connect to PMC/PMD webpage via browsers to view the power data, set up system parameters, manage power demand and perform logic editing function for alarm notification.

■ Built-in Micro SD card for power data logging

The PMC/PMD features a built-in Micro SD card. After the PMC/PMD retrieving the power data from the power meter, the system will save the power data in CSV format in the Micro SD card and regularly send back the data files to the backend management center for data analysis and statistics.

■ Display real-time or historical power data trend

In addition to display power data of the power meter in text format, the power data can also be displayed in real-time and historical trend chart for user to easily identify the variation of the electricity usage of the devices.
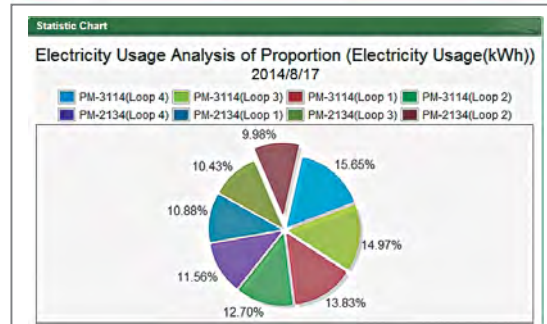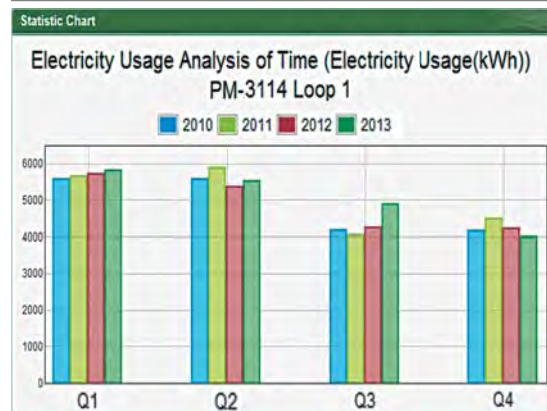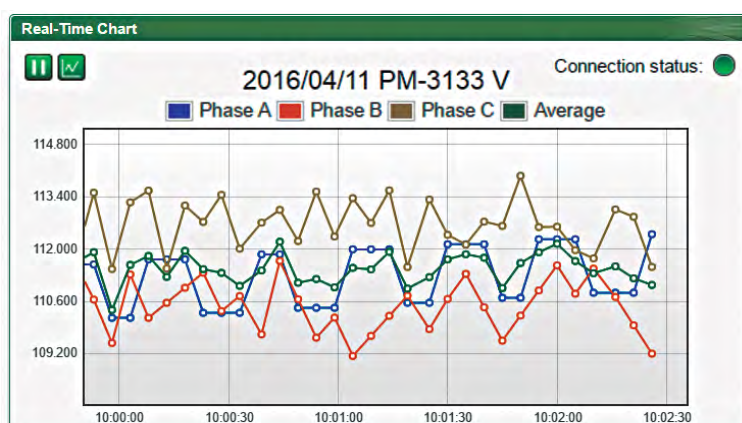
■ FTP Server/Client for data file management and file recovery mechanism supported

The built-in FTP Client function of PMC/PMD allows regular transmission of the power data log files saved in the Micro SD card of PMC/PMD to the backend management center for data analysis and statistics. The PMC/PMD offers a complete data file recovery mechanism so that when experiencing network disconnection, the data log files will be recovered after the network is resumed to ensure the system operates properly. With the FTP Server of PMC/PMD, the user could also use FTP Client utility to retrieve the power data files saved in PMC/PMD from the PC side easily.

◼ Built-in IF-THEN-ELSE logic engine for thought-out power demand management

PMC/PMD is equipped with IF-THEN-ELSE logic engine. The user could complete the control logic via web page and download the logic rules to the PMC/PMD. The logic engine will loop execute the rules in order. By editing the IF-THEN-ELSE logic rules, the user could include the following information in the IF condition, such as: "fail to connect to power meter", "FTP upload failed", "insufficient disk space", "power demand management", "abnormal power data", etc. In addition, the Schedule setting and channel values of I/O modules that are connected to the PMC/PMD can be also included in the IF condition. When the evaluation of the IF condition is matched, the corresponding Action will be executed (such as: Email/SMS/LINE alarm message sending or AO/DO channel value of the I/O modules setting). By this way, the user could quickly implement applications for power demand management, electricity control of the devices and alarm notification sending.

◼ Provide Schedule function

PMC/PMD provides Schedule function that allows to edit logic for applications that requires Schedule function. The Calendar interface allows to easily set up the schedule for weekdays or weekends so that the user could schedule the operations for the devices as required for efficient electricity usage of the devices.

◼ Provide historical power data statistics report

PMC/PMD provides historical data report inquiry and display function, the easy-to-read daily and monthly report of the historical power data would help to understand current electricity usage of the devices.

◼ Modbus TCP/RTU for seamless integration with SCADA

The PMC/PMD supports Modbus TCP/RTU Slave protocol to connect to SCADA software or HMI devices in control center so that it could perform real-time monitoring and control of the electricity usage for the devices. Therefore, the regulation of the system will be more flexible.

◼ Provide Timer Function

Timer function provides Timeout/Not Timeout status for condition evaluations. With the timer function, the users are able to edit logic that requires timing approach. In addition, the timer function can be reset/started in real time that increases flexibility when performing logic control.

■ Support a variety of wide-range I/O modules to achieve power control and load shedding of the devices

According to the requirements of the application and based on the devices connected, the PMC/PMD is able to connect to M-7000 I/O modules, standard Modbus TCP/RTU Slave modules or DO Relay channel of the ICP DAS power meter for real time I/O control operation of the devices, the abundant selections enable maximum flexibility for system set up and power management.

■ On-Site Power data viewing and Power Meter setting

PMD (Power Meter Concentrator with Display) series is equipped with TFT LCD (with Touch Panel). It provides an easy way for viewing the power data and set up the Power Meter parameters on sites.

■ Support SNMP Function

In addition to Modbus protocol, PMC/PMD also supports SNMP function that allows seamless integration with IT Management software. The users could integrate PMC/PMD with the existing management system and collect the power data of each device by SNMP function easily.

■ Provide "Power Usage Effectiveness (PUE)" calculation operation

Power usage effectiveness (PUE) is a measure of how efficiently a computer data center uses energy; specifically, how much energy is used by the computing equipment (in contrast to cooling and other overhead). PUE is the ratio of total amount of energy used by a computer data center facility to the energy delivered to computing equipment. The PUE will be greater than 1. The larger the PUE number the less efficient your utilization is. PMC/PMD provides the PUE calculation operation and also display the PUE data in two modes (Real-Time and History) through Web page.
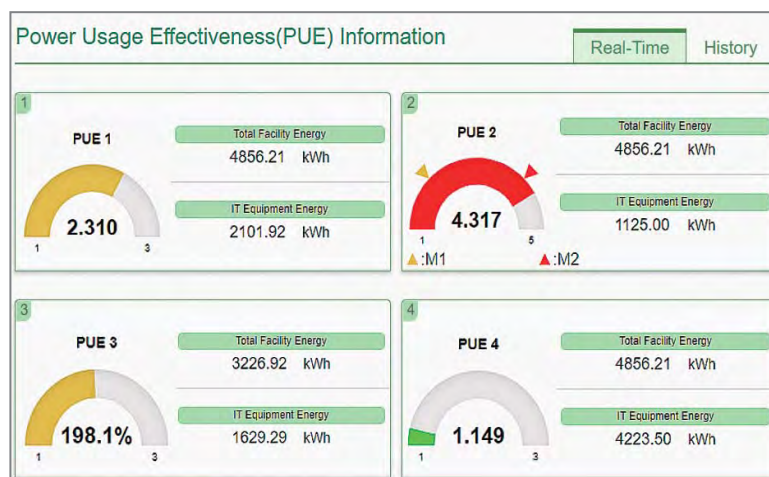
A variety of protocols supported for integration with SCADA/IT/IoT System

Industry 4.0 is based on Internet of Things (IoT) that incorporates the technological concept of communicating and exchanging information between all facilities which brought manufacturing industry to a new era. PMC-523x/PMC-224xM/PMD provides powerful and flexible integration with the power meters at the field side, and also supports various IoT protocols for seamless integration with the SCADA/MES/MIS/IT/IoT systems to transfer the real-time power data from the front-end to the back-end management systems. It also features reliable thought-out power demand management and data logger functions. All of these features make PMC-523x/PMC-224xM/PMD a perfect concentrator of power meters in the Energy Management application of the IoT age.
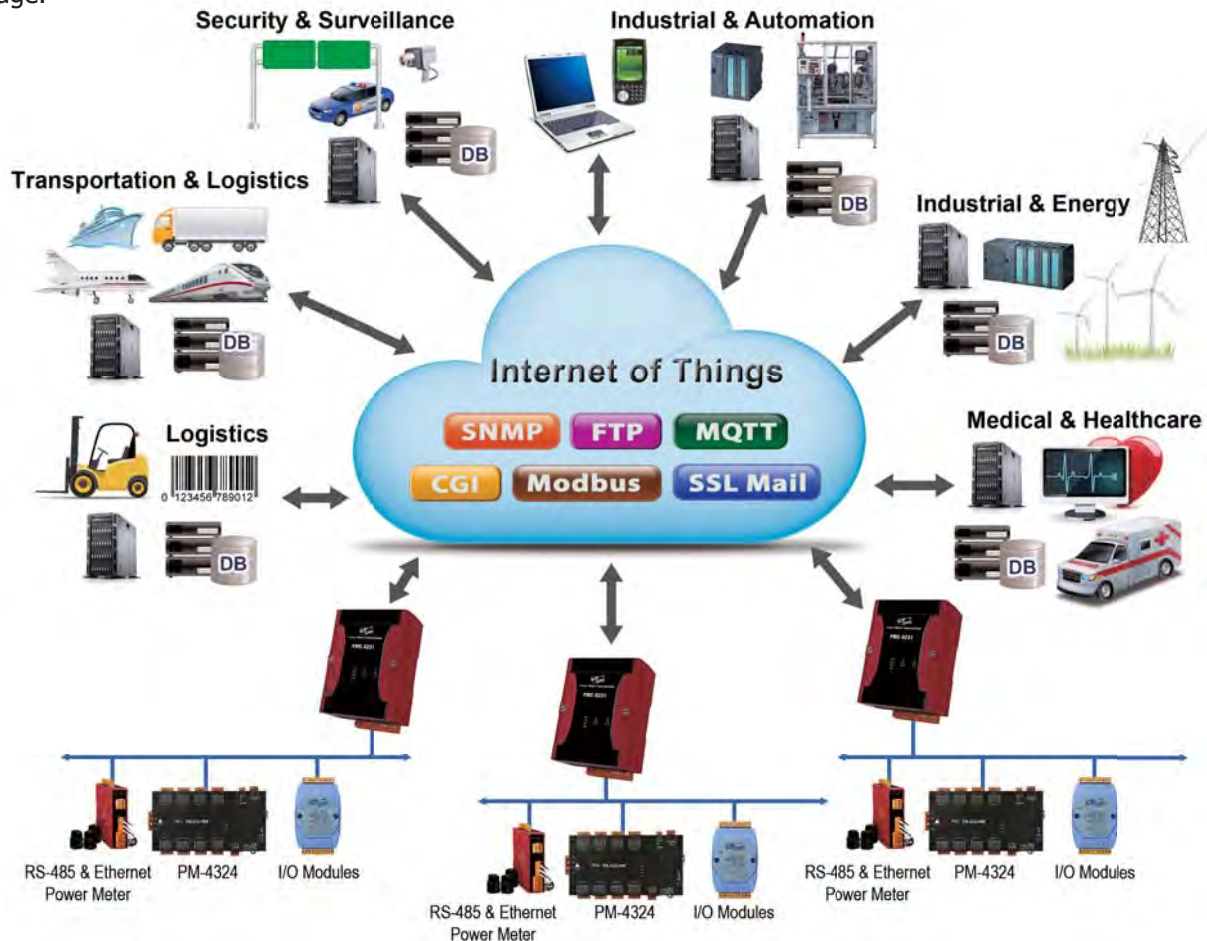
Provide alarm notification function with LINE, Facebook Messenger, SMS and Email
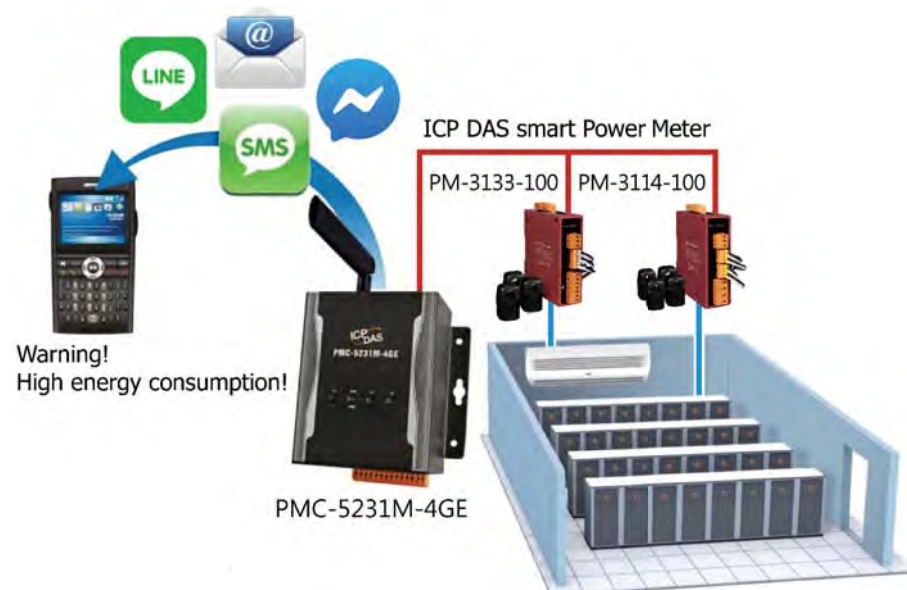
PMC-523x/PMC-224xM/PMD can integrate Instant Messaging services such as LINE and FB Messenger to achieve alarm message notification function. The message sending action can be added to the IF-THEN-ELSE logic edition as part of logic control to provide real-time message notification to the related personnel when an event occurs. The alarm message content could be a preset string with real-time power data or I/O channel data. In addition, the PMC/PMD can also send the alarm notification via SMS or Email.

Connection with IoT Cloud Platform and ICP DAS IoTstar

PMC-523x/PMC-224xM/PMD support the connection ability with the IoT Cloud Platform such as Microsoft Azure, IBM Bluemix, etc. via MQTT protocols. It works as a gateway in the IoT application to connect to power meter, collect and transfer the power data to the Cloud platform for future data analysis. PMC-523x/PMC-224xM/PMD can also receive the message published from the Cloud platform to perform corresponding actions onsite. In addition, PMC-523x/PMC-224xM/PMD can connect to ICP DAS IoTstar which allows remote management on the PMC/PMD concentrator via user-friendly and intuitive Web page interface, and receive the power data of the Power meters from the remote PMC/PMD; the data can be imported into the Database for future information analysis by the SCADA software, Data analysis tool (for example: Microsoft Power BI, Google Data Studio) or Cloud Service.

PMC/PMD Function Comparison Table

Function	PMC-523x	PMC-224xM	PMD
Hardware			
Network Interface	10/100/1000 Base-TX * 1	10/100/1000 Base-TX * 2	10/100/1000 Base-TX * 1
microSD	Built-in with 4 GB microSD (Max. for 32 GB microSD)		
Power Meter Connection	Allow connections to up to 24 ICP DAS Modbus Power Meters.		
I/O Module Connection	Allow connection to up to 8 remote Modbus I/O modules. One XV-Board for PMC-523x and PMC-224xM		
Touch Panel	N/A	N/A	PMD-2201 with 7" panel PMD-4201 with 10" panel
Wireless Data Communication	3G: PMC-5231M-3GWA 4G: PMC-5231M-4GE (4GC)	N/A	N/A
Software			
Operation Interface	Web Page	Web Page	Web Page & Local Display
Basic Function	● Power data collection. Display real-time or historical power data ● Power data logging and power data file auto send-back & recovery when network is resumed after disconnection ● Provide historical power data statistics report ● PUE information display		
Power Demand Management	● Built-in IF-THEN-ELSE logic engine for thought-out power demand management ● Adjust device operations by its power status via Modbus I/O modules ● Provide Schedule function for operations of I/O modules (devices) ● Provide message notification function via Email, SMS, LINE and FB Messenger (SMS is for PMC-5231M-3GWA, PMC-5231M-4GE(4GC))		
Integration with SCADA/IT/IoT/Cloud systems	● Support Modbus TCP/RTU Slave protocol for integration with SCADA ● Support FTP, SNMP & MQTT protocols ● Support Connection to IoT Cloud Platform (Microsoft Azure and IBM Bluemix) ● Support ICP DAS IoTstar Cloud software		

1.4 IoTstar: Cloud Management Software

http://iotstar.icpdas.com

IoTstar is a software developed by ICP DAS for use in remote management of the IIoT concentrators on a private or public cloud platform such as: Microsoft Azure, IBM Bluemix or Amazon AWS, etc.. With the help of the IoTstar and the IIoT concentrators, data of Power meters or sensors can be quickly and easily collected and imported to the database on the cloud platform; and users can analysis and generate report by using the tools provide by the cloud platforms.

◾ Features

1. Based on Public Cloud: Microsoft Azure, IBM Bluemix, Amazon AWS
2. Based on Private Cloud: Microsoft Windows 7/8/10
3. Remote Management and Maintenance
4. Remote Monitoring and Control
5. Sensor data collection and Database import
6. Data Analysis and Report by Public Tools
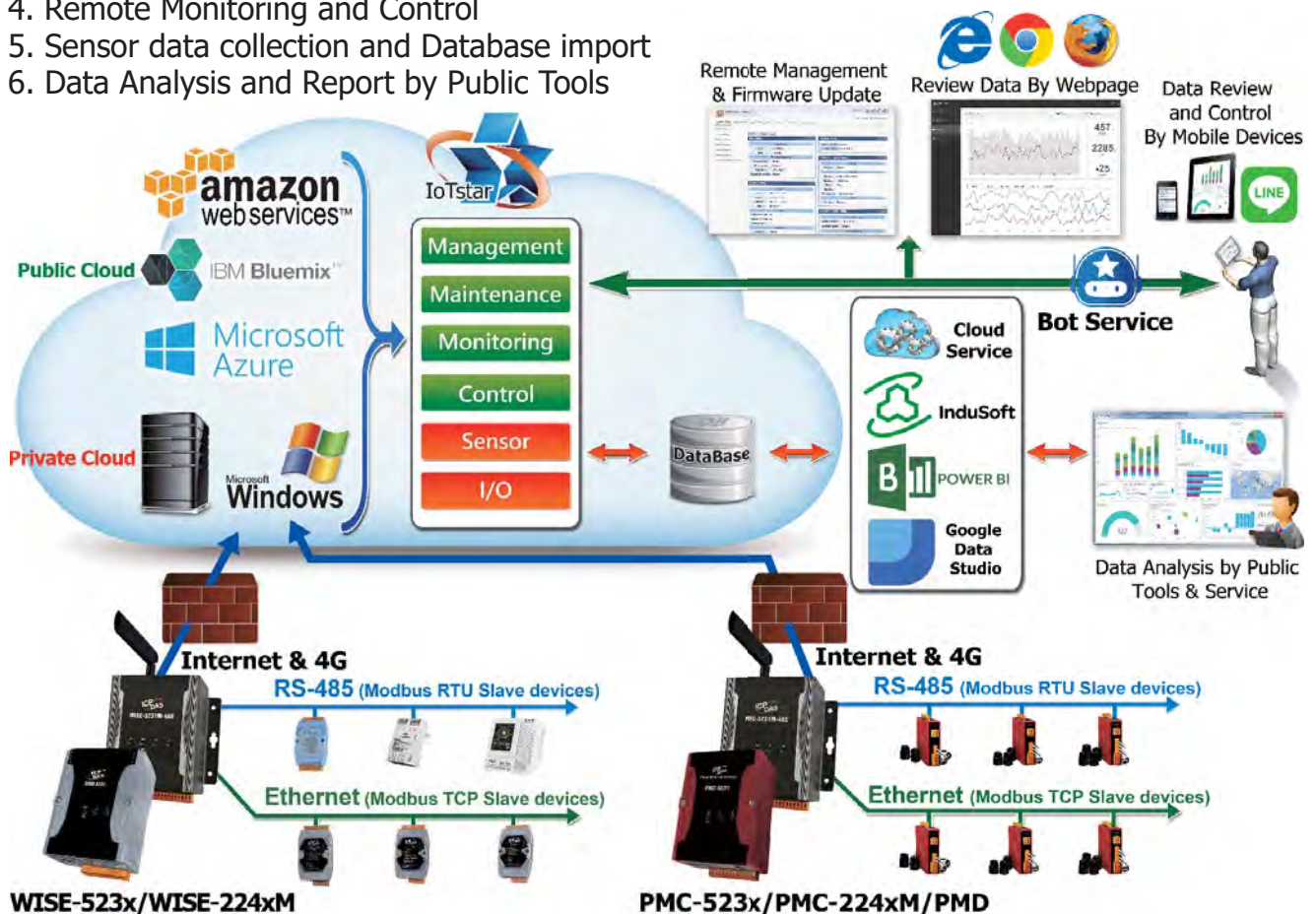
Based on Public Cloud

Can be installed on Microsoft Azure, IBM Bluemix or Amazon AWS to implement the public IoT cloud solution.

Based on Private Cloud

Support Windows system (Windows 7/8/10, Windows Server) to implement the private IoT cloud solution.

Remote Management and Maintenance

Enables the remote management and firmware update on the controllers via user-friendly and intuitive Web page interface.

Remote Monitoring and Control

User can retrieve and review the data of the Power meters (or sensors) directly by the built-in Web page interface.
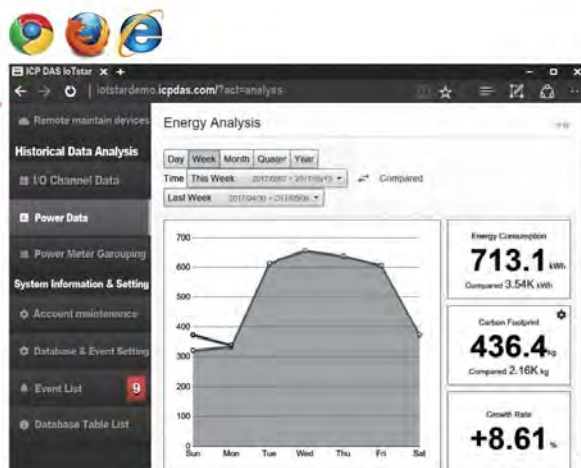
Sensor Data Collection and Database Import

Receive the data log file of the Power meters (or sensors) from the remote IIoT concentrators and import the content of the data log file into the Database.
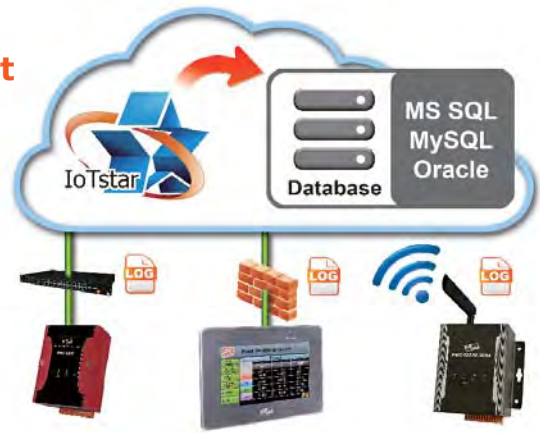
Analysis and Report by Public Tools

By Database interface, it is easy to integrate with SCADA, Microsoft Power BI, Google Data Studio or Cloud Service to retrieve the data of the Power meters (or sensors) directly from the Database for future data analysis.
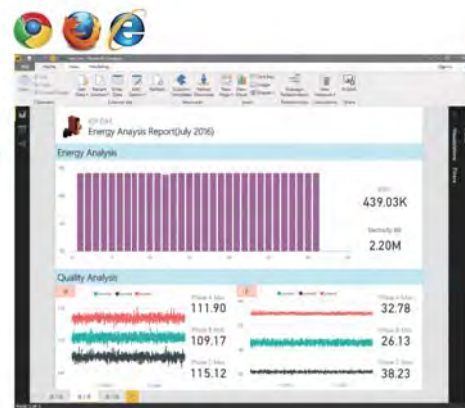
▲ Analysis and Report by Microsoft Power BI
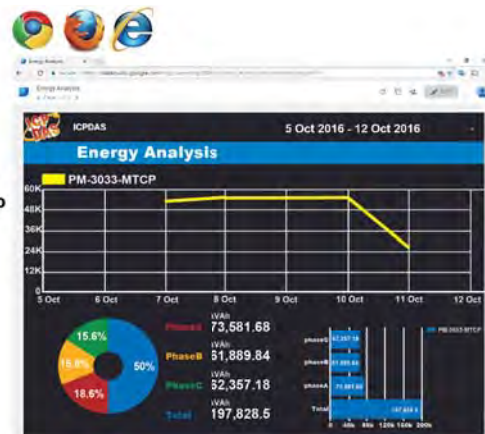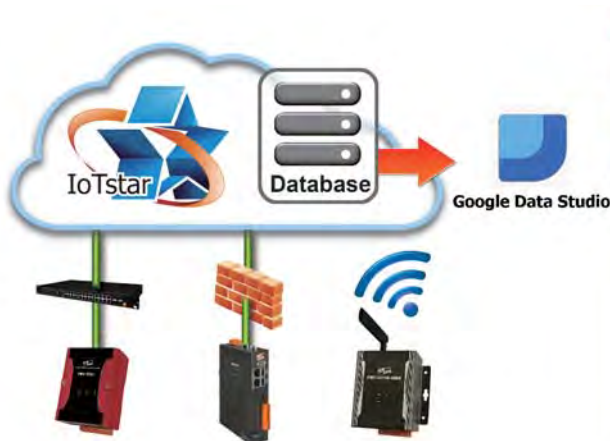
▲ Analysis and Report by Google Data Studio

Products support IoTstar:

WISE-523x IIoT Edge Controller	**WISE-523xM-3GWA** **WISE-523xM-4GE** 3G/4G IIoT Edge Controller	**WISE-224xM** IIoT Edge Controller

PMC-523x/224xM
IIoT Concentrator
for power meters

PMD series
IIoT Concentrator
with touch panel display
for power meters

IoTstar Bot Service (Supported LINE App)

IoTstar Bot Service is an optional software package for IoTstar that provides users two-way message interactions between the WISE/PMC/PMD controller managed by IoTstar and LINE chat rooms. IoTstar Bot Service provides an easier and more convenient mechanism for user to manage his/her remote controllers with LINE App. It does not like the traditional Chatbot which get the information or service by entering the text message; it provides a friendly user interface that includes buttons and dialogue menu to perform the monitoring of remote controllers in an easy way.
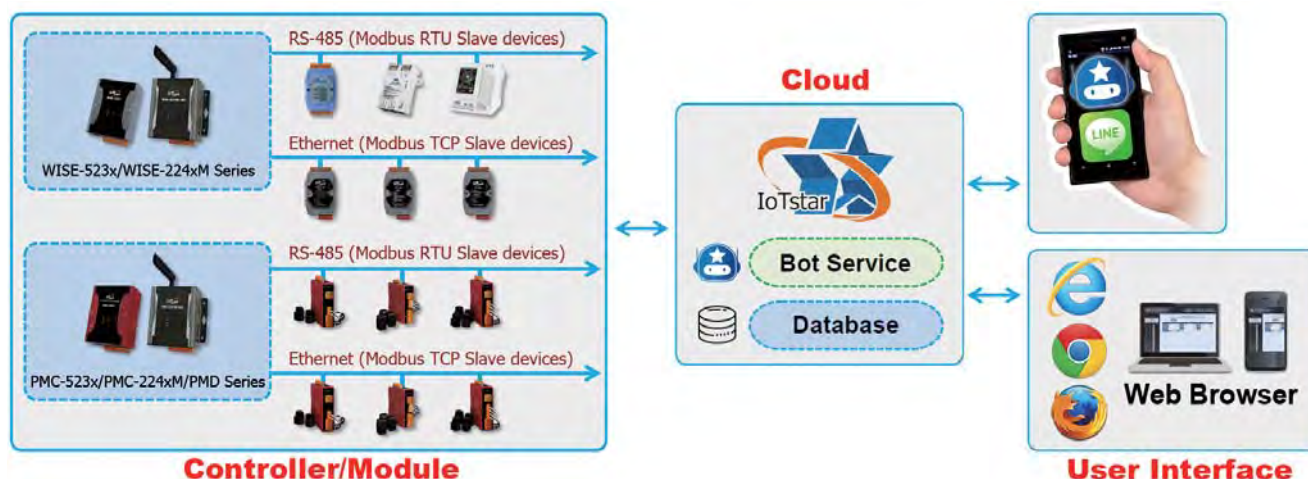
Features

- Monitor WISE/PMC/PMD controllers anytime and anywhere by LINE App.
- Query real-time Power (or sensor) data and change output channels.
- Quickly browse the real-time Power (or sensor) data efficiently by Grouping data.
- Receive real-time event messages with text, pictures or videos (WISE can work with the iCAM IP camera to send the picture or video files).
- Review and query the historical event messages.
- Secure and reliable communication mechanism between LINE and controllers.
- Easy to Maintain; only need the upgrade of LINE App.

Operation
User Interface

Query Power
(or sensor) data

DO/AO channel setting

Event notification
and query

1.5 Software Utility
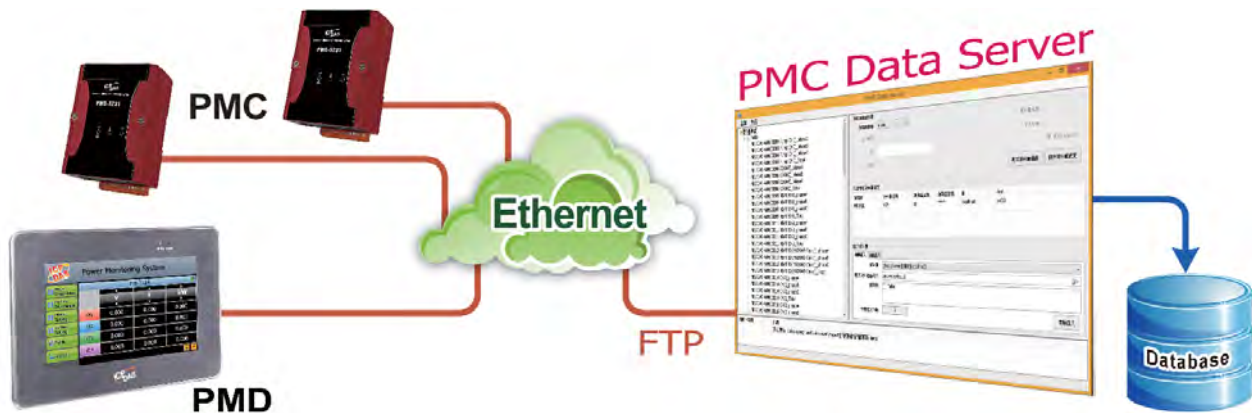
◾ PMC Data Server

The PMC Data Server is a database utility designed for connecting to the PMC/PMD concentrators. When PMC/PMD Data Server is connected to these PMC/PMDs by Ethernet, the PMC/PMDs will send the power data log files to the PMC Data Server at scheduled time, and these power data will be transformed to MS Access/MS SQL/MySQL/Oracle database format for easy data review or inquiry. During the whole process of system development, no programming is required. It takes only a few settings for users to quickly retrieve and view the power data of the devices based on database system and furthermore, enables further process of the data for statistics and analysis.

◾ Power Meter Utility

Power Meter Utility has to be installed on PC and it enables to retrieve and display the power measurement values that measured by power meter via COM Port or Ethernet. The users will be able to read the power measurement values and to perform parameter settings of the meter.

- By Modbus RTU or Modbus TCP protocol, it enables to connect with ICP DAS Power Meters and data retrieving.
- Real time monitor power measurement values of the meter.
- Real time setting up parameters of the meter.
- Restore the parameters of the meter to default settings.
- Support Data Log function.

PM-3133-MTCP Smart Power Meter

tM-7561   PM-3133 Smart Power Meter
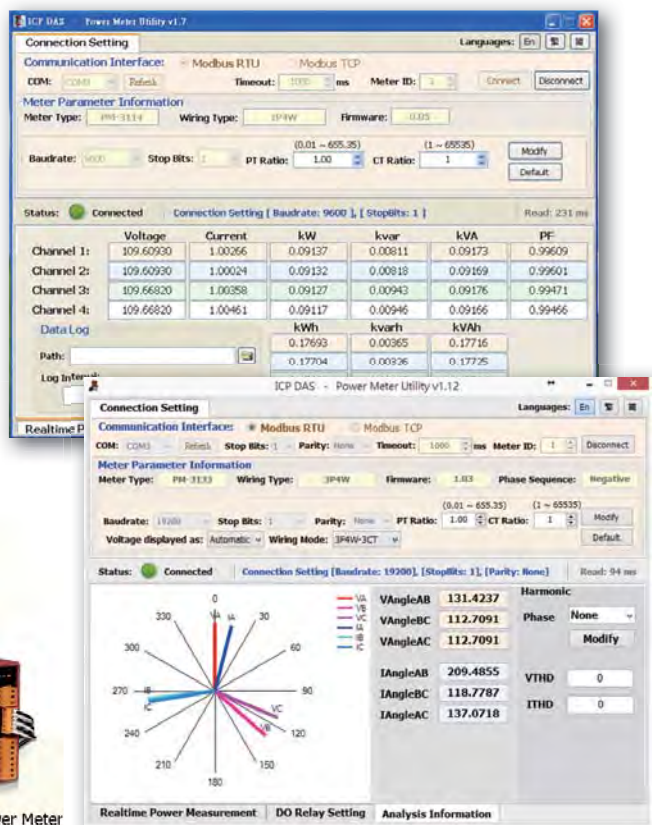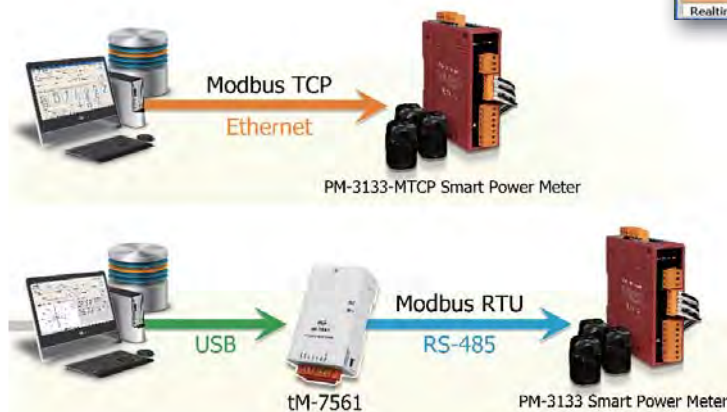
Ch2. Applications

Factory

With the limited availability of the energy sources, countries all over the world all seek to enforce legal regulations in energy saving and carbon reduction; as the cost of energy is getting higher and higher, any factories in the world are paying more attention to energy and resources optimization. For effective usage of the energy not only reduce the electricity cost but also stabilize the power system to maintain the normal operation of the production line.

The PMC/PMD developed by ICP DAS is perfect for building a power monitoring system for factory applications. It will send out real-time notification when there is unusual electricity consumption, and will perform load shedding in real time when the forecast capacity is going to exceed the contract capacity to avoid penalties. And by working with SCADA software, it enables gathering and analysis of the power data to design best power policy to enhance the efficiency of power supply.
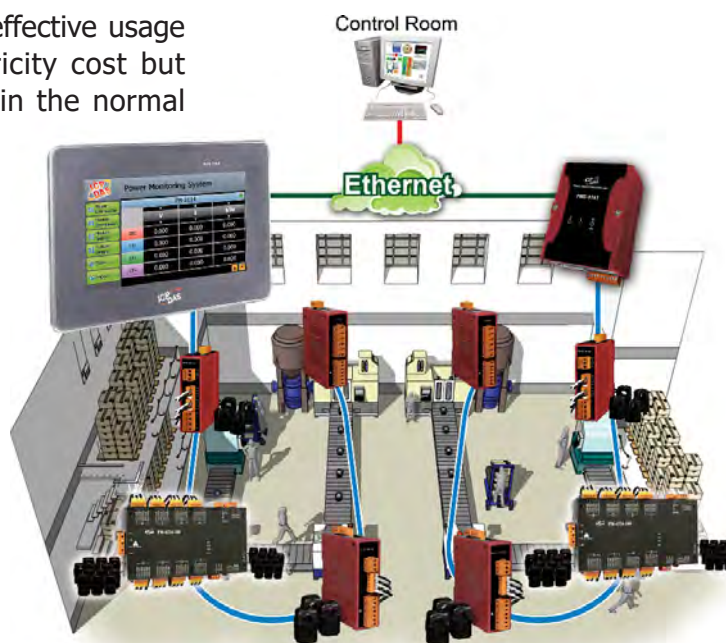
Building

ICP DAS power monitoring and management solution is perfect for large-scale power monitoring for buildings. A PMC/PMD can be installed on each floor and connect to ICP DAS smart power meters via RS-485 or Ethernet interface to measure the power information of air conditioning, lighting, drainage or other electrical devices. The power information of the devices such as voltage, current and kilowatt information will be recorded in real-time and the data can be transmitted to back-end control center. With SCADA software, it can perform data gathering and analysis of the power data. By collecting electricity data, analyzing electricity data, identifying the problems and correcting improper behaviors on the electricity usage, the efficiency of power usage can be enhanced and furthermore, ensure stable power supply and energy saving.
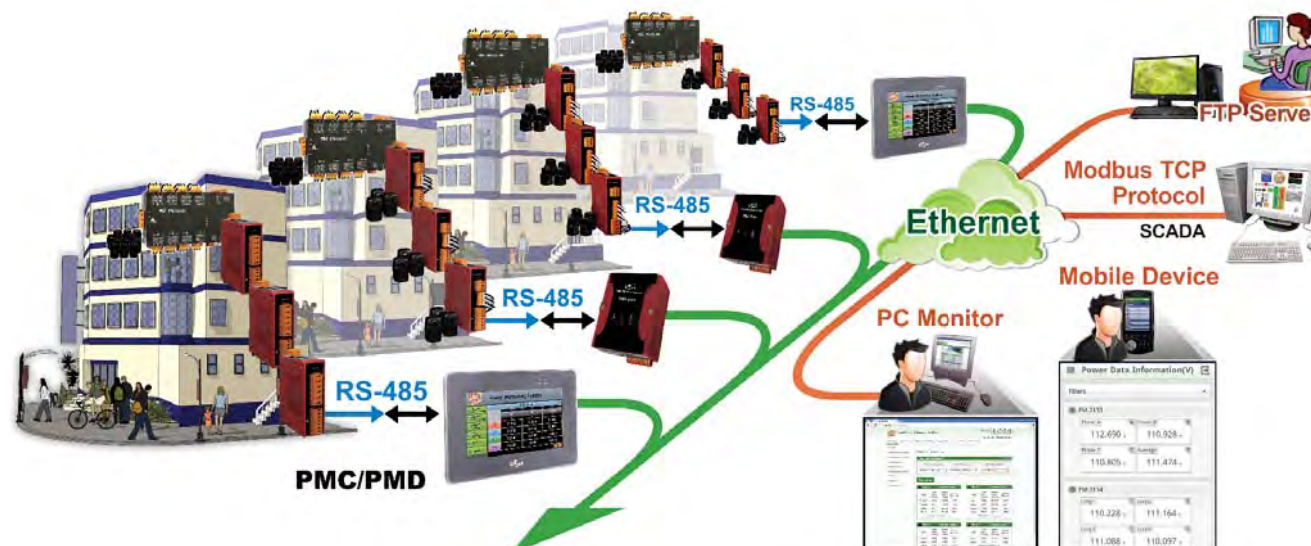
■ Campus

ICP DAS provides a total solution for campus electricity monitoring and management. The related personnel could set up the alarm message notification operation according to the contract they signed. When the electricity consumption is going to exceed the contract capacity, the PMC/PMD will send instant message notifications(such as LINE/FB Messenger/Email/SMS) to related personnel for immediate actions. At the same time, it can perform load shedding to avoid penalties for exceeding contract capacity. By collecting and analyzing the power data of each device, the electricity consumption can be fully tracked and further more is able to establish effective policy to achieve energy saving and carbon reduction.
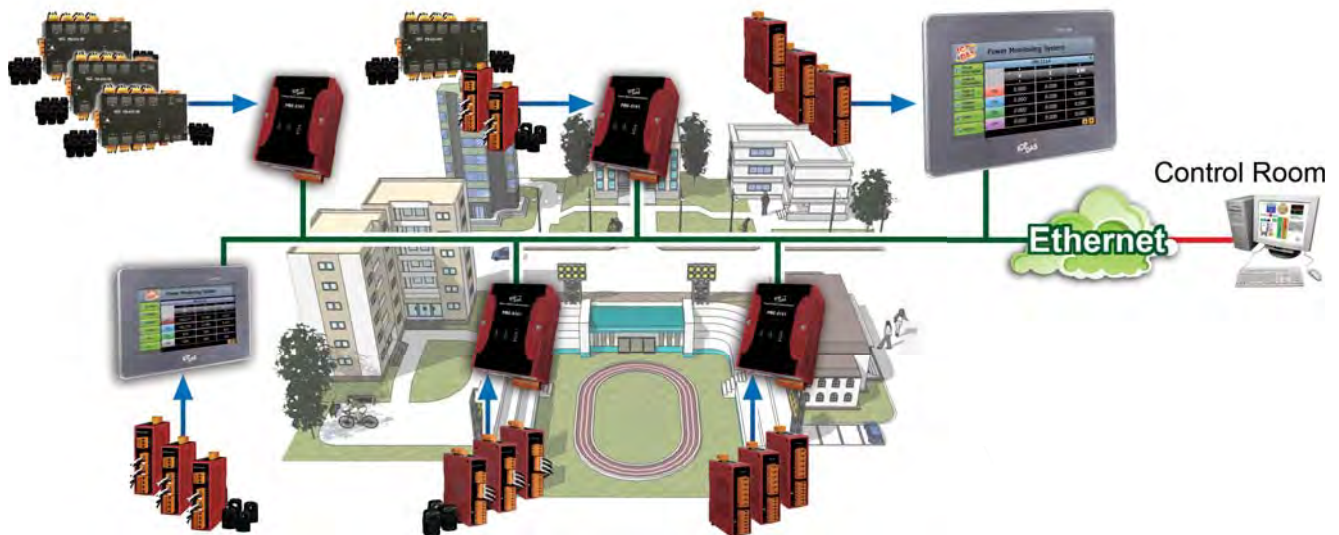
■ Electricity Consumption of Machines

In order to ensure the stability and reliability of the machines; usually it requires the monitoring of electricity consumption. The purpose is not only for energy saving, but also to investigate the influence of electric current variation that may affect the yield rate of the products during the production process. For most machines uses both AC and DC power supply, if the traditional power meters are used, it may require several power meters to implement the monitoring jobs. By using M-7017RMS, it can monitor multiple circuits at the same time and support both AC and DC current monitoring; so that it will save the installation space and no need to install lots modules for individual functions.
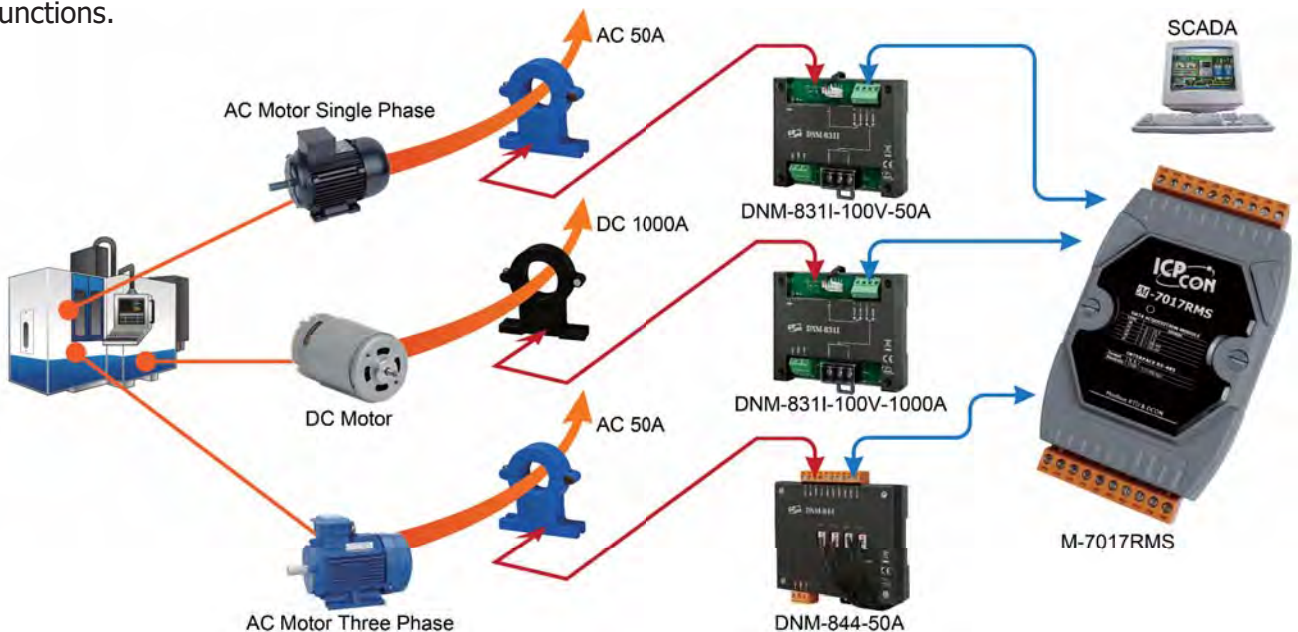
Ch3. SCADA System Software: InduSoft

InduSoft Web Studio®

InduSoft Web Studio is a powerful, integrated collection of automation tools that includes all the building blocks needed to develop modern Human Machine Interfaces (HMI), **Supervisory Control and Data Acquisition (SCADA)** systems, and embedded instrumentation and control applications. InduSoft Web Studio supports all Windows runtime platforms, ranging from Windows CE, Windows 7 (32/64 bit), Windows 8 (32/64 bit), Windows 10, and Windows Server Editions, along with built-in support for local or remote (web) based visualization. InduSoft also conforms to industry standards such as Microsoft .NET, OPC, DDE, ODBC, XML, and ActiveX.

ICP DAS provides the InduSoft bundled driver to integrate InduSoft software and ICP DAS products (I-7000, I-8000, I-87K and CAN Series) for SCADA system. Besides, the VxComm software of ICP DAS can be performed to link to Internet/Intranet modules in an easy way. And DCON Utility of ICP DAS can be used to configure network module for easy use and maintenance.

📁 InduSoft Features

◾ Streamlined Licensing

Now all license levels support an unlimited number of concurrent communication drivers (limited only by hardware constraints). Native communication drivers for the electrical protocols (DNP3/IEC) available for Full Runtime and EmbeddedView, are no longer an add-on. License no longer restricts the type of Thin Clients, nor pre-defined packages of Thin Clients. The user can define the exact maximum number of Thin Clients that should be concurrently supported by the license.
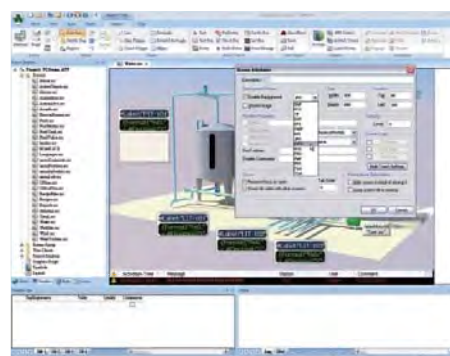
◾ OPC UA Server

Support is now included for the OPC UA Server for full runtime, EmbeddedView, and IoTView.

◾ Drivers and OPC

IWS 8.1 not only Provides over 250 native communication drivers but also native OPC interfaces, such as OPC UA (Client/Server), OPC DA (Client/Server), OPC XML (Client), OPC .NET (Client), and OPC HDA (Server), and many other devices.

◾ Graphics and Design Tools

Create screens to meet any application requirement using the tools in our graphic interface. Combine over 1,000 animated objects to create any functionality required. Store graphics in the library for future use, and easily make projects across a product line share a consistent "look and feel".
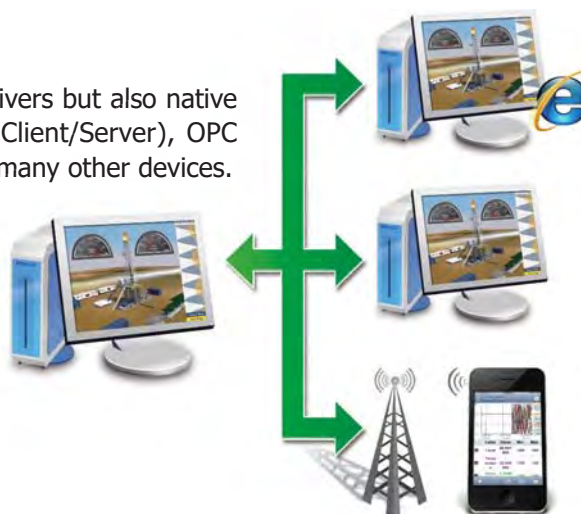
◾ Alarms

Send online alarms or reports using multi-media formats like PDF. Alarms are real-time and historical; log data in binary format or to any database. Use remote notification to send alarms right to your inbox, printer, or smartphone. Custom Alarm fields allow you to customize up to 10 additional fields to the alarm history.

Animation

Take command over graphics in a user friendly and intuitive interface. Paste images, and even rotate dynamically using custom rotation points. Fill bar graphs with color, or adjust the scale of objects with easy-to-use configuration. Other animations include'command'(for touch, keyboard and mouse interaction), hyperlink, text data link, color, resize, transparency, and position.

Multi-Language

Develop your application in one of many development languages, including English, Portuguese, German, French, Russian, Chinese Traditional and Simplified, and Spanish, or use translation tools to switch the runtime to any language. InduSoft Web Studio offers automatic font replacement based on the language selected.

Database

Connect to SQL database (Microsoft SQL, MySQL, Sybase, Oracle), or Microsoft Access or Excel, and ERP/MES systems (including SAP), even from Windows Embedded Compact Edition. The flexible built in interface doesn't require knowledge of SQL. A patented solution allows for communication with SQL and relational databases running on any supported platform.

Recipes and Reports

Save time and maintain consistency by automating part parameters or production quantities with flexible recipe management tools. Create clear, concise reports in plain text, RTF, XML, PDF, HTML, and CSV or integrate with Microsoft Office programs such as Excel. Get the data you need, in the format you need it, to make informed decisions, fast.

Scheduler

Schedule application behavior triggered by tag changes, date/time, frequency, or any trigger. Use this for simulation, to trigger reports or other functionality at a particular time of day, or even to trigger driver worksheets to read/write at a scan rate you choose.

Trends

Real-time and Historical trends, and SPC functionality are supported. Log data in binary format, or to any local or remote SQL database. Color or fill trends with graphic elements to enhance clarity of data. Date/Time based or numeric (X/Y plot) trends give you the flexibility to display information that best suits your application. InduSoft Web Studio supports vertical and horizontal trending.

Scripting

Two powerful scripting languages are supported; built-in InduSoft functions and standard VBScript. Take advantage of widely available resources for VBScript. Both the native InduSoft scripting language and VBScript can be used simultaneously to give you the functionality you need, even from thin clients. Script debugging tools for the native VBScript editor include break-points, and a variable watch list to improve scripting productivity.

InduSoft Software Ordering Information

IWS Development Package for Windows	InduSoft development package can generate applications for Windows, Windows Embedded and Windows Embedded CE
IWS Runtime Package for Windows	InduSoft runtime package for Windows, Windows Embedded
IWS Runtime Package for Windows Embedded CE	InduSoft runtime package for Windows Embedded CE
Additional Package for Development or Runtime License	The additional package number of Thin Clients
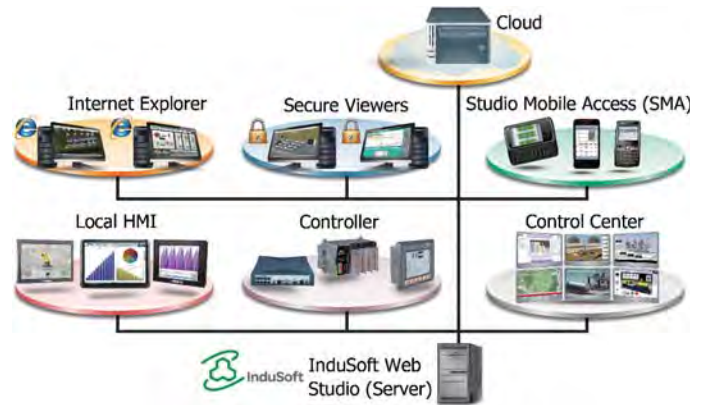
Ch4. Power Meter Concentrator

4.1 Industrial IoT Power Meter Concentrator

PMC-5231

IIoT Power Meter Concentrator
(Single LAN port)

Features

- No extra software tool is required, using browsers to perform system operations
- Support at most "**24** ICP DAS Modbus Power Meter modules + **8** Modbus I/O modules"
  * COM3 and COM4 interface can connect to Max. 16 Modbus RTU modules (include Power Meter & I/O Module) individually.
  * LAN interface can connect to Max. 16 Modbus TCP modules (include Power Meter & I/O Module).
  * Support at most 4 ICP DAS PM-4324 series Power Meters
- Display real-time or historical power data; Provide power data statistics report
- Provide microSD card for power data log operation. Data log file auto send-back & recovery when disconnected network is resumed.
- Built-in IF-THEN-ELSE logic engine for thought-out power demand management
- Provide alarm message notification function via LINE, Messenger or Email
- Adjust device operations by its power status via Modbus I/O modules
- Provide Schedule function for operations of I/O modules (devices)
- Support Modbus TCP/RTU, SNMP and MQTT protocols
- Support Connection to IoT Cloud Platform (Microsoft Azure and IBM Bluemix); Support ICP DAS IoTstar Cloud software.

PMC-5231 is the Industrial IoT Power Meter Concentrator for meeting the trend of energy management in the Industry 4.0 age. It provides flexible integration with the ICP DAS power meters via RS-485 or Ethernet interface, and features various functions such as: measure the power consumption of the devices, energy usage analysis, power data log operation, power demand management and alarm notification functions.

PMC-5231 offers a user-friendly and intuitive web site interface that allows users to implement the Energy monitoring and management system just a few clicks away; no programming is required. By working with the I/O modules, and functions such as IF-THEN-ELSE logic rule execution and LINE/Messenger/Email alarm message notification functions, PMC-5231 offers more thought-out power demand management functions, and is able to perform load shedding of the devices if required. PMC-5231 supports the Modbus TCP/RTU, SNMP, FTP and MQTT protocols for seamless integration with the back-end SCADA/IT/IoT systems.

■ Specifications

CPU Module	
CPU	32-bit ARM CPU, 1 GHz
Expansion Flash Memory	microSD socket with one 4 GB microSD card (support up to 32 GB microSDHC card)
Communication Ports	
Ethernet	RJ-45 x 1, 10/100/1000 Based-TX (Auto-negotiating, Auto MDI/MDI-X, LED indicators)
COM 2	RS-232 (TxD, RxD, GND), non-isolated, Speed: 115200 bps max.
COM 3 / COM 4	RS-485 (Data+, Data-); Speed: 115200 bps max; 2500 V_{DC} isolated (COM 4 only)
Mechanical	
Dimensions (W x L x H)	91 mm x 132 mm x 52 mm
Installation	DIN-Rail Mounting
Environmental	
Operating Temperature / Storage Temperature	-25 to +75 °C / -40 to +80 °C
Ambient Relative Humidity	10 to 90% RH (non-condensing)
Power	
Input Range / Consumption	+12 to +48 V_{DC}; 4.8 W

■ Appearance

Connector for Optional XV-Board

VGA Port

microSD Socket

PMC-5231

LED Indicators

Rotary Switch

LAN

USB Host   Pin Assignment

COM4   COM3   COM2   COM1   DC +12~48V

D- D+ Iso.GND D- D+ GND RxD TxD GND RxD TxD PWR P.GND F.G.

■ Dimensions (Units: mm)

| Front View | Rear View | Bottom View | Left Side View | Right Side View |

91.0   123.0   113.5

52.0   38.9   35.6   38.9   7.7

■ Ordering Information

PMC-5231 CR	Industrial IoT Power Meter Concentrator (RoHS)

PMC-2241M
IIoT Power Meter Concentrator
(Dual LAN ports)

Features

- No extra software tool is required, using browsers to perform system operations
- Support at most "**24** ICP DAS Modbus Power Meter modules + **8** Modbus I/O modules"
  - * COM3 and COM4 interface can connect to Max. 16 Modbus RTU modules (include Power Meter & I/O Module) individually.
  - * LAN interface can connect to Max. 16 Modbus TCP modules (include Power Meter & I/O Module).
  - * Support at most 4 ICP DAS PM-4324 series Power Meters
- Display real-time or historical power data; Provide power data statistics report
- Provide microSD card for power data log operation. Data log file auto send-back & recovery when disconnected network is resumed.
- Built-in IF-THEN-ELSE logic engine for thought-out power demand management
- Provide alarm message notification function via LINE, Messenger or Email
- Adjust device operations by its power status via Modbus I/O modules
- Provide Schedule function for operations of I/O modules (devices)
- Support Modbus TCP/RTU, SNMP and MQTT protocols
- Support Connection to IoT Cloud Platform (Microsoft Azure and IBM Bluemix); Support ICP DAS IoTstar Cloud software.

PMC-2241M is the new generation of Power Meter Concentrator that provides flexible integration with the ICP DAS power meters via RS-485 or Ethernet interface, and features various functions such as: measure the power consumption of the devices, energy usage analysis, power demand management and alarm notification functions. The PMC-2241M features a built-in Micro SD card. After it retrieving the power data from the power meter, it will save the power data in data log file, and automatically send back the data log files to the back-end management center for data analysis and statistics. By working with the I/O modules, and functions such as IF-THEN-ELSE logic rule execution and alarm notification functions including LINE/Messenger/Email, PMC-2241M offers more thought-out power demand management and alarm notification functions, and is able to perform load shedding of the devices if required, and enables real-time monitoring and control of the power consumption of the devices. PMC-2241M also supports the Modbus TCP/RTU, SNMP, FTP and MQTT protocols for seamless integration with the back-end SCADA/IT/IoT systems.

▪ Specifications

CPU Module	
CPU	32-bit ARM CPU, 1 GHz
Expansion Flash Memory	microSD socket with one 4 GB microSD card (support up to 32 GB microSDHC card)
Communication Ports	
Ethernet	RJ-45 x 2, 10/100/1000 Based-TX (Autonegotiating, Auto MDI/MDI-X, LED indicators)
COM 2	RS-232 (TxD, RxD, GND), non-isolated, Speed: 115200 bps max.
COM 3 / COM 4	RS-485 (Data+, Data-); Speed: 115200 bps max; 2500 V_{DC} isolated (COM 4 only)
Mechanical	
Dimensions (W x L x H)/Installation	33 mm × 160 mm × 129 mm; DIN-Rail Mounting
Environmental	
Operating Temperature/ Storage Temperature/ Ambient Relative Humidity	-25 to +75 °C; -40 to +80 °C; 10 to 90% RH (non-condensing)
Power	
Input Range/Consumption	+12 to +48 V_{DC}; 4.8 W

▪ Appearance

Power Input
Rotary Switch
VGA Port
LED Indicator
2 × LAN
2 × USB 2.0
microSD Socket
Connector for Optional XV-board

TxD
RxD   COM1
GND   (Reserved)
TxD
RxD   COM2
GND
D+
D-   COM3
ISO.GND
D+
D-   COM4
ISO.GND

▪ Ordering Information

PMC-2241M CR	Industrial IoT Power Meter Concentrator (RoHS)

4.2 4G Industrial IoT Power Meter Concentrator

PMC-5231M-4GE
PMC-5231M-4GC

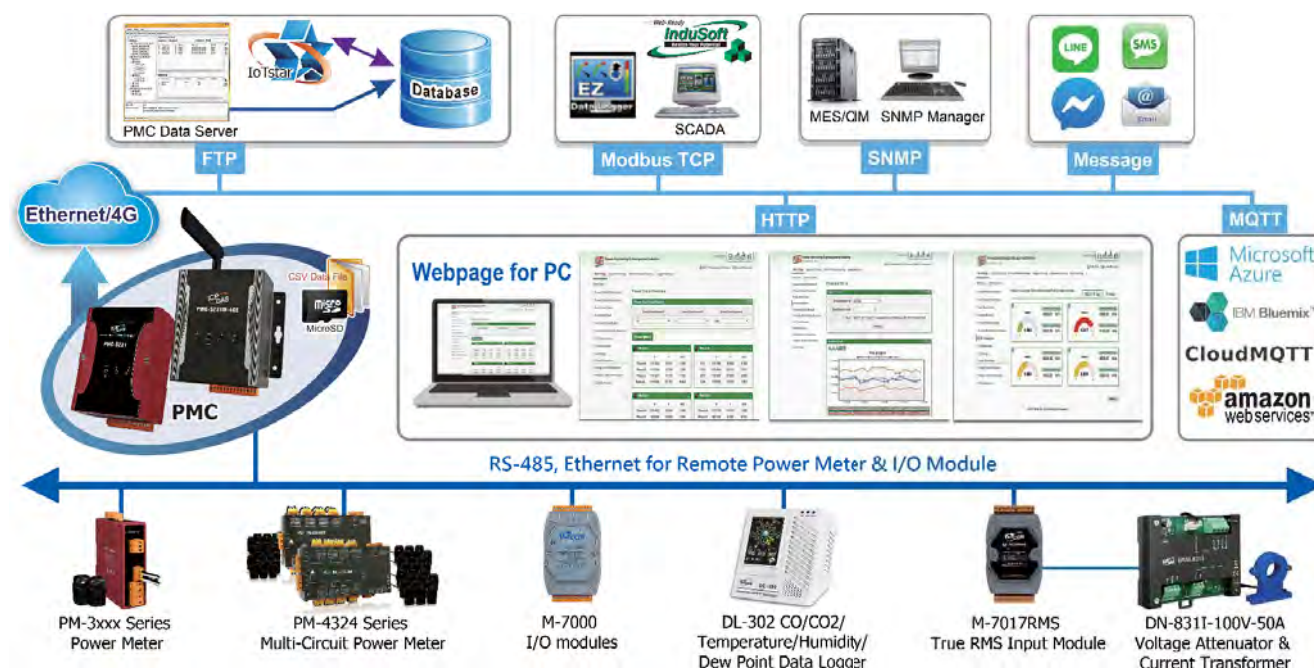4G IIoT Power Meter Concentrator

Features

- No extra software tool is required, using browsers to perform system operations
- Support at most "**24** ICP DAS Modbus Power Meter modules + **8** Modbus I/O modules"
  * COM3 and COM4 interface can connect to Max. 16 Modbus RTU modules (include Power Meter & I/O Module) individually.
  * LAN interface can connect to Max. 16 Modbus TCP modules (include Power Meter & I/O Module).
  * Support at most 4 ICP DAS PM-4324 series Power Meters
- Display real-time or historical power data; Provide power data statistics report
- Provide microSD card for power data log operation. Data log file auto send-back & recovery when disconnected network is resumed.
- Built-in IF-THEN-ELSE logic engine for thought-out power demand management
- Provide alarm message notification function via LINE, Messenger, Email or SMS
- Adjust device operations by its power status via Modbus I/O modules
- Provide Schedule function for operations of I/O modules (devices)
- Support Modbus TCP/RTU, SNMP and MQTT protocols
- Support Connection to IoT Cloud Platform (Microsoft Azure and IBM Bluemix); Support ICP DAS IoTstar Cloud software.
- Support 4G Wireless data communication

PMC-5231M-4GE/4GC is the Industrial IoT Power Meter Concentrator for meeting the trend of energy management in the Industry 4.0 age. It provides flexible integration with the ICP DAS power meters via RS-485 or Ethernet interface, and features various functions such as: measure the power consumption of the devices, energy usage analysis, power data log operation, power de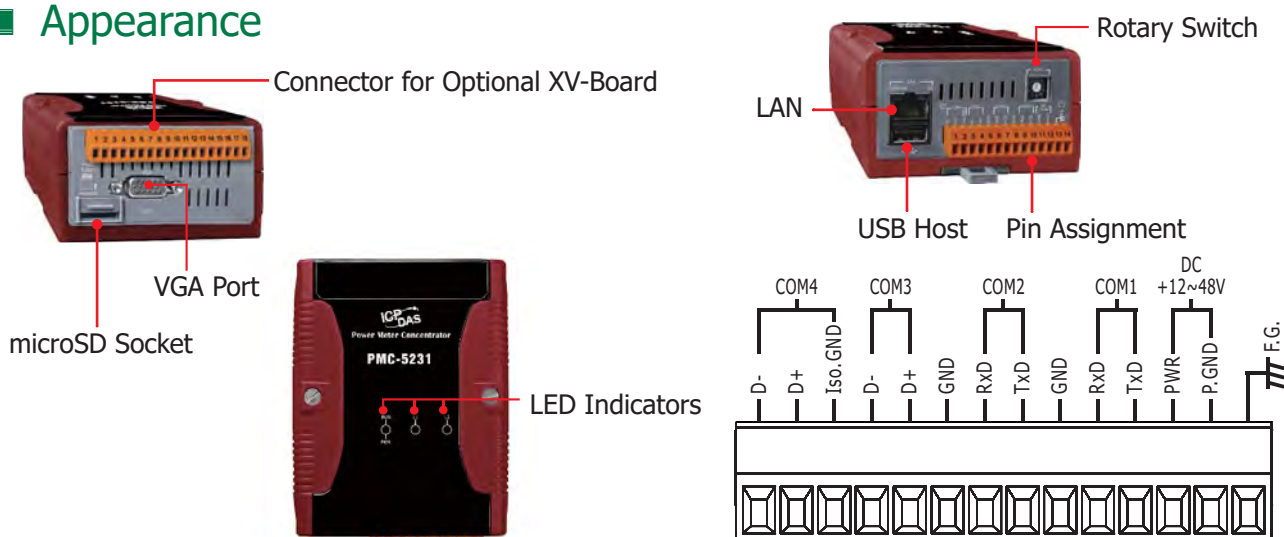mand management and alarm notification functions. PMC-5231M-4GE/4GC offers a user-friendly and intuitive web site interface that allows users to implement the Energy monitoring and management system just a few clicks away; no programming is required. By working with the I/O modules, and functions such as IF-THEN-ELSE logic rule execution and LINE/Messenger/Email/ SMS alarm message notification functions, PMC-5231M-4GE/4GC offers more thought-out power demand management functions, and is able to perform load shedding of the devices if required. PMC-5231M-4GE/4GC supports the Modbus TCP/RTU, SNMP, FTP and MQTT protocols for seamless integration with the back-end SCADA/IT/IoT systems.
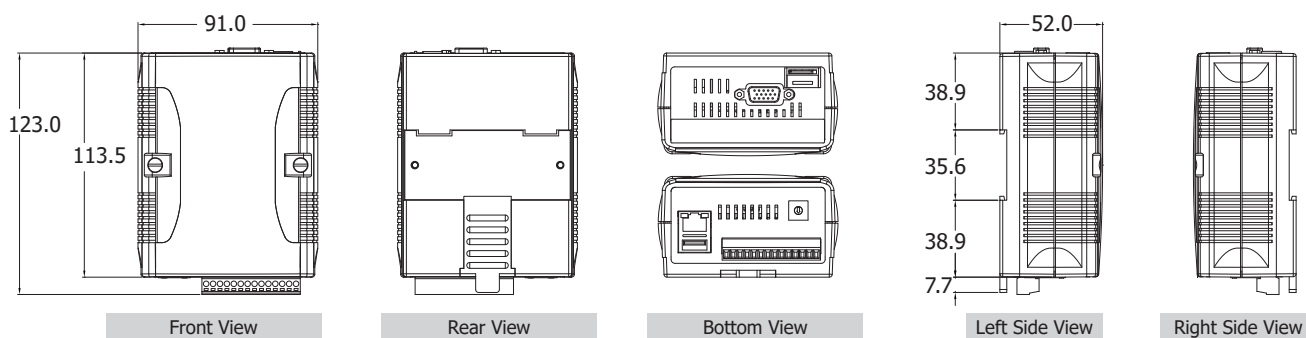
Specifications

CPU Module	
CPU	32-bit ARM CPU, 1 GHz
Expansion Flash Memory	microSD socket with one 4 GB microSD card (support up to 32 GB microSDHC card)
Communication Ports	
Ethernet	RJ-45 x 1, 10/100/1000 Based-TX (Autonegotiating, Auto MDI/MDI-X, LED indicators)
COM 2	RS-232 (TxD, RxD, GND), non-isolated, Speed: 115200 bps max.
COM 3 / COM 4	RS-485 (Data+, Data-); Speed: 115200 bps max; 2500 V_{DC} isolated (COM 4 only)
Power	
Input Range / Consumption	+12 to +48 V_{DC} ; 6.5 W
3G System	
Frequency Band	4GE : WCDMA 850/900/2100 MHz 4GC : WCDMA 900/2100 MHz;TD-SCDMA 1900/2100 MHz; CDMA2000 (BC0) 800 MHz
4G System	
Frequency Band	4GE : FDD LTE: B1/B3/B5/B7/B8/B20 MHz. 4GC : FDD LTE: B1/B3/B8 MHz; TDD LTE: B38/B39/B40/B41 MHz.
Mechanical	
Dimensions (W x L x H)/Installation	117 mm x 126mm x 58 mm; Wall Mounting
Environmental	
Operating Temperature/ Storage Temperature/ Ambient Relative Humidity	-25 to +75 ° C; -40 to +80 ° C; 10 to 90% RH (non-condensing)

Appearance

LED Indicators

VGA Port

microSD Socket

SIM Card Socket

Connector for Optional XV-Board

LAN

USB Host

Pin Assignment

COM4: D-, D+, Iso.GND
COM3: D-, D+
COM2: GND, RxD, TxD
Reserved: GND, RxD, TxD
DC +12~48V: PWR, P.GND
F.G.
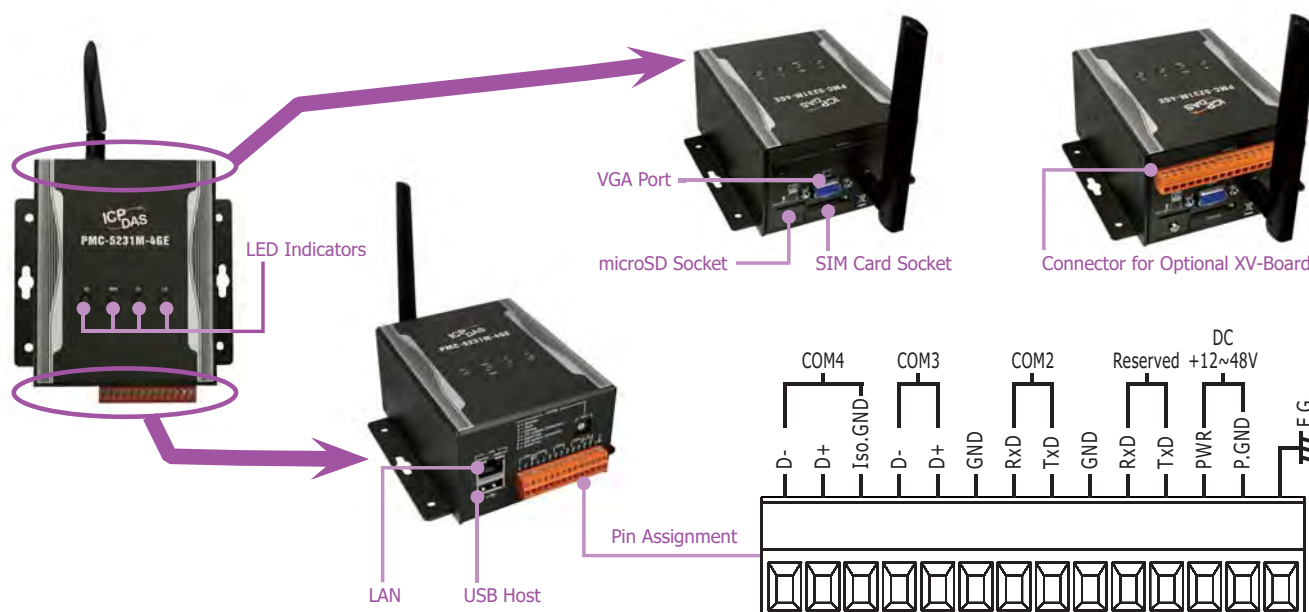
Ordering Information

PMC-5231M-4GE CR	Industrial IoT Power Meter Concentrator (Support 4G Wireless data communication. Frequency Band for EMEA, Korea, Thailand, India and Taiwan) (RoHS)
PMC-5231M-4GC CR	Industrial IoT Power Meter Concentrator (Support 4G Wireless data communication. Frequency Band for China) (RoHS)

4.3 IIoT Power Meter Concentrator with Display

10.4" TFT LCD
PMD-420x
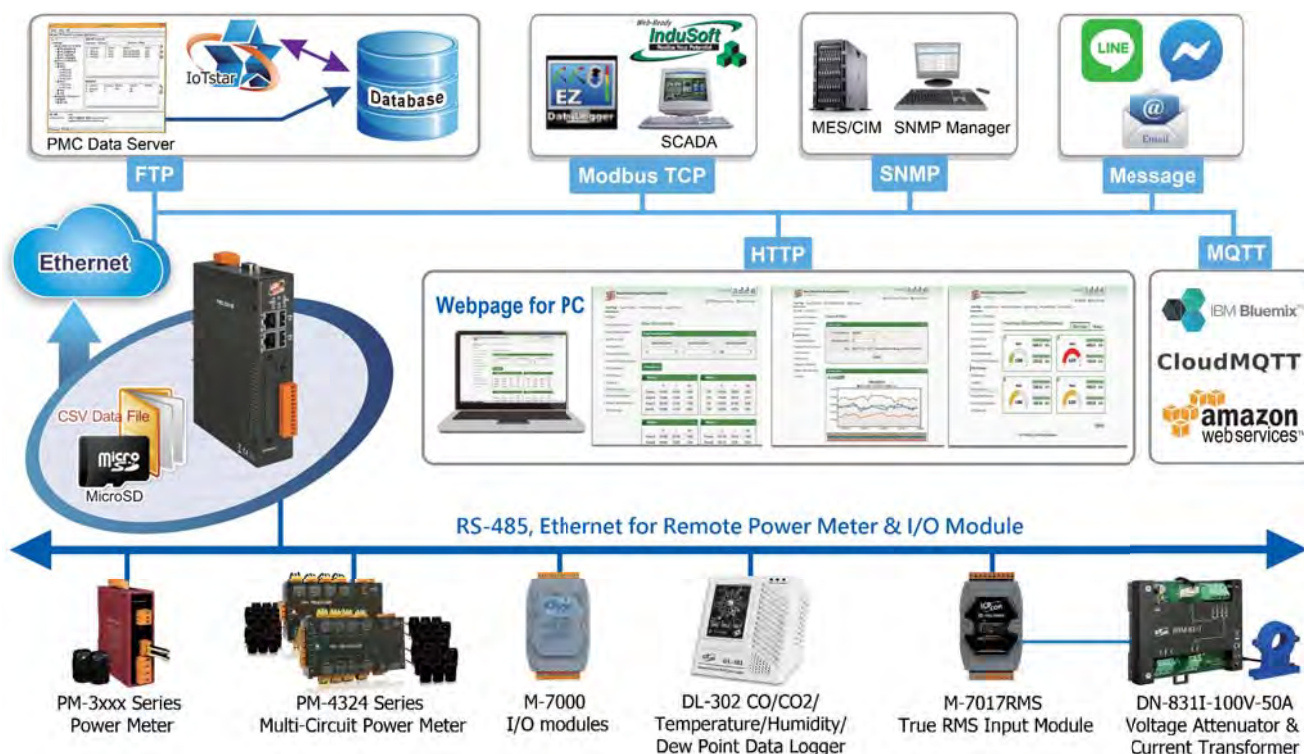
7" TFT LCD
PMD-220x

PMD-220x/420x
IIoT Power Meter Concentrator
with Display

Features

■ No extra software tool is required, using browsers to perform system operations

■ Support at most "**24** ICP DAS Modbus Power Meter modules + **8** Modbus I/O modules"
  * COM1 and COM2 interface can connect to Max. 16 Modbus RTU modules
    (include Power Meter & I/O Module) individually.
  * LAN interface can connect to Max. 16 Modbus TCP modules (include Power
    Meter & I/O Module).
  * Support at most 4 ICP DAS PM-4324 series Power Meters

■ 7"/10.4" TFT LCD (with Touch Panel) & PoE (Power over Ethernet) supported

■ Display real-time or historical power data by browser or local display

■ Provide power data statistics report by browser

■ Provide microSD card for power data log operation. Data log file auto send-back
  & recovery when disconnected network is resumed.

■ Built-in IF-THEN-ELSE logic engine for thought-out power demand management

■ Provide alarm message notification function via LINE, Messenger or Email

■ Adjust device operations by its power status via Modbus I/O modules

■ Provide Schedule function for operations of I/O modules (devices)

■ Support Modbus TCP/RTU, SNMP and MQTT protocols.

■ Support Connection with IoT Cloud Platform (Microsoft Azure and IBM Bluemix);
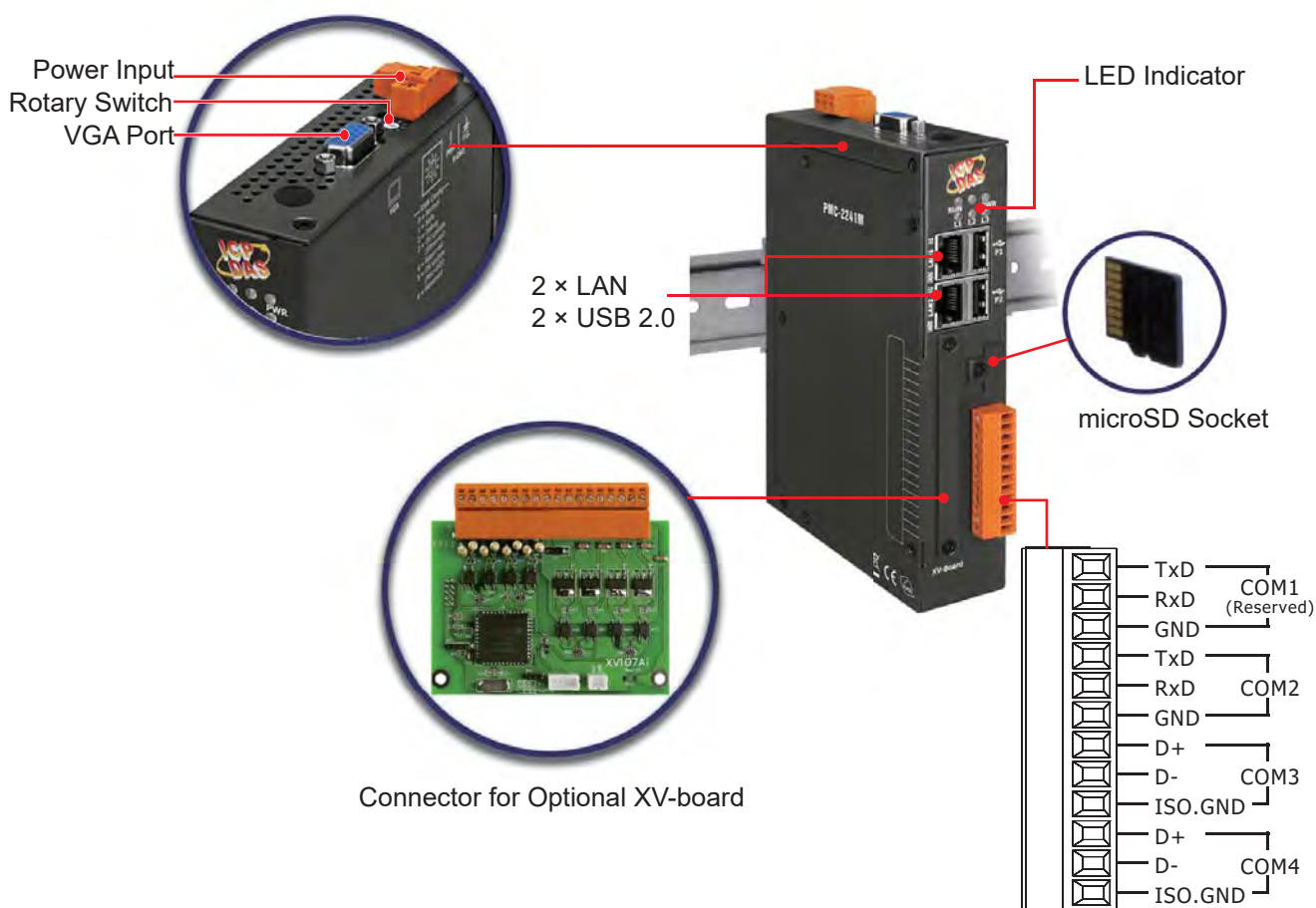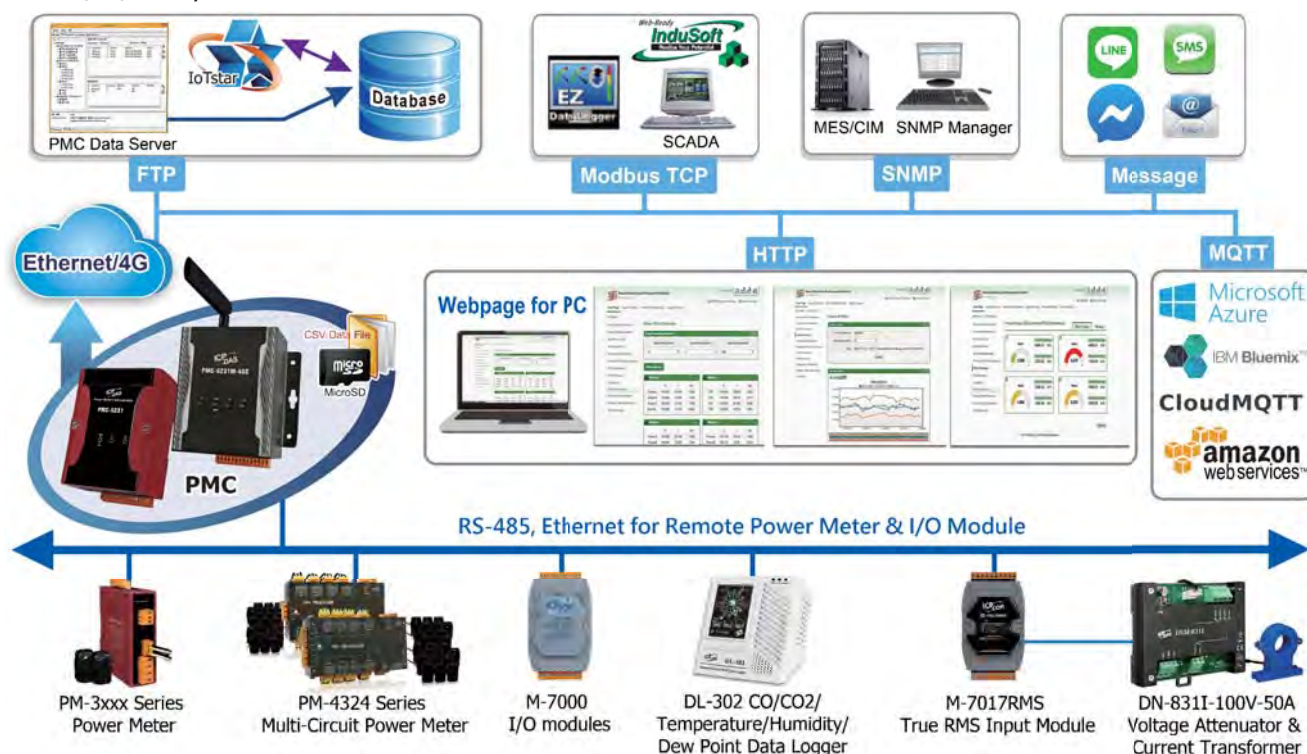 Support ICP DAS IoTstar Cloud software.

PMD Series is the Industrial IoT Power Meter Concentrator for meeting the trend of energy management in the Industry 4.0 age. It is equipped with the Touch Panel and provides an easy way for viewing the power data and setting the system parameters at the local side. It provides flexible integration with the ICP DAS power meters via RS-485 or Ethernet interface, and features various functions such as: measure the power consumption of the devices, energy usage analysis, power data log operation, power demand management and alarm notification functions.

PMD offers a user-friendly and intuitive web site interface that allows users to implement the Energy monitoring and management system just a few clicks away; no programming is required. By working with the I/O modules, and functions such as IF-THEN-ELSE logic rule execution and LINE/Messenger/Email alarm message notification functions, PMD offers more thought-out power demand management functions, and is able to perform load shedding of the devices if required. PMD supports the Modbus TCP/RTU, SNMP, FTP and MQTT protocols for seamless integration with the back-end SCADA/IT/IoT systems.
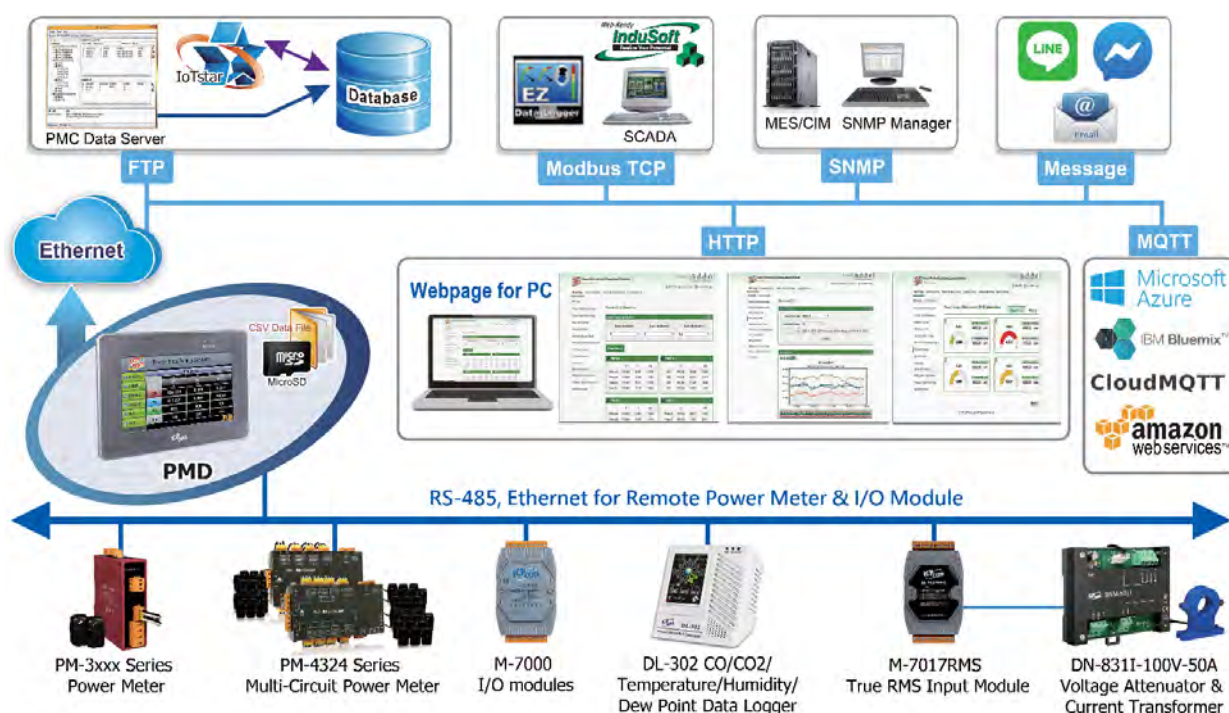
📁 Specifications

Model	PMD-220x	PMD-420x
CPU Module		
CPU	32-bit ARM CPU (720 MHz)	32-bit ARM CPU (1 GHz)
Memory Expansion	microSD socket with 4 GB micro SDHC card (support up to 32 GB)	SD socket with 4 GB SDHC card (support up to 32 GB)
LCD		
Diagonal Size / Resolution	7" (16:9); 800 x 480	10.4" (4:3); 800 x 600
Brightness (cd/2) / Contrast Ratio	400; 500:1	
LED Backlight Life (hrs)	20,000	50,000
Touch Panel	4-wire, resistive type; light transmission: 80 %	5-wire, resistive type; light transmission: 80 %
Communication Ports		
Ethernet	1 x RJ-45 10/100/1000 Base-TX	
COM 1/COM 2	RS-485 (Data+, Data-) (9-wire DB9 connector); 2500 V_{DC} isolated	
COM 3	-	RS-485 (Data+, Data-, GND); 2500 V_{DC} isolated
Mechanical		
Dimensions (W x H x D)/Installation	213 mm x 148 mm x 44 mm; Panel Mounting	291 mm x 229 mm x 54 mm; Panel Mounting
Panel Cut-Out (W x H)	197 mm x 133 mm, +/- 1 mm	277 mm x 215 mm, +/- 1 mm
Ingress Protection	Front panel: NEMA 4/IP65	
Environmental		
Operating Temperature/ Storage Temperature/ Ambient Relative Humidity	-10 °C to +60 °C; -20 °C to +70 °C; 10 to 90% RH (non-condensing)	
Power		
Input Range/Consumption	+12 V_{DC} to +48 V_{DC}; 6W; Power from PoE (IEEE 802.3af)	+12 V_{DC} to +48 V_{DC}; 13W; Power from PoE (IEEE 802.3af)

📁 Appearance

PMD-220x	PMD-420x

PMD-220x

7" LCD Touch Panel
800 x 480 (16:9)

microSD Socket   LED Indicator x 2

Rotary SW.

Earphone-out

COM2 (RS-232/RS-485)
COM1 (RS-232/RS-485)   LAN   Power   USB x 2

PMD-420x

10.4" LCD Touch Panel
800 x 600 (4:3)

SD Socket   LED Indicator x 2

DIP SW.

Rotary SW.
Earphone-out
COM2 (RS-232/RS-485)   LAN
COM1 (RS-232/RS-485)   USB x 2   COM3 (RS-485)   Power &
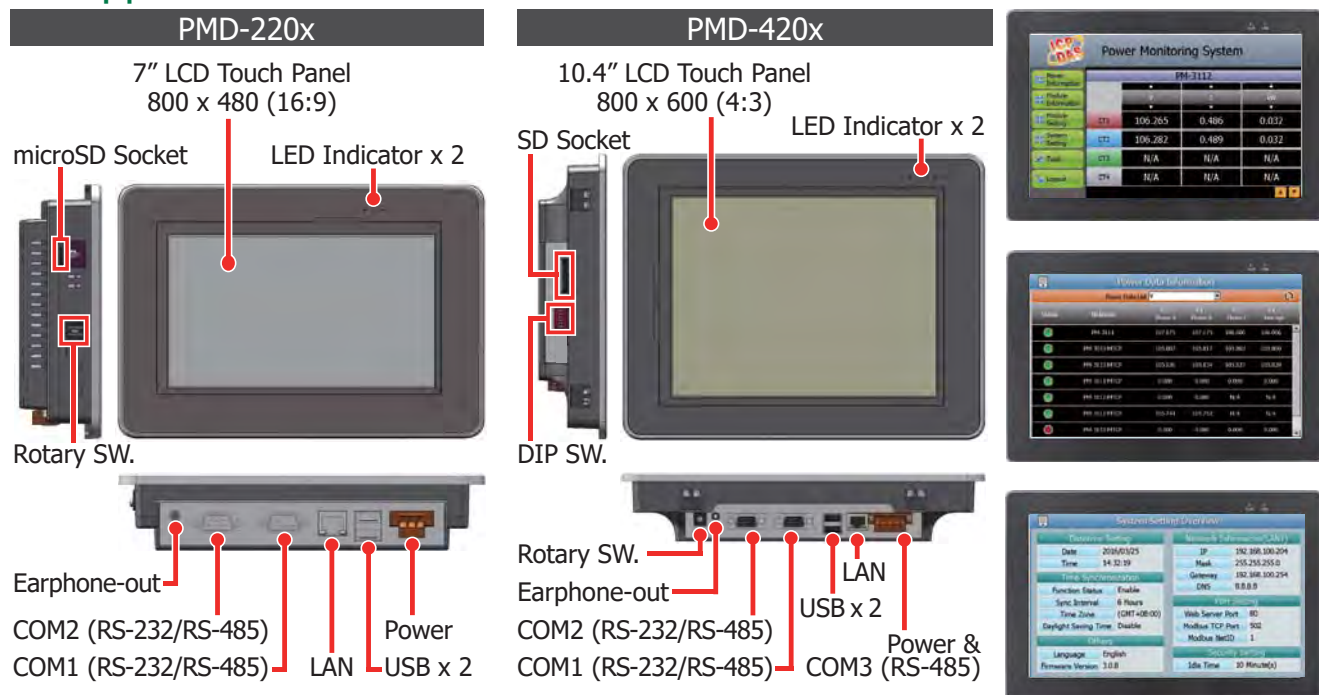
📁 Ordering Information

PMD-2201 CR	Industrial IoT Power Meter Concentrator with 7" Display (English) (RoHS)
PMD-4201 CR	Industrial IoT Power Meter Concentrator with 10.4" Display (English) (RoHS)

ICP DAS

Ch5. Smart Power Meter

5.1 PM Series Features and Selection Guide

Rogowski Coil
Three 1

PM-3133-RCT ▶

Three 1 ▲ PM-3033

Three 1 ▲ PM-3133

Isolated
Three 1 ▲ PM-3133i

Single 2
▲ PM-3112

Single 4
▲ PM-3114

LCD Display
Three 8 **Single** 24
▲ PM-4324D

Three 8 **Single** 24
◀ PM-4324
PM-4324A ▶
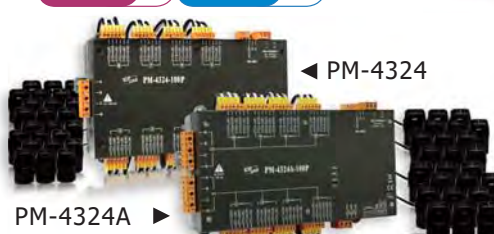
LED Display
Three 1
▼ PM-2133D

- Support multiple communication interface
  - RS-485 (Modbus RTU)
  - Ethernet (Modbus TCP)
  - CAN bus (CANopen)
- Bi-directional kWh metering function for accurate measurement of power consumption and generation data
- Compact in size and easy to install, suitable for various industrial sites
- Available with CT for accurate metering, accuracy better than 0.5% (PF=1)
- Clip-on CT for easy installation

📁 Selection Guide

Module No.	Phase	Loop	+/- kWh	CT Included	Max. Voltage	Max. Current	Max. CT ID	Cable Length	Page
PM-3112-xxx	Single	2	N/A	Yes	300 V	200 A	24 mm	1.8 m	P40
PM-3114-xxx		4							P40
PM-2133D-xxxP	Three	1	Yes	Yes	500 V	400 A	36 mm	4 m	P30
PM-3033	Three	1	Yes	N/A	500 V	5 A	N/A	N/A	P38
PM-3133-xxx	Three	1	Yes	Yes	500 V	400 A	36 mm	1.8 m	P34
PM-3133-xxxP					500 V			4 m	P34
PM-3133i-xxxP					600 V			4 m	P32
PM-3133-RCTxxxxP	Three	1	N/A	Yes	500 V	1000 A	80 mm	4 m	P36
PM-4324-xxxP	Single/ Three	24 / 8	Yes	Yes	500 V	400 A	36 mm	4 m	P42
PM-4324A-xxxP									P42
PM-4324D-xxxP									P45

Note 1: Maximum CT cable length can be extend to **8m** (except for Rogowski Coil CT), and the accuracy does not decrease.
[We suggest to use twisted pair cable AWG18-14, sectional area from 0.75 ~ 2.0mm2.]

Note 2: The end of power meters with -xxx or -xxxP means the specification of the CT. Users can choose the suitable one based on difference of current range and cable section area.

Note 3: The end of power meters with -xxx**P**, the **P** means CT has built-in circuit protection to prevent CT from secondary open-circuit danger to human.

📁 CT Dimensions (Units: mm)

100: CTΦ10mm (60 A Max.)

26	25
39	39 / 10

Left View · Front View

360P: CTΦ36mm (300 A Max.)

43	58 / 36
	82

Left View · Front View

160: CTΦ16mm (100 A Max.)

32	32
26	47 / 16

Left View · Front View

400P: CTΦ36mm (400 A Max.)

43	58 / 36
	82

Left View · Front View

240: CTΦ24mm (200 A Max.)

43	49
47	77 / 24

Left View · Front View
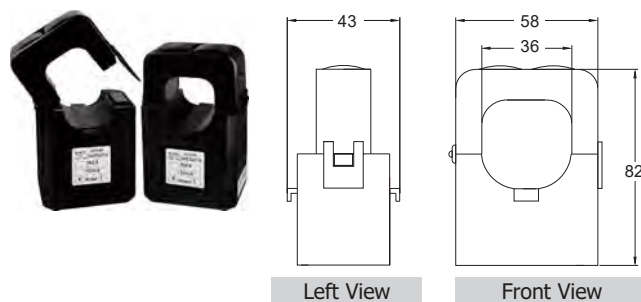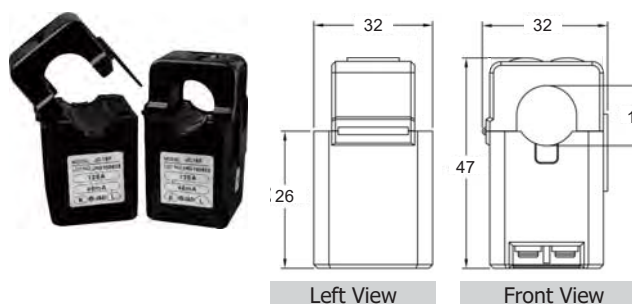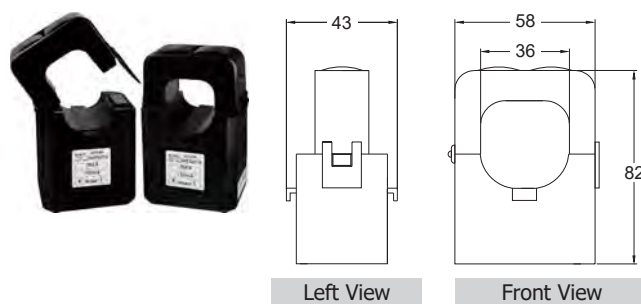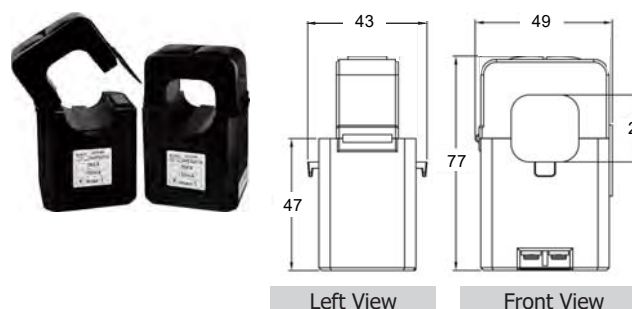
Models	PM-3133-RCT500P
A (Inside diameter)	55.0 mm
B (Outer diameter)	68.5 mm
Models	**PM-3133-RCT1000P**
A (Inside diameter)	80.0 mm
B (Outer diameter)	93.5 mm

B (Outer diameter)
A (inside diameter)

📁 CT Installation Smart Power Meter

A **B** **C**

Clip-on CT for Easy Installation

DIN-Rail Mounting

A **B** **C** **D**

Rogowski Coil Soft CT Installation

5.2 Smart Power Meter with LED Display
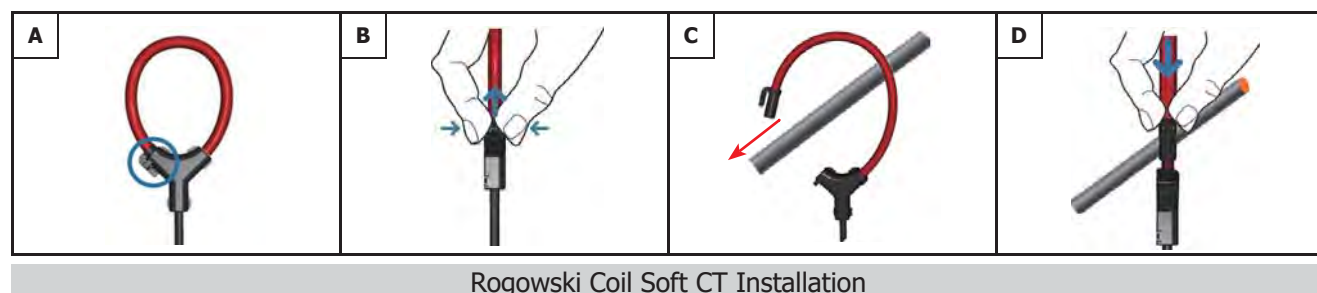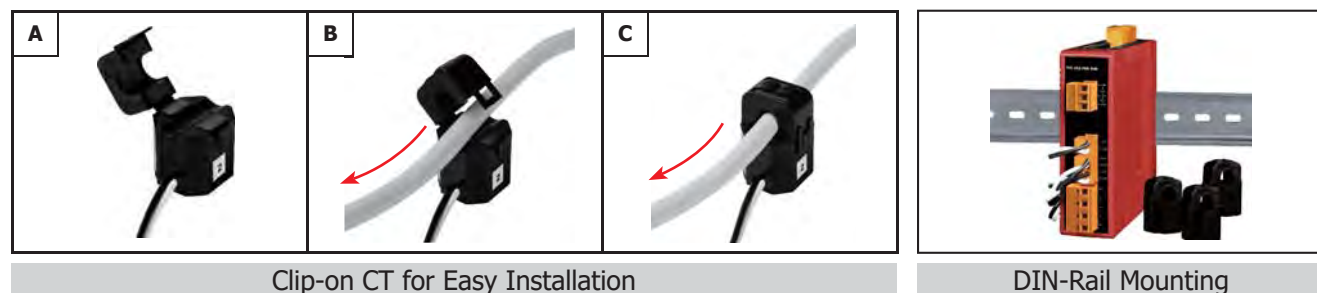
PM-2133D
3-Phase Smart Power Meter with LED Display

Features

- True RMS Power Measurements
- Energy Analysis for 3P4W, 3P3W, 1P3W, 1P2W
- Current Measurements Up to 400 A with Different CT Ratio
- Voltage Measurements Up to 500 V
- Clip-on CT for Easy Installation
- W Accuracy Better than 0.5% (PF=1)
- 8 - Digit LED Display
- Supports Modbus RTU Protocol
- Total Harmonic Distortion (THD)
- Bi-directional Energy

ICP DAS brings the most powerful, cost-effective, advanced Smart Power Meters PM-2133D series that gives you access to real-time electric usage for three-phase power measurement. With its high accuracy (<0.5%, PF=1), the PM-2133D series can be applied to both low voltage primary side and/or medium/high voltage secondary side and enables the users to obtain reliable and accurate energy consumption readings from the monitored equipments in real time under operation. These compact size and cost-effective power meters are equipped with revolutionary wired clip-on CT (various types, support input current up to 400 A). It operates over a wide input voltages range 10 ~ 500 VAC which allows worldwide compatibility. This meter has LED display shows power.

Specifications

Models	PM-2133D		PM-2133D-MTCP
AC Power Measurement			
Wiring	3P4W-3CT, 3P3W-2CT, 3P3W-3CT, 1P2W-1CT, 1P3W-2CT		
Input Voltage	10 ~ 500 V		
Input Current	CTØ10 mm (0.05 A~60 A); CTØ16 mm (0.1 A~100 A); CTØ24 mm (0.15 A~200 A); CTØ36 mm (0.3 A~300 A); CTØ36 mm (0.3 A~400 A).		
Input Frequency	50 Hz (Range 45 ~ 55 Hz)/60 Hz (Range 55 ~ 65 Hz)		
W Accuracy	Better than 0.5% (PF=1)		
Power Parameter Measurement	True RMS voltage (V_{rms}), True RMS current (I_{rms}), Active Power (kW), Active Energy (kWh), Apparent Power (kVA), Apparent Energy (kVAh), Reactive Power (kVAR), Reactive Energy (kVARh), Power Factor (PF), Frequency (45 ~ 65 Hz)		
Data Update Rate	1 Second		
Display Type	LED display		
Communication			
RS-485	Protocol	Modbus RTU	-
	Baud Rate	9600,19200 (default), 38400, 115200	-
	Data Format	N,8,1; N,8,2; E,8,1; E,8,2; O,8,1; O,8,2	-
	Isolation	3000 V_{DC}	-
Ethernet	Protocol	-	Modbus TCP
Power			
Input Range	+85 ~ +264 V_{AC} (277 V_{AC} available)		
Power Consumption	6 W		
Environment			
Operating Temperature	-20 ~ +70 °C		
Storage Temperature	-25 ~ +80 °C		
Ambient Relative Humidity	10% ~ 90% RH, Non-condensing		

Installation and Wiring

LED Display

LED Indicators

LED Indicators

Keypad

AC Measurement
10 ~ 500 V

External Current Transformers (CTs)

RJ-45 Ethernet
for -MTCP

RS-485

Aux. Power Input 85 ~ 264 VAC (277 VAC available)

Dimensions (Units: mm)

92.0±1

46.0±1

Recommended panel Cut-out

Recommended Panel Cut-Out

115.0
108.3
94.5

Left View

110.0

50.0

Front View

Right View

Ordering Information

RS-485 Interface	
PM-2133D-100P CR	Modbus RTU, 3-phase power meter; includes 60A CT (Inside diameter 10 mm; wire lead 4 m) x 3 (RoHS)
PM-2133D-160P CR	Modbus RTU, 3-phase power meter; includes 100A CT (Inside diameter 16 mm; wire lead 4 m) x 3 (RoHS)
PM-2133D-240P CR	Modbus RTU, 3-phase power meter; includes 200A CT (Inside diameter 24 mm; wire lead 4 m) x 3 (RoHS)
PM-2133D-360P CR	Modbus RTU, 3-phase power meter; includes 300A CT (Inside diameter 36 mm; wire lead 4 m) x 3 (RoHS)
PM-2133D-400P CR	Modbus RTU, 3-phase power meter; includes 400A CT (Inside diameter 36 mm; wire lead 4 m) x 3 (RoHS)

Ethernet Interface (Available soon)	
PM-2133D-100P-MTCP CR	Modbus TCP, 3-phase power meter; includes 60A CT (Inside diameter 10 mm; wire lead 4 m) x 3 (RoHS)
PM-2133D-160P-MTCP CR	Modbus TCP, 3-phase power meter; includes 100A CT (Inside diameter 16 mm; wire lead 4 m) x 3 (RoHS)
PM-2133D-240P-MTCP CR	Modbus TCP, 3-phase power meter; includes 200A CT (Inside diameter 24 mm; wire lead 4 m) x 3 (RoHS)
PM-2133D-360P-MTCP CR	Modbus TCP, 3-phase power meter; includes 300A CT (Inside diameter 36 mm; wire lead 4 m) x 3 (RoHS)
PM-2133D-400P-MTCP CR	Modbus TCP, 3-phase power meter; includes 400A CT (Inside diameter 36 mm; wire lead 4 m) x 3 (RoHS)

5.3 Three-phase Smart Power Meter

PM-3133i/-MTCP/-CPS
Isolated 3-phase Smart Power Meter

Features
- True RMS Power Measurements
- Energy Analysis for 3P4W, 3P3W, 1P3W, 1P2W
- Current Measurements Up to 400 A with Different CT Ratio
- Isolated Voltage Measurements Up to 600 V
- Clip-on CT for Easy Installation
- W Accuracy Better than 0.5% (PF=1)
- Total Harmonic Distortion (THD)
- Bi-directional Energy
- Supports Modbus RTU Protocol
- Multiple Data Format

ICP DAS brings the most powerful, cost-effective, advanced Smart Power Meters PM-3133i series that gives you access to real-time electric usage for three-phase power measurement. With its high 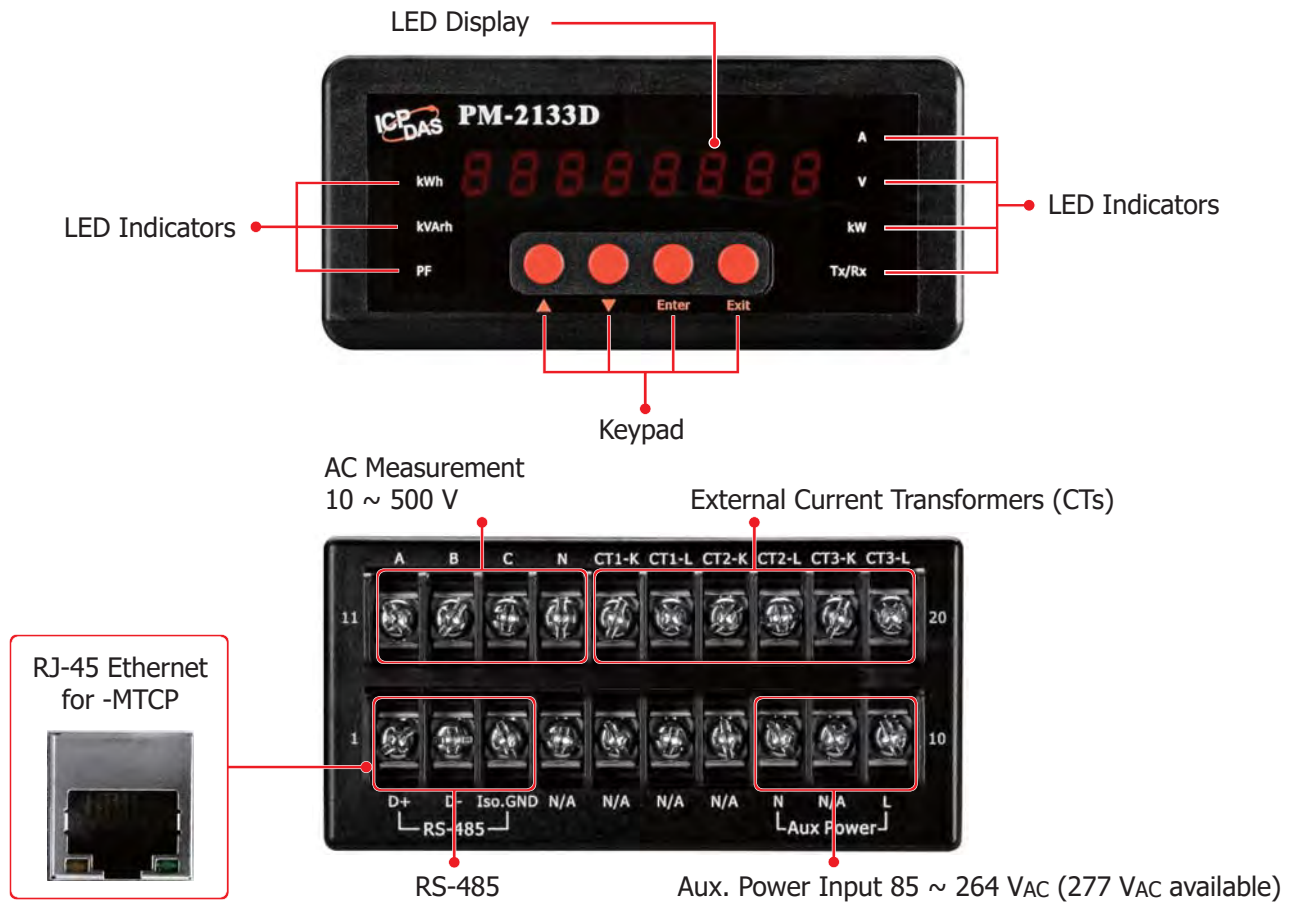accuracy (<0.5%, PF=1), the PM-3133i series can be applied to both low voltage primary side and/or medium/high voltage secondary side and enables the users to obtain reliable and accurate energy consumption readings from the monitored equipments in real time under operation. These compact size and cost-effective power meters are equipped with revolutionary wired clip-on CT (various types, support input current up to 400 A). It operates over a wide input voltages range 10 ~ 600 VAC w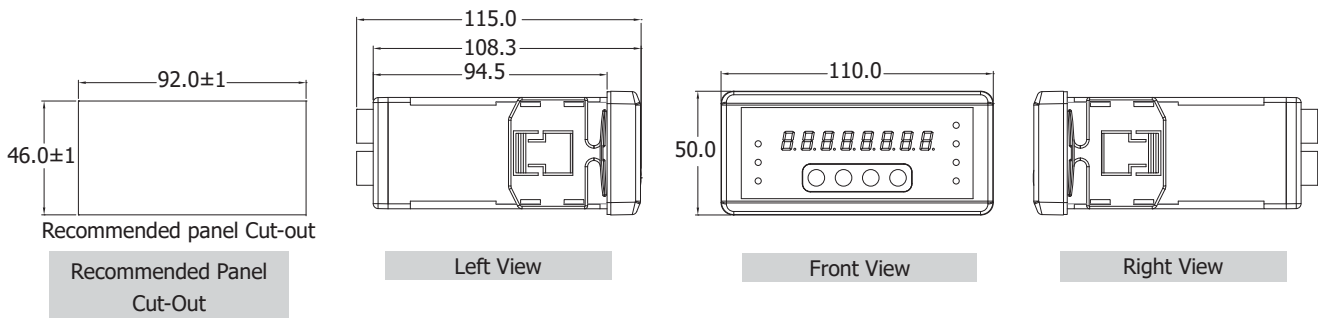hich allows worldwide compatibility. Built-in AC isolator protection, this means total isolation between the AC measurement side and the control side.

Specifications

Models	PM-3133i		PM-3133i-MTCP	PM-3133i-CPS
AC Power Measurement				
Wiring	3P4W-3CT, 3P3W-2CT, 3P3W-3CT, 1P2W-1CT, 1P3W-2CT			
Input Voltage	10 ~ 600 V; built-in isolation transformer			
Input Current	CTØ10 mm (0.05 A~60 A); CTØ16 mm (0.1 A~100 A); CTØ24 mm (0.15 A~200 A); CTØ36 mm (0.3 A~300 A); CTØ36 mm (0.3 A~400 A).			
Input Frequency	50 Hz (Range 45 ~ 55 Hz)/60 Hz (Range 55 ~ 65 Hz)			
W Accuracy	Better than 0.5% (PF=1)			
Power Parameter Measurement	True RMS voltage (V_{rms}), True RMS current (I_{rms}), Active Power (kW), Active Energy (kWh), Apparent Power (kVA), Apparent Energy (kVAh), Reactive Power (kVAR), Reactive Energy (kVARh), Power Factor (PF), Frequency (45 ~ 65 Hz)			
Data Update Rate	1 Second			
Communication				
RS-485 / Protocol	Modbus RTU	-	-	
RS-485 / Baud Rate	9600,19200 (default), 38400, 115200; DIP Switch Selectable	-	-	
RS-485 / Data Format	N,8,1 (default); N,8,2; E,8,1; E,8,2; O,8,1; O,8,2	-	-	
RS-485 / Isolation	3000 V_{DC}	-	-	
Ethernet (PoE) / Protocol	-	Modbus TCP	-	
CAN bus / Protocol	-	-	CANopen	
CAN bus / Baud Rate	-	-	125 k (default), 250 k, 500 k, 1 M; DIP Switch Selectable	
CAN bus / Isolation	-	-	3000 V_{DC}	
Power				
Input Range	+12 ~ 48 V_{DC}		+12 ~ 48 V_{DC} or PoE	+12 ~ 48 V_{DC}
Power Consumption	2 W			
Environment				
Temperature	Operating Temperature: -20 ~ +70 °C / Storage Temperature: -25 ~ +80 °C			
Ambient Relative Humidity	10% ~ 90% RH, Non-condensing			

Wire Connections

When the inverter is running, it will generate some high frequency or low frequency noise, and interfere with the peripheral equipment by conduction or radiation.

It is recommended that the CT and reference voltage of the meter be installed on the primary side of the "AC Filter" with an EMI ferrite core to minimize the interference effects of the inverter.

Dimensions (Units: mm)

| Left View | Front View | Right View | Rear View | Top View | Bottom View |
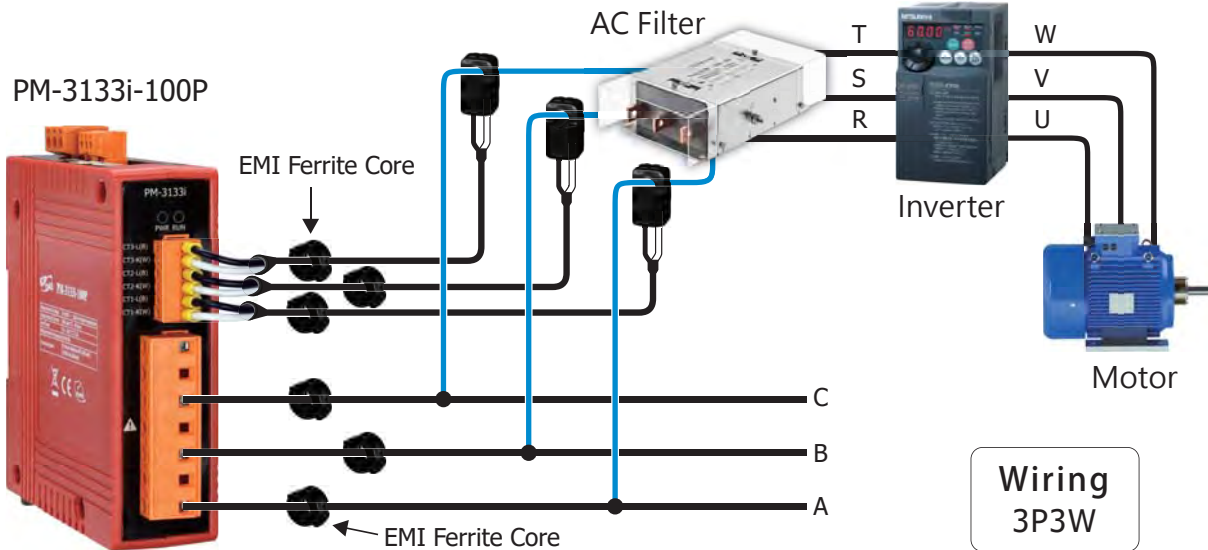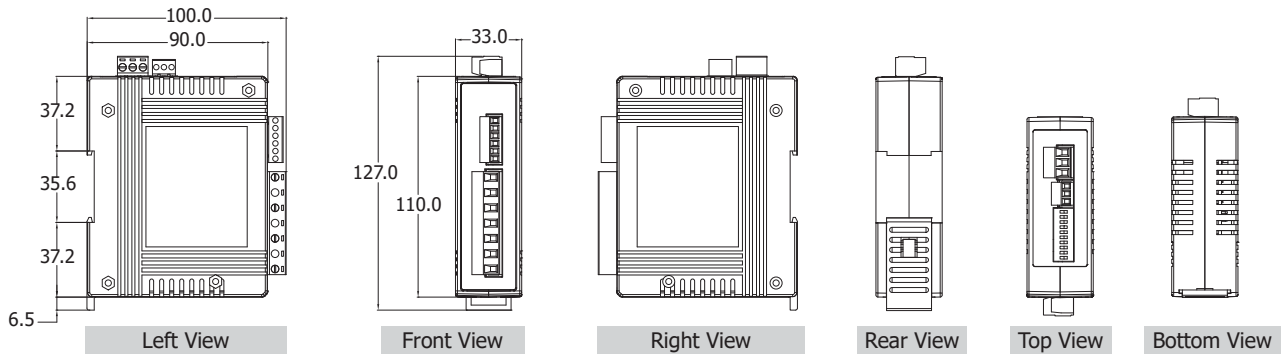
Ordering Information

RS-485 Interface	
PM-3133i-100P CR	Modbus RTU, Isolated 3-phase power meter; includes 60A CT (Inside diameter 10 mm; wire lead 4 m) x 3 (RoHS)
PM-3133i-160P CR	Modbus RTU, Isolated 3-phase power meter; includes 100A CT (Inside diameter 16 mm; wire lead 4 m) x 3 (RoHS)
PM-3133i-240P CR	Modbus RTU, Isolated 3-phase power meter; includes 200A CT (Inside diameter 24 mm; wire lead 4 m) x 3 (RoHS)
PM-3133i-360P CR	Modbus RTU, Isolated 3-phase power meter; includes 300A CT (Inside diameter 36 mm; wire lead 4 m) x 3 (RoHS)
PM-3133i-400P CR	Modbus RTU, Isolated 3-phase power meter; includes 400A CT (Inside diameter 36 mm; wire lead 4 m) x 3 (RoHS)

Ethernet Interface (Available soon)	
PM-3133i-100P-MTCP CR	Modbus TCP, Isolated 3-phase power meter; includes 60A CT (Inside diameter 10 mm; wire lead 4 m) x 3 (RoHS)
PM-3133i-160P-MTCP CR	Modbus TCP, Isolated 3-phase power meter; includes 100A CT (Inside diameter 16 mm; wire lead 4 m) x 3 (RoHS)
PM-3133i-240P-MTCP CR	Modbus TCP, Isolated 3-phase power meter; includes 200A CT (Inside diameter 24 mm; wire lead 4 m) x 3 (RoHS)
PM-3133i-360P-MTCP CR	Modbus TCP, Isolated 3-phase power meter; includes 300A CT (Inside diameter 36 mm; wire lead 4 m) x 3 (RoHS)
PM-3133i-400P-MTCP CR	Modbus TCP, Isolated 3-phase power meter; includes 400A CT (Inside diameter 36 mm; wire lead 4 m) x 3 (RoHS)

CAN bus Interface (Available soon)	
PM-3133i-100P-CPS CR	CANopen, Isolated 3-phase power meter; includes 60A CT (Inside diameter 10 mm; wire lead 4 m) x 3 (RoHS)
PM-3133i-160P-CPS CR	CANopen, Isolated 3-phase power meter; includes 100A CT (Inside diameter 16 mm; wire lead 4 m) x 3 (RoHS)
PM-3133i-240P-CPS CR	CANopen, Isolated 3-phase power meter; includes 200A CT (Inside diameter 24 mm; wire lead 4 m) x 3 (RoHS)
PM-3133i-360P-CPS CR	CANopen, Isolated 3-phase power meter; includes 300A CT (Inside diameter 36 mm; wire lead 4 m) x 3 (RoHS)
PM-3133i-400P-CPS CR	CANopen, Isolated 3-phase power meter; includes 400A CT (Inside diameter 36 mm; wire lead 4 m) x 3 (RoHS)

Features

- True RMS Power Measurements
- Energy Analysis for 3P4W, 3P3W, 1P3W, 1P2W
- Current Measurements Up to 400 A with Different CT Ratio
- Voltage Measurements Up to 500 V
- Clip-on CT for Easy Installation
- W Accuracy Better than 0.5% (PF=1)
- Supports RS-485, Ethernet (PoE) or CANopen Interface
- Supports Modbus RTU, Modbus TCP or CANopen Protocol
- Supports 2 Power Relay Output (Form A)
- Total Harmonic Distortion (THD)
- IEC 61010-1 and EN 61010-1
- Multiple Data Format

PM-3133/-MTCP/-CPS
Three-phase Smart Power Meter

ICP DAS brings the most powerful, cost-effective, advanced Smart Power Meters PM-3133 series that gives you access to real-time electric usage for three-phase power measurement. With its high accuracy (<0.5%, PF=1), the PM-3133 series can be applied to both low voltage primary side and/or medium/high voltage secondary side and enables the users to obtain reliable and accurate energy consumption readings from the monitored equipments in real time under operation. These compact size and cost-effective power meters are equipped with revolutionary wired clip-on CT (various types, support input current up to 400 A). It operates over a wide input voltages range 10 ~ 500 V_{AC} which allows worldwide compatibility. And with 2 channels relay outputs, it can be linked with sirens or lightings for alarm messages. It also supports Modbus RTU, Modbus TCP or CANopen protocols for easy integration. You can use CT's that you currently own with PM-3133P (without CTs) Power Meter. The CT inputs of the PM-3133P can handle a maximum of 333mV of AC current.

Specifications

| Models	PM-3133		PM-3133-MTCP	PM-3133-CPS
AC Power Measurement				
Wiring	3P4W-3CT, 3P3W-2CT, 3P3W-3CT, 1P2W-1CT, 1P3W-2CT			
Measurement Voltage	10 ~ 500 V			
Measurement Current	CTØ10 mm (60 A); CTØ16 mm (100 A); CTØ24 mm (200 A); CTØ36 mm (300 A); CTØ36 mm (400 A)			
Measurement Frequency	50/60 Hz			
W Accuracy	Better than 0.5% (PF=1)			
Power Parameter Measurement	True RMS voltage (V_{rms}), True RMS current (I_{rms}), Active Power (kW), Active Energy (kWh), Apparent Power (kVA), Apparent Energy (kVAh), Reactive Power (kVAR), Reactive Energy (kVARh), Power Factor (PF), Frequency			
Data Update Rate	1 Second			
Communication				
RS-485	Protocol	Modbus RTU	-	-
	Baud Rate	9600,19200 (default), 38400, 115200; DIP Switch Selectable	-	-
	Data Format	N,8,1 (default); N,8,2; E,8,1; E,8,2; O,8,1; O,8,2	-	-
	Isolation	3000 V_{DC}	-	-
Ethernet (PoE)	Protocol	-	Modbus TCP	-
CANopen	Protocol	-	-	CANopen
	Baud Rate	-	-	125 k (default), 250 k, 500 k, 1 M; DIP Switch Selectable
	Isolation	-	-	3000 V_{DC}
Alarm Output				
Power Relay	Form A (Normal Open) x 2; Relay Contact Voltage Range: 5 A @ 250 V_{AC} (47 ~ 63Hz), 5 A @ 30 V_{DC}			
Power				
Power Input	+12 ~ 48 V_{DC}		+12 ~ 48 V_{DC} or PoE	+12 ~ 48 V_{DC}
Power Consumption	2 W			
Environment				
Temperature	Operating Temperature: -20 ~ +70 °C / Storage Temperature: -25 ~ +80 °C			
Ambient Relative Humidity	10% ~ 90% RH, Non-condensing			

◼ Appearance

LED Indicators

Power   Run

DO0
DO1

RL0 NO
DO0
RL COM
DO1
RL1 NO

RS-485 interface

CANopen interface

Ethernet interface

◼ Dimensions (Units: mm)

100
90
37.2
35.6
37.2
6.5

Left View

33
127
110

Front View

◼ Selection Guide

PM-3133 - X X X P - X X X

CT dimensions (Max. Current)
100: CTΦ10 mm, 60 A Max.
160: CTΦ16 mm, 100 A Max.
240: CTΦ24 mm, 200 A Max.
360P: CTΦ36 mm, 300 A Max.
400P: CTΦ36 mm, 400 A Max.

Current Transformers
(Secondary voltage 333 mV)

Communication
□: RS-485
CPS: CANopen
MTCP: Modbus TCP

◼ Ordering Information

RS-485 Interface	
PM-3133P CR	Modbus RTU, 3-phase power meter (Compatible with CTs from 50 to 1000 A/333 mV output) (RoHS)
PM-3133-100 CR	Modbus RTU, 3-phase power meter; includes 60A CT (Inside diameter 10 mm; wire lead 1.8 m) x 3 (RoHS)
PM-3133-160 CR	Modbus RTU, 3-phase power meter; includes 100A CT (Inside diameter 16 mm; wire lead 1.8 m) x 3 (RoHS)
PM-3133-240 CR	Modbus RTU, 3-phase power meter; includes 200A CT (Inside diameter 24 mm; wire lead 1.8 m) x 3 (RoHS)
PM-3133-100P CR	Modbus RTU, 3-phase power meter; includes 60A CT (Inside diameter 10 mm; wire lead 4 m) x 3 (RoHS)
PM-3133-160P CR	Modbus RTU, 3-phase power meter; includes 100A CT (Inside diameter 16 mm; wire lead 4 m) x 3 (RoHS)
PM-3133-240P CR	Modbus RTU, 3-phase power meter; includes 200A CT (Inside diameter 24 mm; wire lead 4 m) x 3 (RoHS)
PM-3133-360P CR	Modbus RTU, 3-phase power meter; includes 300A CT (Inside diameter 36 mm; wire lead 4 m) x 3 (RoHS)
PM-3133-400P CR	Modbus RTU, 3-phase power meter; includes 400A CT (Inside diameter 36 mm; wire lead 4 m) x 3 (RoHS)

Ethernet Interface	
PM-3133P-MTCP CR	Modbus TC, 3-phase power meter (Compatible with CTs from 50 to 1000 A/333 mV output) (RoHS)
PM-3133-100-MTCP CR	Modbus TCP, 3-phase power meter; includes 60A CT (Inside diameter 10 mm; wire lead 1.8 m) x 3 (RoHS)
PM-3133-160-MTCP CR	Modbus TCP, 3-phase power meter; includes 100A CT (Inside diameter 16 mm; wire lead 1.8 m) x 3 (RoHS)
PM-3133-240-MTCP CR	Modbus TCP, 3-phase power meter; includes 200A CT (Inside diameter 24 mm; wire lead 1.8 m) x 3 (RoHS)
PM-3133-360P-MTCP CR	Modbus TCP, 3-phase power meter; includes 300A CT (Inside diameter 36 mm; wire lead 4 m) x 3 (RoHS)
PM-3133-400P-MTCP CR	Modbus TCP, 3-phase power meter; includes 400A CT (Inside diameter 36 mm; wire lead 4 m) x 3 (RoHS)

CAN bus Interface	
PM-3133-100-CPS CR	CANopen, 3-phase power meter; includes 60A CT (Inside diameter 10 mm; wire lead 1.8 m) x 3 (RoHS)
PM-3133-160-CPS CR	CANopen, 3-phase power meter; includes 100A CT (Inside diameter 16 mm; wire lead 1.8 m) x 3 (RoHS)
PM-3133-240-CPS CR	CANopen, 3-phase power meter; includes 200A CT (Inside diameter 24 mm; wire lead 1.8 m) x 3 (RoHS)
PM-3133-360P-CPS CR	CANopen, 3-phase power meter; includes 300A CT (Inside diameter 36 mm; wire lead 4 m) x 3 (RoHS)
PM-3133-400P-CPS CR	CANopen, 3-phase power meter; includes 400A CT (Inside diameter 36 mm; wire lead 4 m) x 3 (RoHS)

Features

- True RMS Power Measurements
- Energy Analysis for 3P4W, 3P3W, 1P3W, 1P2W
- Current Measurements Up to 1000 A
- Voltage Measurements Up to 500 V
- Rogowski Coil Soft CT for Easy Installation
- W Accuracy Better than 2% (PF=1; Input Current >50A)
- Supports RS-485, Ethernet (PoE) or CANopen Interface
- Supports Modbus RTU, Modbus TCP or CANopen Protocol
- Supports 2 Power Relay Output (Form A)
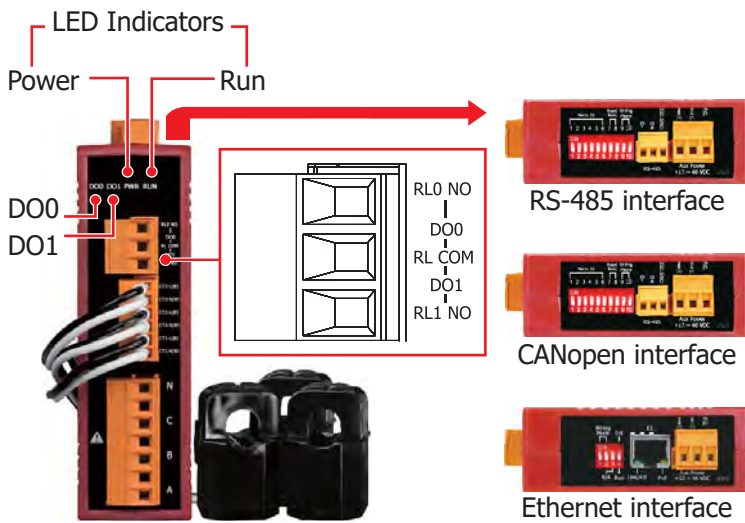- Total Harmonic Distortion (THD)
- Multiple Data Format

PM-3133-RCT
Three-phase Smart Power Meter

ICP DAS brings the most powerful, cost-effective, advanced Smart Power Meters PM-3133-RCT that gives you access to real-time electric usage for three-phase power measurement. With its high accuracy (<2%, PF=1; Input Current >50 A), this series can be used to both low voltage primary side and medium/high voltage secondary side and enables the users to obtain reliable and accurate energy consumption readings from the monitored equipments in real time under operation. These compact size and cost-effective power meters monitoring equipment with Rogowski Coil CT is "rope-style" Current Transformer which delivers "Easy Installation" features for large window size (55 ~ 105 mm) and mechanical flexibility for tight space.

It operates over a wide range of input voltages 10 ~ 500 V_{AC} which allows universal compatibility. Also, with 2 channels relay outputs, it can be linked with sirens or lightings for alarm messages. It also supports Modbus RTU, Modbus TCP or CANopen protocols for easy integration.

📁 Specifications

Models	PM-3133-RCT	PM-3133-RCT-MTCP	PM-3133-RCT-CPS
AC Power Measurement			
Wiring	3P4W-3CT, 3P3W-2CT, 3P3W-3CT, 1P2W-1CT, 1P3W-2CT		
Measurement Voltage	10 ~ 500 V		
Measurement Current	CTØ55 mm (500 A), CTØ80 mm (1000 A)		
Measurement Frequency	50/60 Hz		
W Accuracy	Better than 2% (PF=1; Input Current >50 A)		
Power Parameter Measurement	True RMS voltage (V_{rms}), True RMS current (I_{rms}), Active Power (kW), Active Energy (kWh), Apparent Power (kVA), Apparent Energy (kVAh), Reactive Power (kVAR), Reactive Energy (kVARh), Power Factor (PF), Frequency, THD		
Data Update Rate	1 Second		
Communication			
Interface	RS-485	Ethernet (PoE)	CANopen
Protocol	Modbus-RTU	Modbus TCP	CANopen
Baud Rate	9600,19200 (default), 38400, 115200; DIP Switch Selectable	-	125 k (default), 250 k, 500 k, 1 M; DIP Switch Selectable
Data Format	N,8,1 (default); N,8,2; E,8,1; E,8,2; O,8,1; O,8,2	-	-
Isolation	3000 V_{DC}	-	3000 V_{DC}
Alarm Output			
Power Relay	Form A (Normal Open) × 2; Relay Contact Voltage Range: 5 A @ 250 V_{AC} (47 ~ 63Hz), 5 A @ 30 V_{DC}		
Power			
Power Input	+12 ~ 48 V_{DC}	+12 ~ 48 V_{DC} or PoE	+12 ~ 48 V_{DC}
Power Consumption	2 W		
Environment			
Temperature	Operating Temperature: -20 ~ +70°C / Storage Temperature: -25 ~ +80 °C		
Ambient Relative Humidity	10% ~ 90% RH, Non-condensing		

Installation

Rogowski Coil
Flexible Current Transformers
Input range 50A-1000A
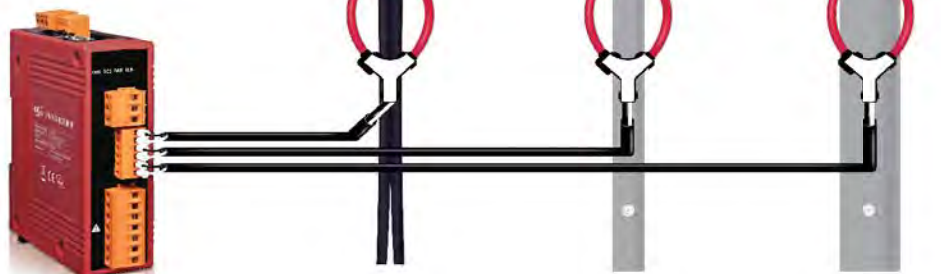
Rogowski Coil CT is "ropestyle" which delivers "Easy Installation" features for large window size and mechanical flexibility for tight space.
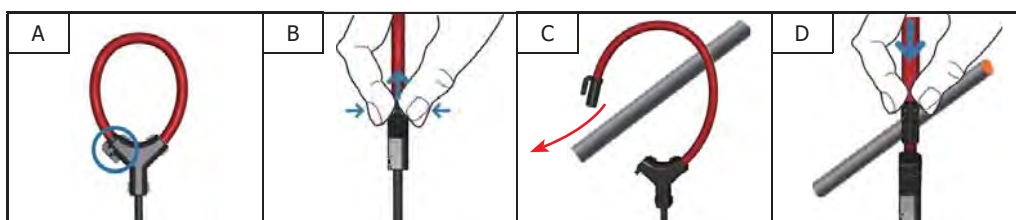
Rogowski Coil Soft CT Installation

Dimensions (Units: mm)

Models	A (Inside diameter)	B (Outer diameter)
PM-3133-RCT500P	55.0 mm	68.5 mm
PM-3133-RCT1000P	80.0 mm	93.5 mm
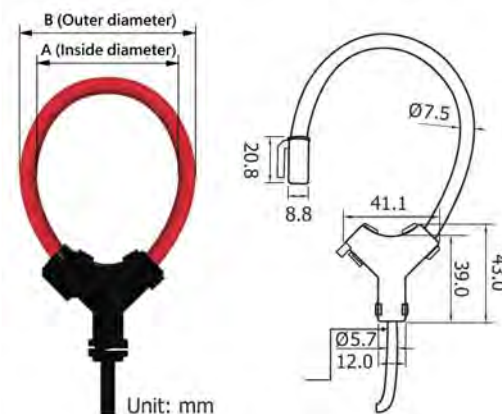
Ordering Information

RS-485 Interface (Modbus RTU)	
PM-3133-RCT500P CR	Modbus RTU, 3-phase power meter, 500A Rogowski Coil CT (Inside diameter 55 mm; wire lead 4 m) x 3 (RoHS)
PM-3133-RCT1000P CR	Modbus RTU, 3-phase power meter, 1000A Rogowski Coil CT (Inside diameter 80 mm; wire lead 4 m) x 3 (RoHS)

Ethernet Interface (Modbus TCP)	
PM-3133-RCT500P-MTCP CR	Modbus TCP, 3-phase power meter, 500A Rogowski Coil CT (Inside diameter 55 mm; wire lead 4 m) x 3 (RoHS)
PM-3133-RCT1000P-MTCP CR	Modbus TCP, 3-phase power meter, 1000A Rogowski Coil CT (Inside diameter 80 mm; wire lead 4 m) x 3 (RoHS)

CAN bus Interface (CANopen)(Available soon)	
PM-3133-RCT500P-CPS CR	CANopen, 3-phase power meter, 500A Rogowski Coil CT (Inside diameter 55 mm; wire lead 4 m) x 3 (RoHS)
PM-3133-RCT1000P-CPS CR	CANopen, 3-phase power meter, 1000A Rogowski Coil CT (Inside diameter 80 mm; wire lead 4 m) x 3 (RoHS)

PM-3033/-MTCP/-CPS
Three-phase Smart Power Meter

Features
- True RMS Power Measurements
- Energy Analysis for 3P4W, 3P3W, 1P3W, 1P2W
- Direct input of secondary side 1A/5A CT
- Voltage Measurements Up to 500 V
- W Accuracy Better than 0.5% (PF=1)
- Supports RS-485, Ethernet (PoE) or CANopen Interface
- Supports Modbus RTU/Modbus TCP or CANopen Protocol
- Total Harmonic Distortion (THD)
- IEC 61010-1 and EN 61010-1

ICP DAS brings the most powerful, cost-effective, advanced Smart Power Meters PM-3033 series that gives you access to real-time electric usage for three-phase power measurement. With its high accuracy (<0.5%, PF=1), the PM-3033 series can be applied to both low voltage primary side and/ or medium/high voltage secondary side and enables the users to obtain reliable and accurate energy consumption readings from the monitored equipments in real time under operation.

Direct input from "secondary side 1A/5A" type CTs. Dedicated CTs are no longer needed, which lowers the cost of implementation. It operates over a wide input voltages range 10 ~ 500 V$_{AC}$ which allows worldwide compatibility. It also supports Modbus RTU, Modbus TCP or CANopen protocols for easy integration.

📂 Specifications

Models		PM-3033	PM-3033-MTCP	PM-3033-CPS
AC Power Measurement				
Wiring		3P4W-3CT, 3P3W-2CT, 3P3W-3CT, 1P2W-1CT, 1P3W-2CT		
Measurement Voltage		10 ~ 500 V		
Measurement Current		1A or 5A		
Measurement Frequency		50/60 Hz		
W Accuracy		Better than 0.5% (PF=1)		
Power Parameter Measurement		True RMS voltage (V$_{rms}$), True RMS current (I$_{rms}$), Active Power (kW), Active Energy (kWh), Apparent Power (kVA), Apparent Energy (kVAh), Reactive Power (kVAR), Reactive Energy (kVARh), Power Factor (PF), Frequency		
Data Update Rate		1 Second		
Communication				
RS-485	Protocol	Modbus RTU	-	-
	Baud Rate	9600, 19200 (default), 38400, 115200; DIP Switch Selectable	-	-
	Data Format	N,8,1 (default); N,8,2; E,8,1; E,8,2; O,8,1; O,8,2	-	-
	Isolation	3000 V$_{DC}$	-	-
Ethernet (PoE)	Protocol	-	Modbus TCP	-
CANopen	Protocol	-	-	CANopen
	Baud Rate	-	-	125 k (default), 250 k, 500 k, 1 M; DIP Switch Selectable
	Isolation	-	-	3000 V$_{DC}$
Power				
Power Input		+12 ~ 48 V$_{DC}$	+12 ~ 48 V$_{DC}$ or PoE	+12 ~ 48 V$_{DC}$
Power Consumption		2 W		
Environment				
Temperature		Operating Temperature: -20 ~ +70 °C / Storage Temperature: -25 ~ +80 °C		
Ambient Relative Humidity		10% ~ 90% RH, Non-condensing		

CT Installation and Wiring

Aux. Power Input
+12 ~ 48 V$_{DC}$

LED Indicators

Direct input of
secondary side
1A/5A CT

AC Measurement
10 ~ 500 V

PM-3033

1 A (Max)

L

K

Rated Primary Current: 50/60 Hz
Turns ratio: Np:Ns=1:800
Current Ratio: **800A/1A**

PM-3033

5 A (Max)

L

K

Rated Primary Current: 50/60 Hz
Turns ratio: Np:Ns=1:160
Current Ratio: **800A/5A**

Dimensions (Units: mm)

Left View	Front View	Right View	Rear View	Top View	Bottom View
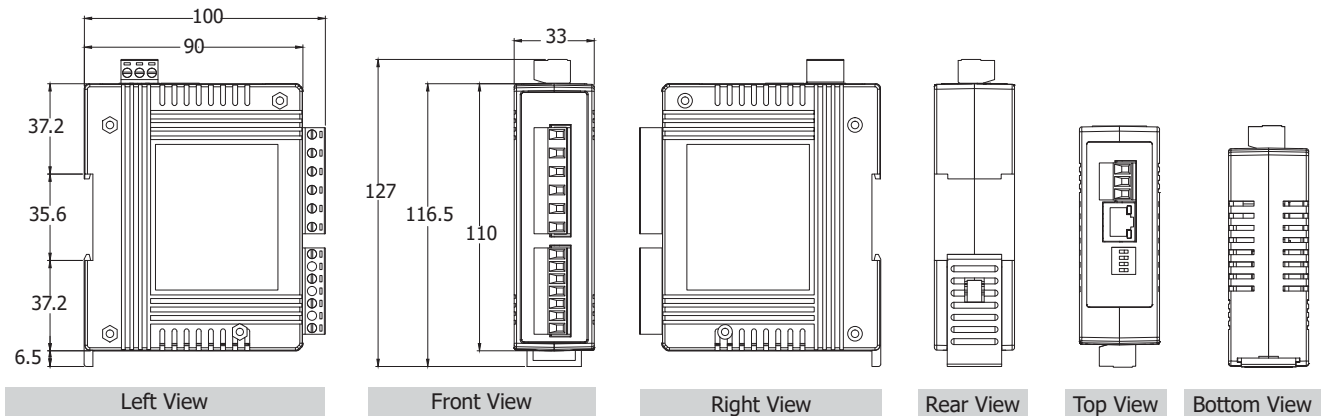
Selection Guide

PM-3033 - X X X

Communication
□: RS-485
CPS: CANopen
MTCP: Modbus TCP

Ordering Information

RS-485 Interface	
PM-3033 CR	Modbus RTU, 3-phase power meter (1A/5A CT Input type) (RoHS)

Ethernet Interface	
PM-3033-MTCP CR	Modbus TCP, 3-phase power meter (1A/5A CT Input type) (RoHS)

CAN bus Interface	
PM-3033-CPS CR	CANopen, 3-phase power meter (1A/5A CT Input type) (RoHS)

5.4 Single-phase Smart Power Meter

PM-3112/-MTCP/-CPS
PM-3114/-MTCP/-CPS
Single-phase Smart Power Meter

Features

- ■ True RMS Power Measurements
- ■ Energy Analysis for 1P2W, 1P4W
- ■ Current Measurements Up to 200 A with Different CT Ratio
- ■ Voltage Measurements Up to 300 V
- ■ Clip-on CT for Easy Installation
- ■ W Accuracy Better than 0.5% (PF=1)
- ■ Supports Modbus RTU, Modbus TCP or CANopen Protocol
- ■ Supports 2 Power Relay Output (Form A)
- ■ IEC 61010-1 and EN 61010-1

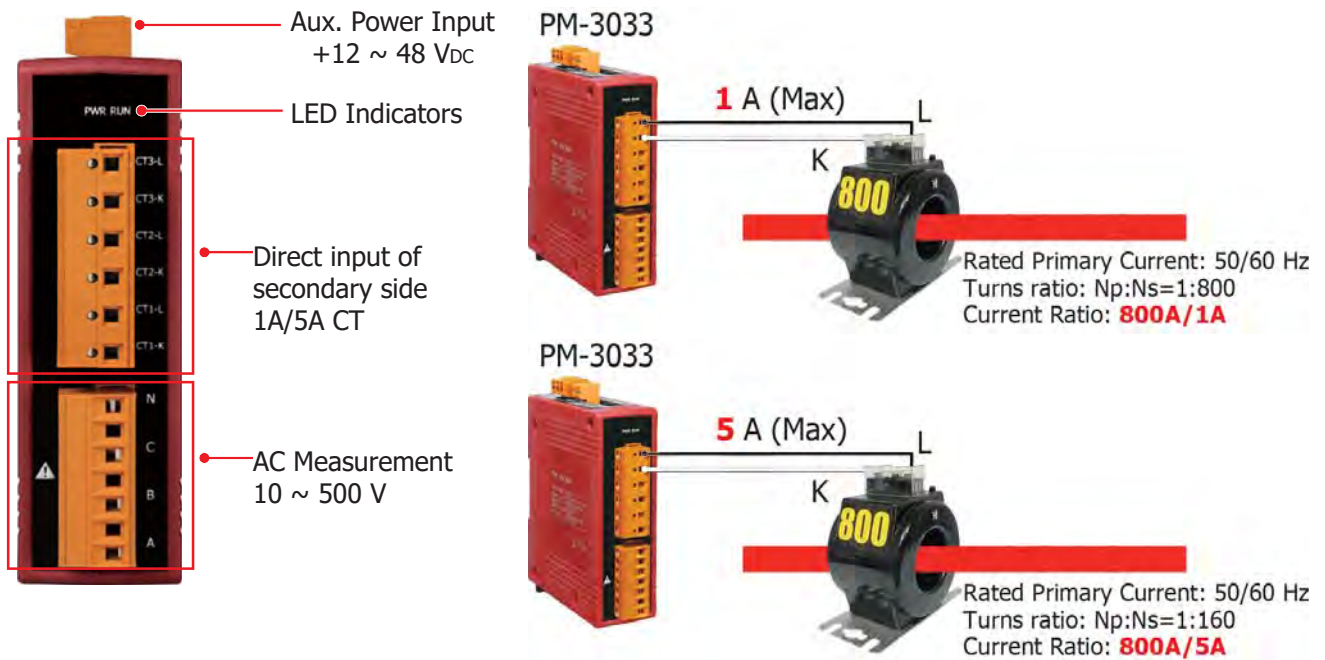ICP DAS brings the most powerful, cost-effective, advanced Smart Power Meters PM-3000 series that gives you access to real-time electric usage for single-phase power measurement. With its high accuracy (< 0.5%, PF=1), the PM-3000 series can be applied to both low voltage primary side and/or medium/high voltage secondary side and enables the users to obtain reliable and accurate energy consumption readings from the monitored equipments in real time under operation. These compact size and cost-effective power meters are equipped with revolutionary wired clip-on CT (various types, support input current up to 200 A). It operates over a wide input voltages range 10 ~ 300 V_{AC} which allows worldwide compatibility. And with 2 channels relay outputs, it can be linked with sirens or lightings for alarm messages. It also supports Modbus RTU, Modbus TCP or CANopen protocols for easy integration.

📁 Specifications

Models	PM-3112	PM-3114	PM-3112-MTCP	PM-3114-MTCP	PM-3112-CPS	PM-3114-CPS
AC Power Measurement						
Wiring	1P2W-2CT	1P4W-4CT	1P2W-2CT	1P4W-4CT	1P2W-2CT	1P4W-4CT
Input Voltage	10 ~ 300 V					
Input Current	CTØ10 mm (60 A); CTØ16 mm (100 A); CTØ24 mm (200 A)					
Input Frequency	50/60 Hz					
W Accuracy	Better than 0.5% (PF=1)					
Starting Current	>0.03A (60A), >0.05A (100A), >0.09A (200A)					
Power Parameter Measurement	True RMS voltage (V_{rms}), True RMS current (I_{rms}), Active Power (kW), Active Energy (kWh), Apparent Power (kVA), Apparent Energy (kVAh), Reactive Power (kVAR), Reactive Energy (kVARh), Power Factor (PF), Frequency					
Data Update Rate	1 Second					
Communication						
RS-485	Protocol	Modbus-RTU		-		-
	Baud Rate	9600,19200 (default), 38400, 115200; DIP Switch Selectable		-		-
	Data Format	N,8,1 (default); N,8,2; E,8,1; E,8,2; O,8,1; O,8,2		-		-
	Isolation	3000 V_{DC}		-		-
Ethernet	Protocol	-		Modbus TCP		-
CANopen	Protocol	-		-		CANopen
	Baud Rate	-		-		125 k (default), 250 k, 500 k, 1 M; DIP Switch Selectable
Alarm Output						
Power Relay	Form A (Normal Open) x 2; Relay Contact Voltage Range: 5 A @ 250 V_{AC} (47 ~ 63Hz), 5 A @ 30 V_{DC}					
Power						
Input Range/Power Consumption	+12 ~ 48 V_{DC}/2 W					
Environment						
Temperature/Ambient Relative Humidity	Operating Temperature: -20 ~ +70°C/Storage Temperature: -25 ~ +80°C/10% ~ 90% RH, Non-condensing					

■ 2 Independent Main Circuit Inputs

PM-3114-100

Fluorescent lamp **110V**

Refrigerator **110V**

Air conditioner **220V**

Water heater **220V**

(LINE) L1
N
L2

CT1 and CT2 for reference voltage V1; CT3 ~ CT4 for reference voltage V2.

■ Dimensions (Units: mm)

| Left View | Front View | Right View | Rear View | Top View | Bottom View |
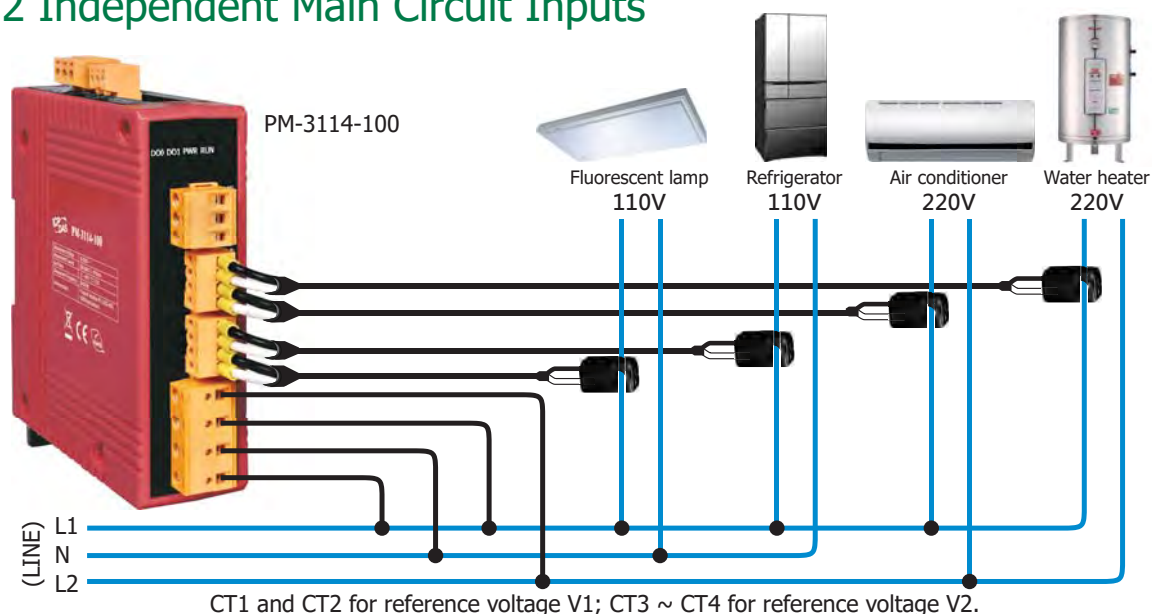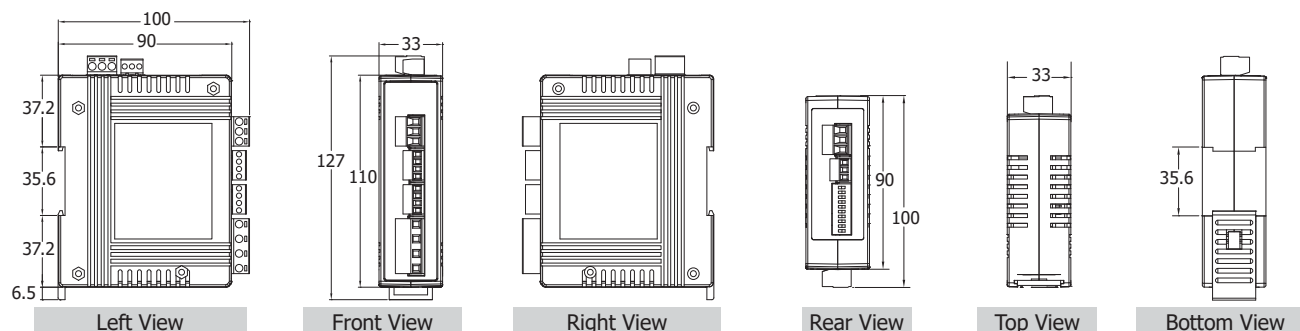
■ Ordering Information

| RS-485 Interface	
PM-3112-100 CR	Modbus RTU, 2 loops single-phase Power Meter; includes 60A CT (Inside diameter 10 mm; wire lead 1.8 m) x 2 (RoHS)
PM-3112-160 CR	Modbus RTU, 2 loops single-phase Power Meter; includes 100A CT (Inside diameter 16 mm; wire lead 1.8 m) x 2 (RoHS)
PM-3112-240 CR	Modbus RTU, 2 loops single-phase Power Meter; includes 200A CT (Inside diameter 24 mm; wire lead 1.8 m) x 2 (RoHS)
PM-3114-100 CR	Modbus RTU, 4 loops single-phase Power Meter; includes 60A CT (Inside diameter 10 mm; wire lead 1.8 m) x 4 (RoHS)
PM-3114-160 CR	Modbus RTU, 4 loops single-phase Power Meter; includes 100A CT (Inside diameter 16 mm; wire lead 1.8 m) x 4 (RoHS)
PM-3114-240 CR	Modbus RTU, 4 loops single-phase Power Meter; includes 200A CT (Inside diameter 24 mm; wire lead 1.8 m) x 4 (RoHS)

Ethernet Interface	
PM-3112-100-MTCP CR	Modbus RTU, 2 loops single-phase Power Meter; includes 60A CT (Inside diameter 10 mm; wire lead 1.8 m) x 2 (RoHS)
PM-3112-160-MTCP CR	Modbus RTU, 2 loops single-phase Power Meter; includes 100A CT (Inside diameter 16 mm; wire lead 1.8 m) x 2 (RoHS)
PM-3112-240-MTCP CR	Modbus RTU, 2 loops single-phase Power Meter; includes 200A CT (Inside diameter 24 mm; wire lead 1.8 m) x 2 (RoHS)
PM-3114-100-MTCP CR	Modbus RTU, 4 loops single-phase Power Meter; includes 60A CT (Inside diameter 10 mm; wire lead 1.8 m) x 4 (RoHS)
PM-3114-160-MTCP CR	Modbus RTU, 4 loops single-phase Power Meter; includes 100A CT (Inside diameter 16 mm; wire lead 1.8 m) x 4 (RoHS)
PM-3114-240-MTCP CR	Modbus RTU, 4 loops single-phase Power Meter; includes 200A CT (Inside diameter 24 mm; wire lead 1.8 m) x 4 (RoHS)

CAN bus Interface	
PM-3112-100-CPS CR	Modbus RTU, 2 loops single-phase Power Meter; includes 60A CT (Inside diameter 10 mm; wire lead 1.8 m) x 2 (RoHS)
PM-3112-160-CPS CR	Modbus RTU, 2 loops single-phase Power Meter; includes 100A CT (Inside Siameter 16 mm; wire lead 1.8 m) x 2 (RoHS)
PM-3112-240-CPS CR	Modbus RTU, 2 loops single-phase Power Meter; includes 200A CT (Inside diameter 24 mm; wire lead 1.8 m) x 2 (RoHS)
PM-3114-100-CPS CR	Modbus RTU, 4 loops single-phase Power Meter; includes 60A CT (Inside diameter 10 mm; wire lead 1.8 m) x 4 (RoHS)
PM-3114-160-CPS CR	Modbus RTU, 4 loops single-phase Power Meter; includes 100A CT (Inside diameter 16 mm; wire lead 1.8 m) x 4 (RoHS)
PM-3114-240-CPS CR	Modbus RTU, 4 loops single-phase Power Meter; includes 200A CT (Inside diameter 24 mm; wire lead 1.8 m) x 4 (RoHS)

5.5 Multi-circuit Smart Power Meter
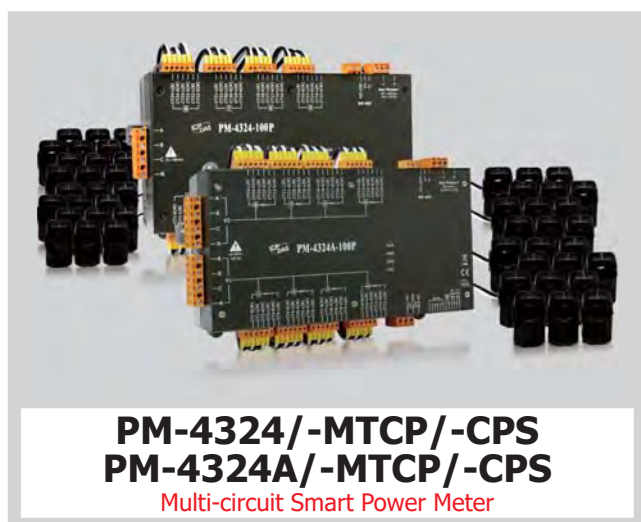
PM-4324/-MTCP/-CPS
PM-4324A/-MTCP/-CPS
Multi-circuit Smart Power Meter

Features

■ 8 Three Phase Circuits or 24 Single Phase Circuits
■ True RMS Power Measurements
■ Energy Analysis for 3P4W, 3P3W, 1P3W, 1P2W
■ 2 Independent main circuit inputs for PM-4324A series
■ Current Measurements Up to 400 A with Different CT Ratio
■ Voltage Measurements Up to 500 V
■ Easy install with split core CT
■ W Accuracy Better than 0.5% (PF=1)
■ Support RS-485, Ethernet or CAN bus Interface
■ Support 2 Power Relay Output (Form A)
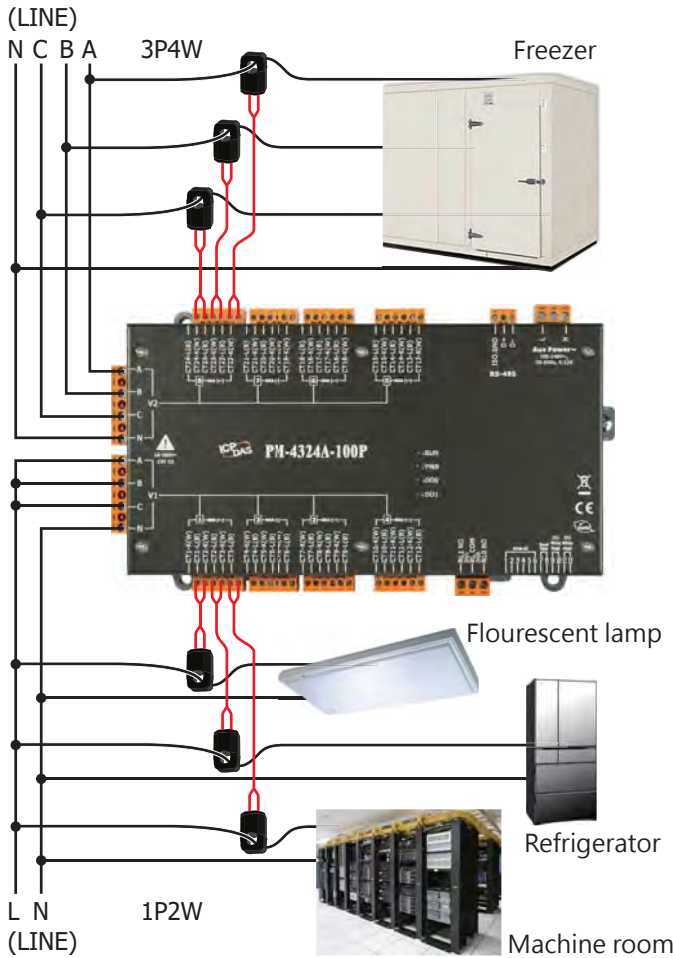■ Total Harmonic Distortion (THD)

The PM-4324 series multi-circuit power meter monitors up to 8 three-phase circuits or 24 single-phase circuits, or any combination of single or three-phase circuits. The PM-4324 series can measure up to 24 currents via external Current Transformers (CTs). This flexibility makes the PM-4324 series perfect for multi-tenant facilities such as residential projects, office buildings and shopping malls. This compact instrument is designed to easily fit into existing panelboards or be flush mounted nearby, thus eliminating the need for expensive retrofit projects or for allocating extra space for the device. The PM-4324A is the same model as the PM-4324, except for the AC Measurement. The PM-4324A has 2 separate main circuit inputs that can use in the different power system.

📂 Specifications

Models	PM-4324/PM-4324A	PM-4324-MTCP/PM-4324A-MTCP	PM-4324-CPS/PM-4324A-CPS
AC Power Measurement			
Wiring	3P4W-3CT, 3P3W-2CT, 3P3W-3CT, 1P2W-1CT, 1P3W-2CT		
Measurement Voltage	10 ~ 500 V		
Measurement Current	CTØ10 mm (60 A); CTØ16 mm (100 A); CTØ24 mm (200 A); CTØ36 mm (300 A); CTØ36 mm (400 A)		
Measurement Frequency	50/60 Hz		
W Accuracy	Better than 0.5% (PF=1)		
Power Parameter Measurement	True RMS voltage (V_{rms}), True RMS current (I_{rms}), Active Power (kW), Active Energy (kWh), Apparent Power (kVA), Apparent Energy (kVAh), Reactive Power (kVAR), Reactive Energy (kVARh), Power Factor (PF), Frequency		
Data Update Rate	1 Second		
Communication			
Interface	RS-485	Ethernet	CAN Bus
Protocol	Modbus-RTU	Modbus TCP	CANopen
Baud Rate	9600, 19200 (default), 38400, 115200; DIP Switch Selectable	-	125 k (default), 250 k, 500 k, 1 M; DIP Switch Selectable
Data Format	N,8,1; N,8,2; E,8,1; E,8,2; O,8,1; O,8,2	-	-
Isolation	3000 V_{DC}	-	3000 V_{DC}
Alarm Output			
Power Relay	Form A (Normal Open) x 2; Relay Contact Voltage Range: 5 A @ 250 V_{AC} (47 ~ 63 Hz), 5 A @ 30 V_{DC}		
Power			
Input Range	+85 ~ +264 V_{AC}		
Power Consumption	6 W		
Mechanical			
Dimensions / Casing	237 mm x 52 mm x 134 mm (W x L x H) / Plastic		
Module Installation	DIN-Rail Mounting		
Environment			
Temperature	Operating Temperature: -20 ~ +70°C / Storage Temperature: -25 ~ +80°C		
Ambient Relative Humidity	10% ~ 90% RH, Non-condensing		

Wire Connections

Dual Main Circuit 3P4W + 1P2W

(LINE)
N C B A   3P4W   Freezer

PM-4324A-100P

Flourescent lamp

Refrigerator

Machine room

L N   1P2W
(LINE)

Single Main Circuit 3P3W

(LINE)
C B A   Machine

PM-4324-100P

Machine

Appearance

PM-4324A

V2 reference voltage

V1 reference voltage

AC measurement
10 ~ 500 V
(A, B, C, N)

V1 reference voltage

PM-4324

Up to 24 currents via external Current Transformers (CTs)

RS-485

Aux. Power Input
85 ~ 264 VAC

PM-4324A

PM-4324

2 channels Relay output

Node ID, Baud Rate

📗 Selection Guide

PM-4324 A - X X X P - X X X

2 independent main circuit inputs

CT dimensions (Max. Current)
100P: CTΦ10 mm, 60 A Max.
160P: CTΦ16 mm, 100 A Max.
240P: CTΦ24 mm, 200 A Max.
360P: CTΦ36 mm, 300 A Max.
400P: CTΦ36 mm, 400 A Max.

Current Transformers
(Secondary voltage 333 mV)

Communication
□: RS-485
CPS: CANopen
MTCP: Modbus TCP

📗 Ordering Information

RS-485 Interface

PM-4324P CR	Modbus RTU, Multi-Circuit Power Meter (Can be directly input from the secondary side of 333mV CT) (RoHS)
PM-4324-100P CR	Modbus RTU, Multi-Circuit Power Meter; includes 60A CT (Inside diameter 10 mm; wire lead 4 m) x 24 (RoHS)
PM-4324-160P CR	Modbus RTU, Multi-Circuit Power Meter; includes 100A CT (Inside diameter 16 mm; wire lead 4 m) x 24 (RoHS)
PM-4324-240P CR	Modbus RTU, Multi-Circuit Power Meter; includes 200A CT (Inside diameter 24 mm; wire lead 4 m) x 24 (RoHS)
PM-4324-360P CR	Modbus RTU, Multi-Circuit Power Meter; includes 300A CT (Inside diameter 36 mm; wire lead 4 m) x 24 (RoHS)
PM-4324-400P CR	Modbus RTU, Multi-Circuit Power Meter; includes 400A CT (Inside diameter 36 mm; wire lead 4 m) x 24 (RoHS)
PM-4324A-100P CR	Modbus RTU, Multi-Circuit Power Meter; includes 60A CT (Inside diameter 10 mm; wire lead 4 m) x 24 (RoHS)
PM-4324A-160P CR	Modbus RTU, Multi-Circuit Power Meter; includes 100A CT (Inside diameter 16 mm; wire lead 4 m) x 24 (RoHS)
PM-4324A-240P CR	Modbus RTU, Multi-Circuit Power Meter; includes 200A CT (Inside diameter 24 mm; wire lead 4 m) x 24 (RoHS)
PM-4324A-360P CR	Modbus RTU, Multi-Circuit Power Meter; includes 300A CT (Inside diameter 36 mm; wire lead 4 m) x 24 (RoHS)
PM-4324A-400P CR	Modbus RTU, Multi-Circuit Power Meter; includes 400A CT (Inside diameter 36 mm; wire lead 4 m) x 24 (RoHS)

Ethernet Interface

PM-4324P-MTCP CR	Modbus TCP, Multi-Circuit Power Meter (Can be directly input from the secondary side of 333mV CT) (RoHS)
PM-4324-100P-MTCP CR	Modbus TCP, Multi-Circuit Power Meter; includes 60A CT (Inside diameter 10 mm; wire lead 4 m) x 24 (RoHS)
PM-4324-160P-MTCP CR	Modbus TCP, Multi-Circuit Power Meter; includes 100A CT (Inside diameter 16 mm; wire lead 4 m) x 24 (RoHS)
PM-4324-240P-MTCP CR	Modbus TCP, Multi-Circuit Power Meter; includes 200A CT (Inside diameter 24 mm; wire lead 4 m) x 24 (RoHS)
PM-4324-360P-MTCP CR	Modbus TCP, Multi-Circuit Power Meter; includes 300A CT (Inside diameter 36 mm; wire lead 4 m) x 24 (RoHS)
PM-4324-400P-MTCP CR	Modbus TCP, Multi-Circuit Power Meter; includes 400A CT (Inside diameter 36 mm; wire lead 4 m) x 24 (RoHS)
PM-4324A-100P-MTCP CR	Modbus TCP, Multi-Circuit Power Meter; includes 60A CT (Inside diameter 10 mm; wire lead 4 m) x 24 (RoHS)
PM-4324A-160P-MTCP CR	Modbus TCP, Multi-Circuit Power Meter; includes 100A CT (Inside diameter 16 mm; wire lead 4 m) x 24 (RoHS)
PM-4324A-240P-MTCP CR	Modbus TCP, Multi-Circuit Power Meter; includes 200A CT (Inside diameter 24 mm; wire lead 4 m) x 24 (RoHS)
PM-4324A-360P-MTCP CR	Modbus TCP, Multi-Circuit Power Meter; includes 300A CT (Inside diameter 36 mm; wire lead 4 m) x 24 (RoHS)
PM-4324A-400P-MTCP CR	Modbus TCP, Multi-Circuit Power Meter; includes 400A CT (Inside diameter 36 mm; wire lead 4 m) x 24 (RoHS)

CAN bus Interface

PM-4324-100P-CPS CR	CANopen, Multi-Circuit Power Meter (Can be directly input from the secondary side of 333mV CT) (RoHS)
PM-4324-160P-CPS CR	CANopen, Multi-Circuit Power Meter; includes 60A CT (Inside diameter 10 mm; wire lead 4 m) x 24 (RoHS)
PM-4324-240P-CPS CR	CANopen, Multi-Circuit Power Meter; includes 100A CT (Inside diameter 16 mm; wire lead 4 m) x 24 (RoHS)
PM-4324-360P-CPS CR	CANopen, Multi-Circuit Power Meter; includes 200A CT (Inside diameter 24 mm; wire lead 4 m) x 24 (RoHS)
PM-4324-400P-CPS CR	CANopen, Multi-Circuit Power Meter; includes 400A CT (Inside diameter 36 mm; wire lead 4 m) x 24 (RoHS)
PM-4324A-100P-CPS CR	CANopen, Multi-Circuit Power Meter; includes 60A CT (Inside diameter 10 mm; wire lead 4 m) x 24 (RoHS)
PM-4324A-160P-CPS CR	CANopen, Multi-Circuit Power Meter; includes 100A CT (Inside diameter 16 mm; wire lead 4 m) x 24 (RoHS)
PM-4324A-240P-CPS CR	CANopen, Multi-Circuit Power Meter; includes 200A CT (Inside diameter 24 mm; wire lead 4 m) x 24 (RoHS)
PM-4324A-360P-CPS CR	CANopen, Multi-Circuit Power Meter; includes 300A CT (Inside diameter 36 mm; wire lead 4 m) x 24 (RoHS)
PM-4324A-400P-CPS CR	CANopen, Multi-Circuit Power Meter; includes 400A CT (Inside diameter 36 mm; wire lead 4 m) x 24 (RoHS)

PM-4324D/-MTCP/-CPS

Multi-circuit Smart Power Meter with LCD Display

Features

- 8 Three Phase Circuits or 24 Single Phase Circuits
- True RMS Power Measurements
- Energy Analysis for 3P4W, 3P3W, 1P3W, 1P2W
- Current Measurements Up to 400 A with Different CT Ratio
- Voltage Measurements Up to 600 V
- Easy install with split core CT
- W Accuracy Better than 0.5% (PF=1)
- LCD Display
- 2/3-wire DS18B20 Wire Connection
- Support Modbus RTU Protocol
- Support 2 Power Relay Output (Form A)
- Total Harmonic Distortion (THD)

The PM-4324D series multi-circuit power meter monitors up to 8 three-phase circuits or 24 single-phase circuits, or any combination of single or three-phase circuits. The PM-4324D series can measure up to 24 currents via external Current Transformers (CTs). This flexibility makes the PM-4324D series perfect for multi-tenant facilities such as residential projects, office buildings and shopping malls. This compact instrument is designed to easily fit into existing panelboards or be flush mounted nearby, thus eliminating the need for expensive retrofit projects or for allocating extra space for the device. The digital temperature sensor function that provides one port for 2- or 3 wire DS18B20 digital temperature sensor input. This meter has LCD display shows power.
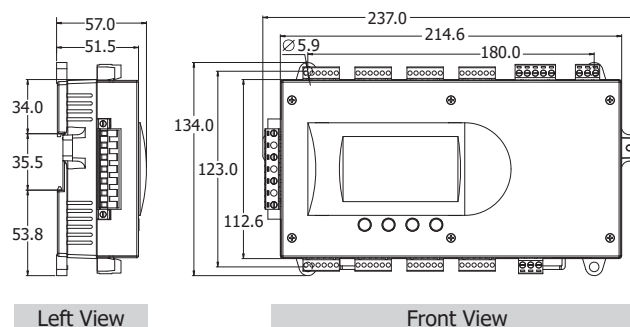
Specifications

Models	PM-4324D	PM-4324D-MTCP	PM-4324D-CPS
AC Power Measurement			
Wiring	3P4W-3CT, 3P3W-2CT, 3P3W-3CT, 1P2W-1CT, 1P3W-2CT		
Measurement Voltage	10 ~ 600 V		
Measurement Current	CTØ10 mm (60 A); CTØ16 mm (100 A); CTØ24 mm (200 A); CTØ36 mm (300 A); CTØ36 mm (400 A)		
Measurement Frequency	50/60 Hz		
W Accuracy	Better than 0.5% (PF=1)		
Power Parameter Measurement	True RMS voltage (V_{rms}), True RMS current (I_{rms}), Active Power (kW), Active Energy (kWh), Apparent Power (kVA), Apparent Energy (kVAh), Reactive Power (kVAR), Reactive Energy (kVARh), Power Factor (PF), Frequency		
Data Update Rate	1 Second		
LCD Display	Yes		
Communication			
RS-485 — Protocol	Modbus RTU	-	-
RS-485 — Baud Rate	9600, 19200 (default), 38400, 115200; DIP Switch Selectable	-	-
RS-485 — Data Format	N,8,1; N,8,2; E,8,1; E,8,2; O,8,1; O,8,2;	-	-
RS-485 — Isolation	3000 V_{DC}	-	-
Ethernet — Protocol	-	Modbus TCP	-
CAN bus — Protocol	-	-	CANopen
CAN bus — Baud Rate	-	-	125 k (default), 250 k, 500 k, 1 M; DIP Switch Selectable
CAN bus — Isolation	-	-	3000 V_{DC}
Alarm Output			
Power Relay	Form A (Normal Open) x 2; Relay Contact Voltage Range: 5 A @ 250 VAC (47 ~ 63 Hz), 5 A @ 30 VDC		
Power			
Input Range	+85 ~ +264 V_{AC} (277 V_{AC} available)		
Power Consumption	6 W		

Specifications

Models	PM-4324D/-MTCP/-CPS
Mechanical	
Casing	Plastic
Dimensions (W x L x H)	237 mm x 57 mm x 134 mm
Module Installation	DIN-Rail Mount
Environment	
Operating Temperature	-20 ~ +70 °C
Storage Temperature	-25 ~ +80 °C
Ambient Relative Humidity	10% ~ 90% RH, Non-condensing

Dimensions (Units: mm)

Left View   Front View

Appearance

RS-485

Aux. Power Input
+85 ~ +264 V$_{AC}$
(277 V$_{AC}$ available)

AC Measurement
(1 reference voltage)
10 ~ 600 V (A, B, C, N)

Up to 24 currents via external Current Transformers (CTs)

LCD Display

LED

Keypad

External DS18B20 temperature sensor

1 2 3	1 2 3	......	1 2 3	1 2 3
DS18B20	DS18B20		DS18B20	DS18B20
Sensor20	Sensor19		Sensor2	Sensor1

Node ID, Baud rate
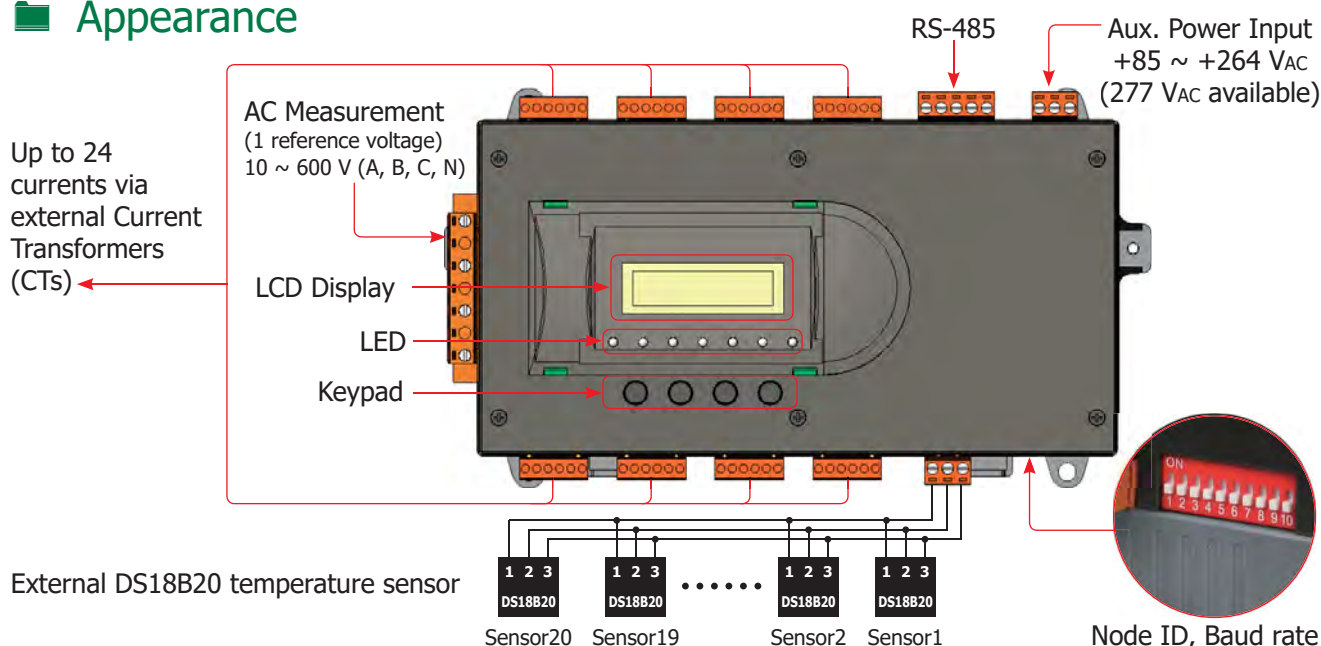
Ordering Information

RS-485 Interface	(Available soon)
PM-4324DP CR	Modbus RTU, Multi-Circuit Power Meter (Can be directly input from the secondary side of 333 mV CT) (RoHS)
PM-4324D-100P CR	Modbus RTU, Multi-Circuit Power Meter; includes 60A CT (Inside diameter 10 mm; wire lead 4 m) x 24 (RoHS)
PM-4324D-160P CR	Modbus RTU, Multi-Circuit Power Meter; includes 100A CT (Inside diameter 16 mm; wire lead 4 m) x 24 (RoHS)
PM-4324D-240P CR	Modbus RTU, Multi-Circuit Power Meter; includes 200A CT (Inside diameter 24 mm; wire lead 4 m) x 24 (RoHS)
PM-4324D-360P CR	Modbus RTU, Multi-Circuit Power Meter; includes 300A CT (Inside diameter 36 mm; wire lead 4 m) x 24 (RoHS)
PM-4324D-400P CR	Modbus RTU, Multi-Circuit Power Meter; includes 400A CT (Inside diameter 36 mm; wire lead 4 m) x 24 (RoHS)

Ethernet Interface	(Available soon)
PM-4324D-100P-MTCP CR	Modbus TCP, Multi-Circuit Power Meter; includes 60A CT (Inside diameter 10 mm; wire lead 4 m) x 24 (RoHS)
PM-4324D-160P-MTCP CR	Modbus TCP, Multi-Circuit Power Meter; includes 100A CT (Inside diameter 16 mm; wire lead 4 m) x 24 (RoHS)
PM-4324D-240P-MTCP CR	Modbus TCP, Multi-Circuit Power Meter; includes 200A CT (Inside diameter 24 mm; wire lead 4 m) x 24 (RoHS)
PM-4324D-360P-MTCP CR	Modbus TCP, Multi-Circuit Power Meter; includes 300A CT (Inside diameter 36 mm; wire lead 4 m) x 24 (RoHS)
PM-4324D-400P-MTCP CR	Modbus TCP, Multi-Circuit Power Meter; includes 400A CT (Inside diameter 36 mm; wire lead 4 m) x 24 (RoHS)

CAN bus Interface	(Available soon)
PM-4324D-100P-CPS CR	CANopen, Multi-Circuit Power Meter; includes 60A CT (Inside diameter 10 mm; wire lead 4 m) x 24 (RoHS)
PM-4324D-160P-CPS CR	CANopen, Multi-Circuit Power Meter; includes 100A CT (Inside diameter 16 mm; wire lead 4 m) x 24 (RoHS)
PM-4324D-240P-CPS CR	CANopen, Multi-Circuit Power Meter; includes 200A CT (Inside diameter 24 mm; wire lead 4 m) x 24 (RoHS)
PM-4324D-360P-CPS CR	CANopen, Multi-Circuit Power Meter; includes 300A CT (Inside diameter 36 mm; wire lead 4 m) x 24 (RoHS)
PM-4324D-400P-CPS CR	CANopen, Multi-Circuit Power Meter; includes 400A CT (Inside diameter 36 mm; wire lead 4 m) x 24 (RoHS)

5.6 EtherCAT Smart Power Meter Solutions

ECAT-2610-DW
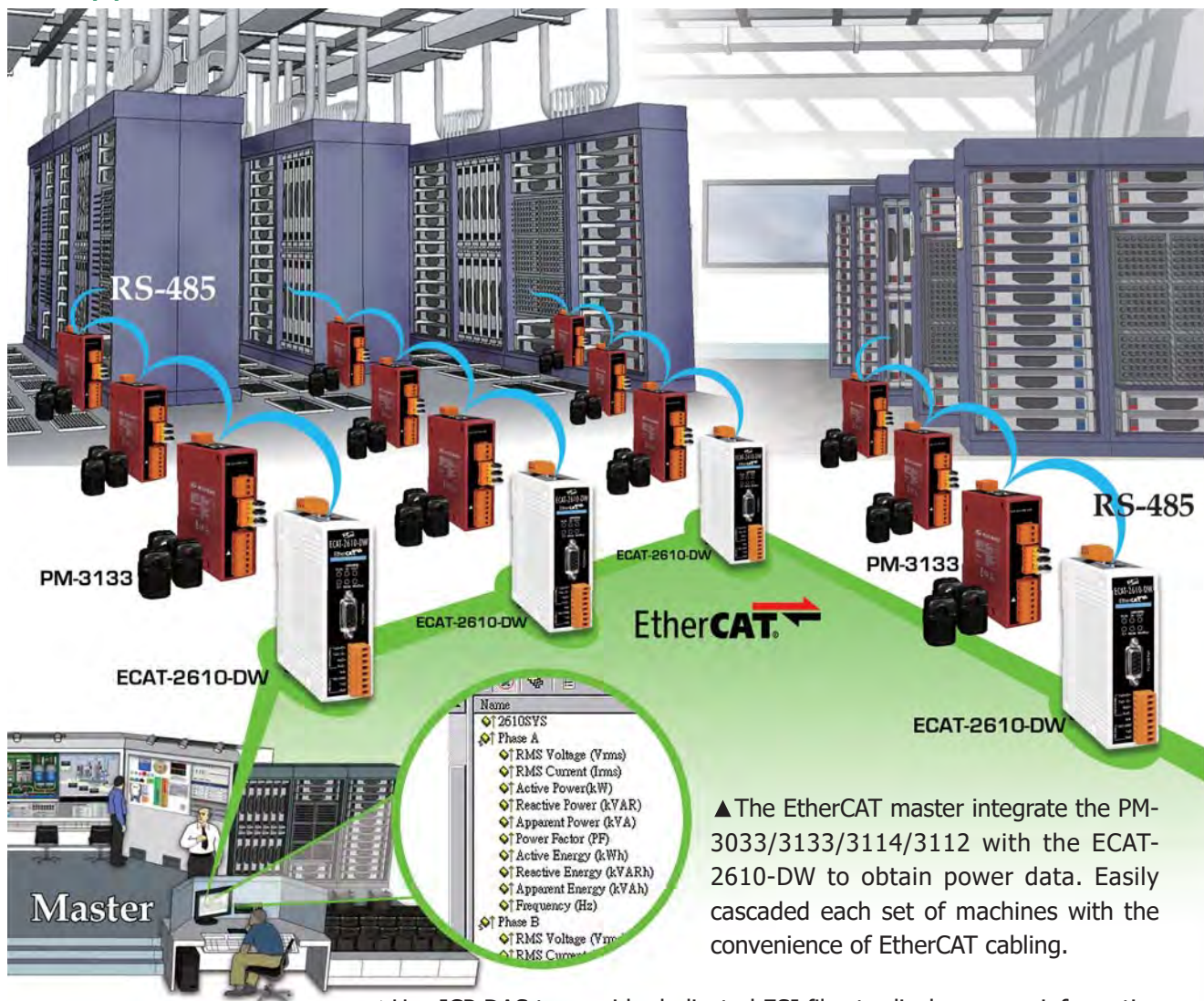EtherCAT to Modbus RTU and Power Meter Gateway
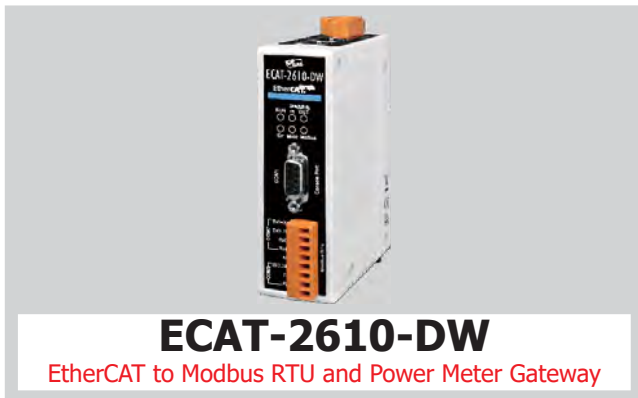
Features

■ Supports maximum 128 Input and Output Data

■ Supports maximum 6 connection for PM-3033/3133

■ 2 x RJ-45 bus interface, Integrate RS-232/422/485 serial device to EtherCAT

■ Allows system integrators to retro-fit older automation devices into modern EtherCAT communication structures

■ Supports blended to other Modbus slave
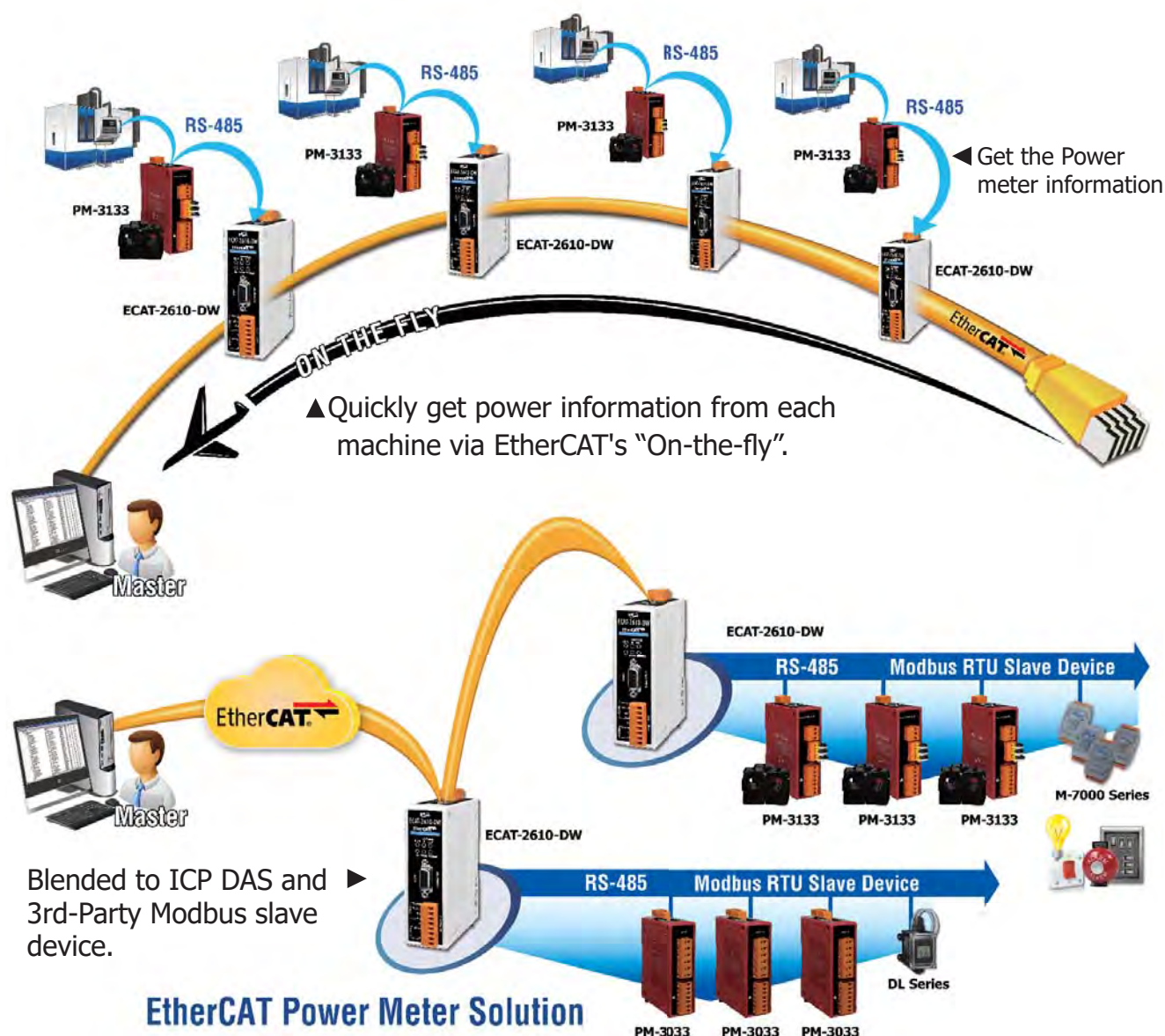
■ Supports maximum Baud Rate 115200 bps

📁 Introduction

ECAT-2610-DW has EtherCAT to Modbus RTU gateway function, and integrate power meter slave devices such as PM-3033/3133/3114/3112 into EtherCAT control system through the special configuration file that provided by ICP DAS. And very easy to install and configure. The EtherCAT master can access RxPDO and TxPDO to connect multiple power meter slave devices such as PM-3033/3133/3114/3112. It can achieve a more diversified energy management program.

📁 Applications

▲The EtherCAT master integrate the PM-3033/3133/3114/3112 with the ECAT-2610-DW to obtain power data. Easily cascaded each set of machines with the convenience of EtherCAT cabling.

▲Use ICP DAS to provide dedicated ESI files to display power information.

▲Quickly get power information from each machine via EtherCAT's "On-the-fly".

Blended to ICP DAS and ▶ 3rd-Party Modbus slave device.

EtherCAT Power Meter Solution

📁 Specifications

Protocol	
Protocol	EtherCAT
Communication Interface	
RJ-45 Port	RJ-45 x 1 Distance between Stations: Max. 100 m (100BASE-TX) Data Transfer Medium: Ethernet/EtherCAT Cable (Min. CAT 5e)
Serial Interface — RS-232	The RS-232, RS-422 and RS-485 cannot be used simultaneously ■ TxD, RxD, GND
Serial Interface — RS-422	■ TxD+, TxD-, RxD+, RxD-
Serial Interface — RS-485	■ Data+, Data-

📁 Ordering Information

ECAT-2610-DW CR	EtherCAT to Modbus RTU and Power Meter Gateway (RoHS)

5.7 PROFINET Smart Power Meter Solutions

GW-7662
PROFINET to Modbus RTU/ASCII Gateway

Features

- PROFINET Gateway
- Modbus RTU master
- Protocol: PROFINET IO Device
- Generic GSDML File Provided (Version 2.25)
- Max length of input/output data is 512/512 Bytes
- Max baud rate for COM1: 460.8kbps
- Connect up to 22 PM-3033/3133 devices
- Support Daisy Chain

Introduction

GW-7662 is a PROFINET to Modbus RTU gateway. It can connect several PM-3033/3133/3114/3112 devices via RS-485 in Modbus side, and then PROFINET controller can access the electronic information from GW-7662. PM-3000 series device can access to real-time electric usage for single-phase/three-phase power measurement, and it also support Modbus RTU protocol that makes GW-7662 access these measured values easily.

Applications
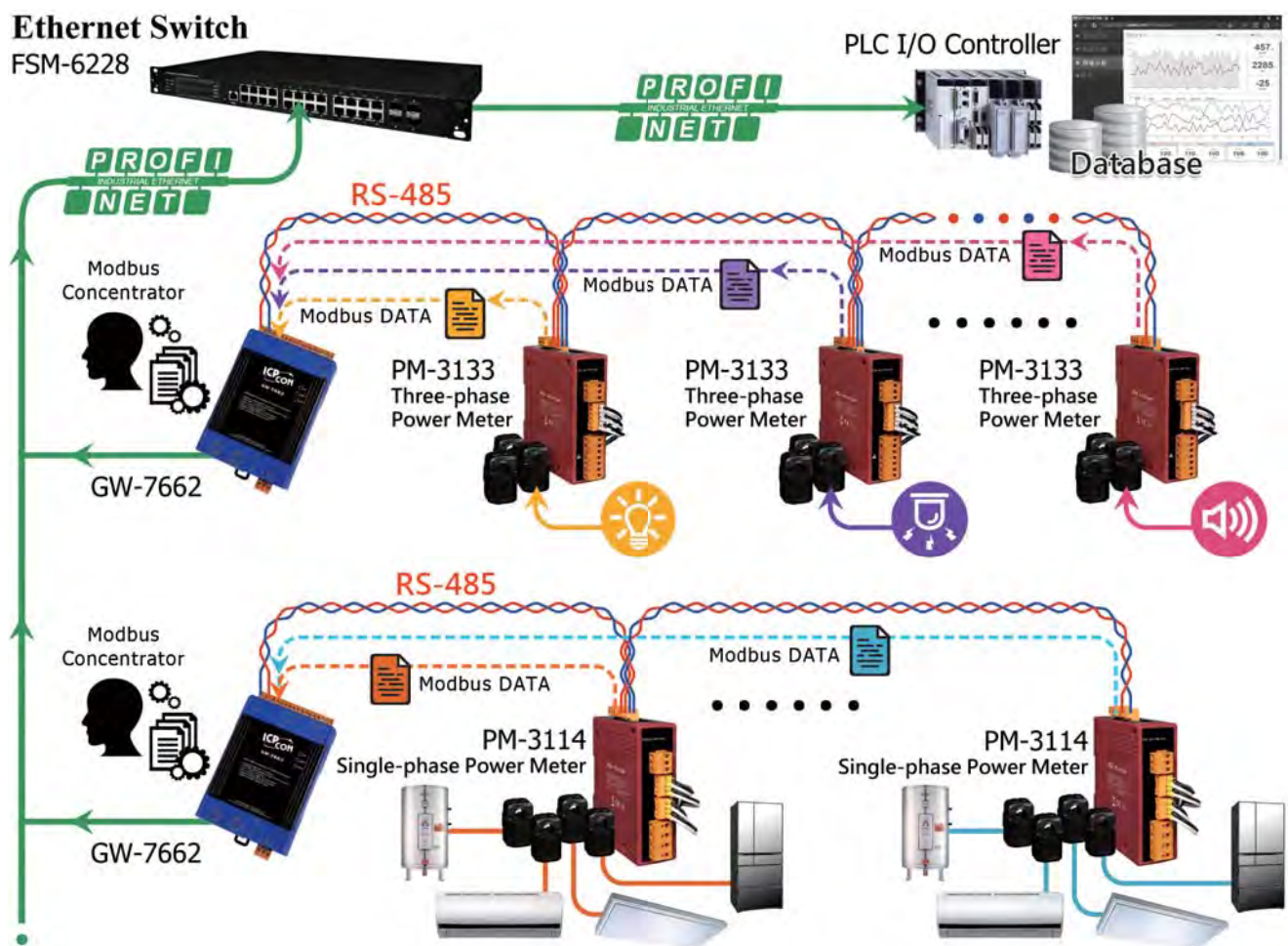
▲GW-7662 Can integrate the electronic information of the several devices into PROFINET system, the user can manage these electronic information via PROFINET controller.

▲The User can quickly access the electronic information of all the devices via PROFINET high speed transmission.

▲GW-7662 can connect PM-3033/3133/3114/3112 device and other ICP DAS's Modbus RTU slave modules in the same time.

📁 System Specifications

Protocol	
Slave	PROFINET IO
Master	Modbus RTU
Interface	
Ethernet	10/100 Base-TX, 8-pin RJ-45 x 2, (Auto-negotiating, Auto-MDI/MDIX)
UART (COM1)	2-wire RS-485, 4-wire RS-422, 3-wire RS-232

📁 Ordering Information

GW-7662 CR	PROFINET to Modbus RTU/ASCII Gateway (RoHS)

5.8 EtherNet/IP Smart Power Meter Solutions

GW-7472
EtherNet/IP to Modbus RTU/TCP Gateway

Features
- ■ EtherNet/IP adapter
- ■ Modbus RTU Master
- ■ Modbus TCP/IP Client
- ■ Maximum EtherNet/IP Input/Output date size: 500 bytes
- ■ Support 1 Implicit connection
- ■ Support Daisy Chain
- ■ The Ethernet upgrade is supported

📁 Introduction

GW-7472 is an EtherNet/IP to Modbus RTU/TCP gateway. The GW-7472 Modbus RTU can connect with PM-3033/3133/3114/3112 via RS-485 daisy chain. Users can also set commands in the GW-7472, and then polls the data from PM-3033. Then PLC can get all the data of power meters in the GW-7472 registers by EtherNet/IP. This is a much more convenient way for power meter management. GW-7472 supports Network Topology, and we can use Ehthernet Switch to expend the topology. Furthermore, GW-7472 is easy to install with PoE function.

📁 Applications
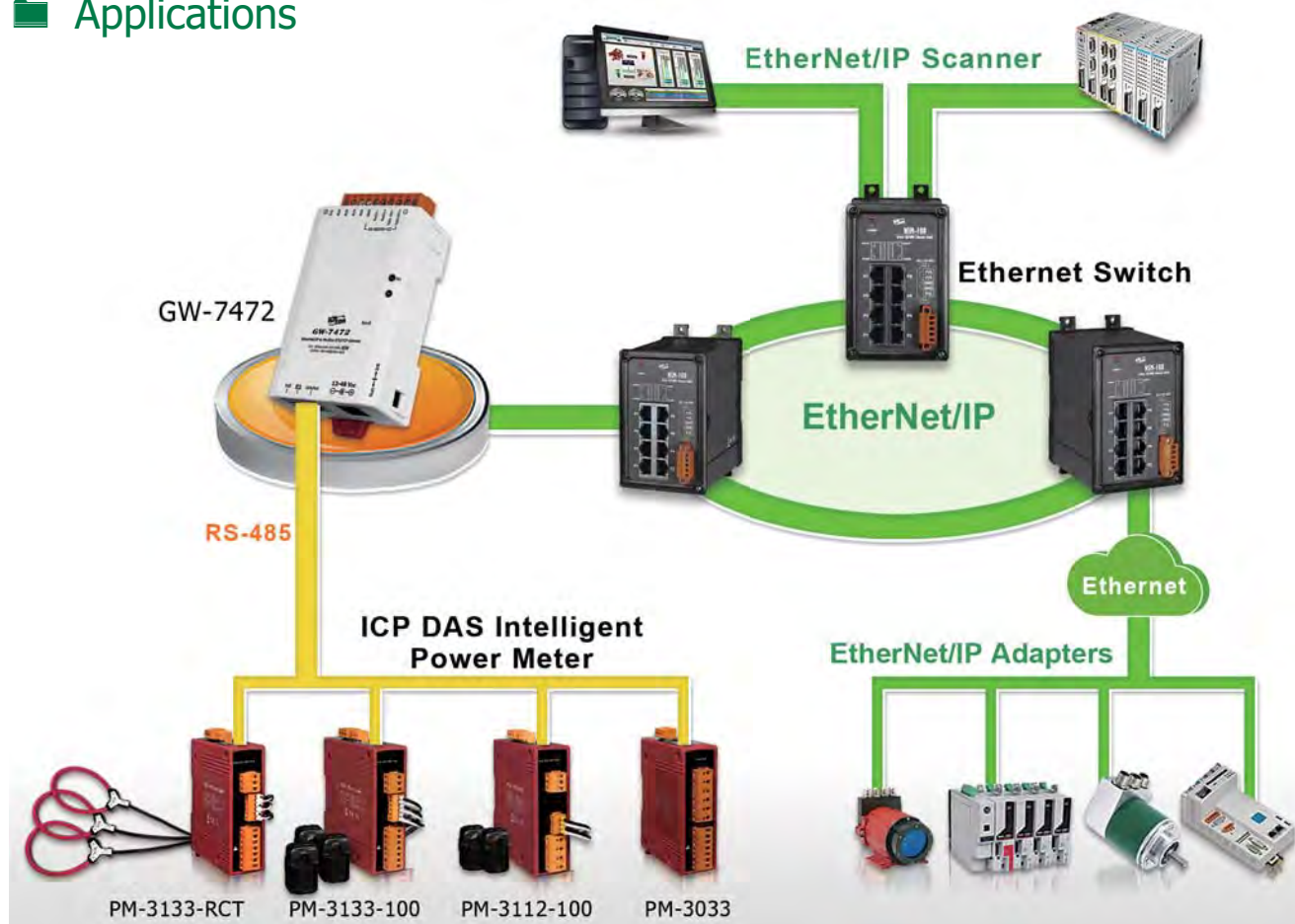
▲With Modbus polling, GW-7472 gets data from power meters and put them into internal registers. PLC can get the data from GW-7472 via EtherNet/IP.
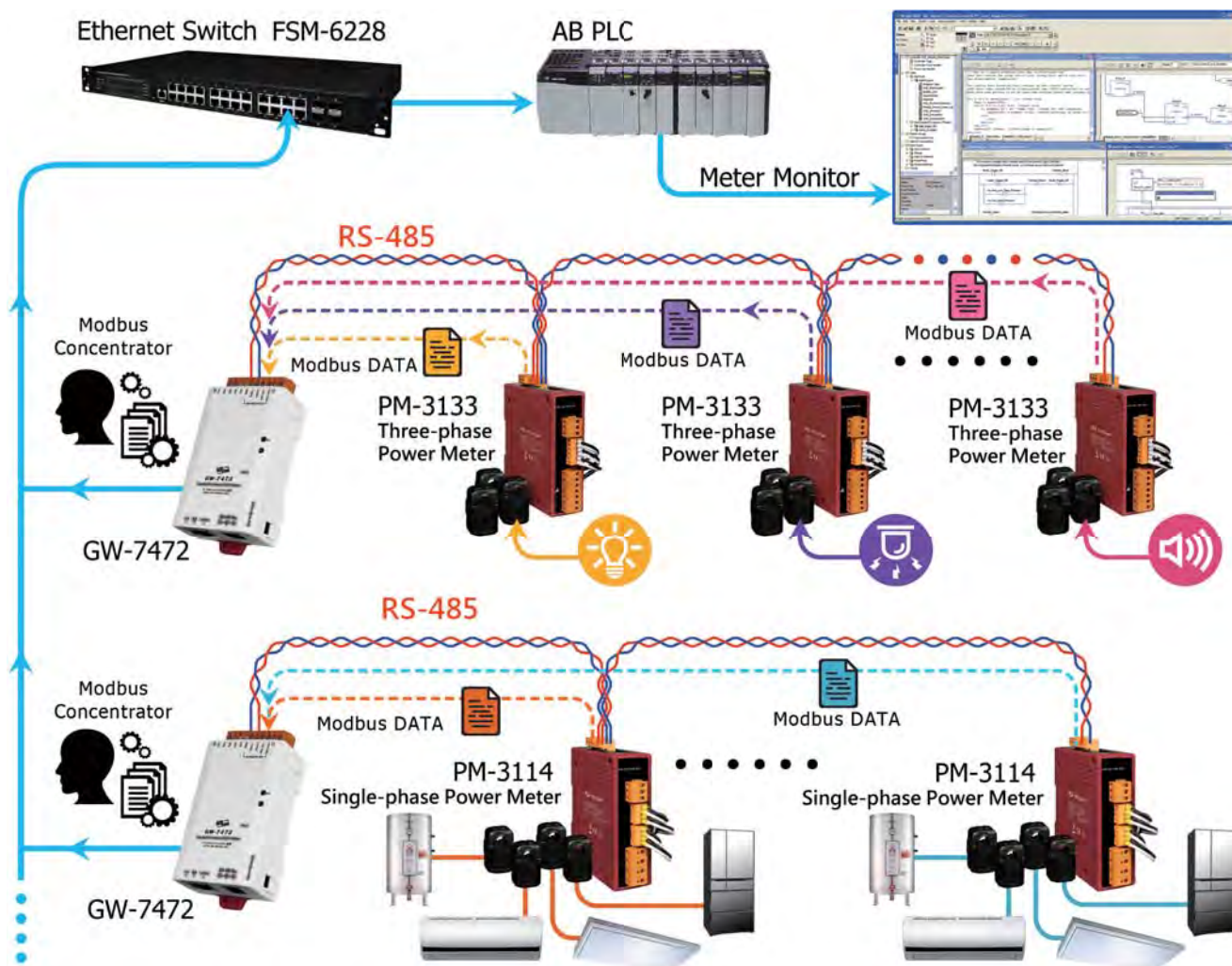
▲The GW-7472 can automatically get the data of power meters with polling commands, and users can obtain the status of PM-3033/3133/3114/3112 from the interface of EtherNet/IP.

System Specifications

Protocol	
Slave	EtherNet/IP adapter
Master	Modbus RTU Master Modbus TCP/IP Client
Ethernet Interface	
Ethernet	10/100 Base-TX, 8-pin RJ-45 x 1, (Auto-negotiating, Auto-MDI/MDIX, LED indicator) PoE (IEEE 802.3af, Class 1)
UART (COM1)	2-wire RS-485 4-wire RS-422

Ordering Information

GW-7472 CR	Tiny EtherNet/IP to Modbus RTU/TCP gateway with PoE and 1 RS-422/485 (RoHS)

Ch6. True RMS Input Module

M-7017RMS
8-channel True RMS Input Module

Features

- 8-channel True RMS Input
- ±0.15% Factory Calibrated Accuracy
- The RMS input range: +150 mV$_{rms}$ ~ +10 V$_{rms}$
- For Standard Operation with Frequencies: 45 Hz ~ 10 KHz
- Individual Channel Configurable

Introduction

The M-7017RMS is an 8-channel differential AC input module that is used to convert the AC input signals to their True RMS DC values. The RMS input range can be from +150 mV$_{rms}$ to +10 V$_{rms}$, and each channel can be configured individually.

The M-7017RMS is a complete, high-accuracy, RMS-to-DC converter that computes the True RMS DC value of any complex waveform. It also features 4 kV ESD protection, 2500 V$_{DC}$ intra-module isolation and +/-35 V$_{DC}$ overvoltage protection.

Applications

- Building Automation
- Factory Automation
- Machine Automation
- Remote Maintenance
- Remote Diagnosis
- Testing Equipment
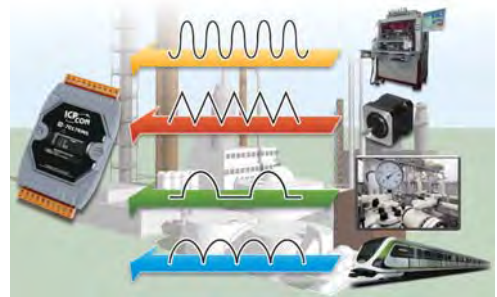
System Specifications

Communication	
Interface	RS-485
Bias Resistor	No (Usually supplied by the RS-485 Master. Or, add a tM-SG4 or SG-785.)
Baud Rate	1200 ~ 115200 bps
Protocol	Modbus RTU, DCON
Dual Watchdog	Yes, Module (1.6 Seconds), Communication (Programmable)

LED Indicators/Display	
System LED Indicator	1 as Power/Communication Indicator

Isolation	
Intra-module Isolation, Field-to-Logic	2500 V$_{DC}$

EMS Protection		
ESD (IEC 61000-4-2)	±4 kV Contact for each Terminal	
	±8 kV Air for Random Point	
EFT (IEC 61000-4-4)	±4 kV for Power Line	
Surge (IEC 61000-4-5)	±0.5 kV for Power Line	

Power	
Reverse Polarity Protection	Yes
Input	+10 ~ +30 V$_{DC}$
Consumption	0.9 W

Mechanical	
Dimensions (L x W x H)	123 mm x 72 mm x 35 mm
Installation	DIN-Rail

Environment	
Operating Temperature/ Storage Temperature	-25 to +75°C/-40 to +85°C
Humidity	10 to 95% RH, Non-condensing

I/O Specifications

Analog Input		
Channels	8	
Wiring	Differential	
Input Range	0 ~ +10 V$_{rms}$, 0 ~ +5 V$_{rms}$, 0 ~ +1 V$_{rms}$, 0 ~ +500 mV$_{rms}$, 0 ~ +150 mV$_{rms}$	
Resolution	16-bit	
Accuracy		
Sinusoid	50/60 Hz	±0.15% of FSR
	45 Hz to 10 Hz	±0.5% of FSR
Non-Sinusoid	Crest Factor=1 to 2	±0.2% of FSR
	Crest Factor=2 to 3	±0.35% of FSR
DC	0 ~ +10 V$_{rms}$/ 0 ~ +5 V$_{rms}$/ 0 ~ +1 V$_{rms}$	±0.3% of FSR
	Other	±0.7% of FSR
Sampling Rate	10 Hz (Total)	
-3dB Bandwidth	15.7 Hz	
Zero Drift	±20 µV/°C	
Span Drift	±25 ppm/°C	
Common Mode Rejection	86 dB	
Normal Mode Rejection	100 dB	
Input Impedance	>2 MΩ	
Individual Channel Configuration	Yes	
Overvoltage Protection	±35 V$_{DC}$	

Production traceability and online real-time alarm for machining processes

The previous system can only record the production order and the stack light status of the machines. For only a few simple information can be collected, it was not sufficient to assist the production engineers to further analysis or source the cause/signs of the machine failure. As we know, the data of generated current during motor operation is a key information to diagnose the health status of the machines and the quality of the machining processes.

■ The remote data acquisition system provided by ICP DAS is as follows:
   Hardware: The M-7017RMS + DN-800 series daughter board.
   Software: EZ Data Logger

EZ Data Logger is a simple data acquisition software that allows you to quickly and easily build a data acquisition system. It provides a free version that supports up to 64 I/O points, for small scale data acquisition, and will save you the cost in purchasing extra software.

■ Benefit of ICP DAS solution:
The solution provided by ICP DAS features stable and easy-to-install hardware, easy-to-use software and no programming required. It is a very helpful tool for engineers in production line to get more detailed data records on the production machine, fault analysis, and propose improvement plans. And furthermore improve the utilization rate and the production quality of the machines.
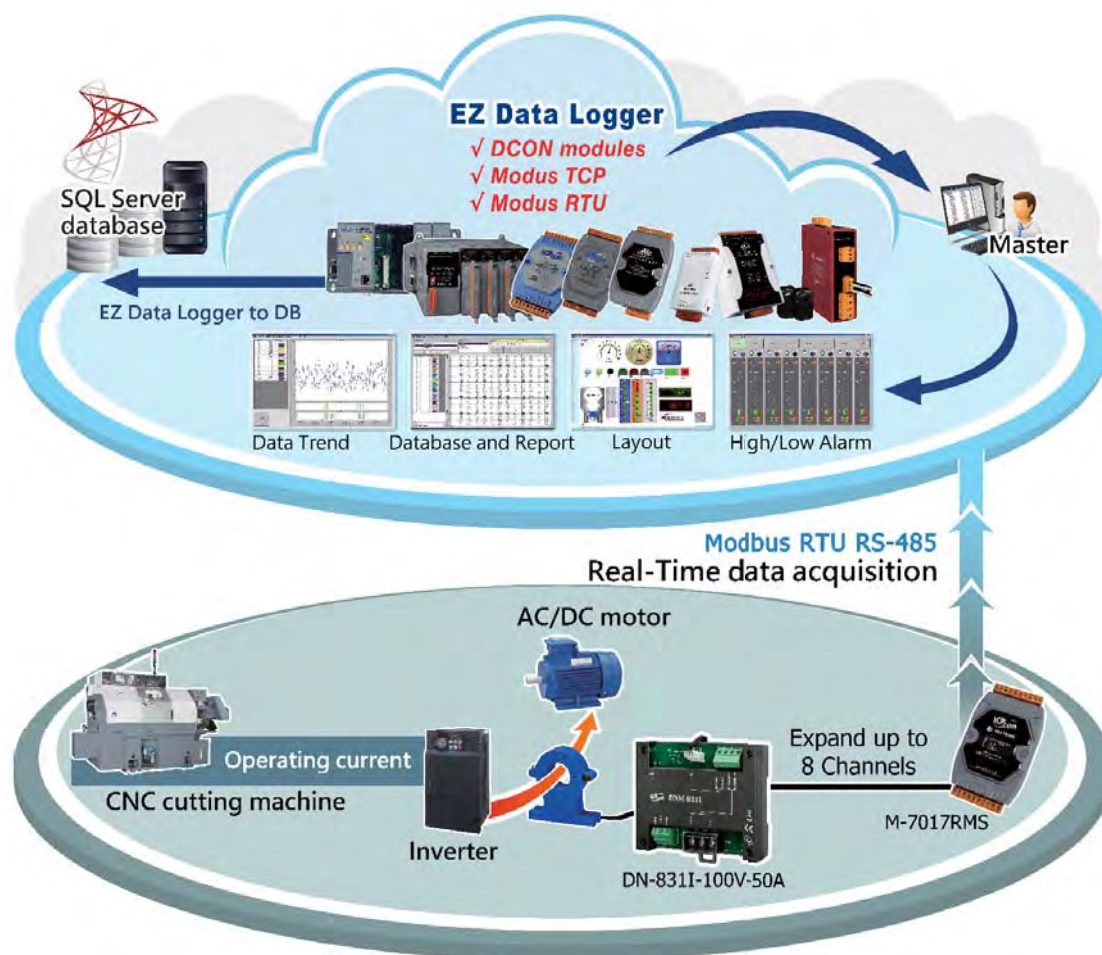
Ordering Information

M-7017RMS-G CR	8-channel True RMS Input Module (Gray Cover) (RoHS)

Accessories

DN-800 Series	Voltage Attenuator and Current Transformer

# Ch7. Voltage Attenuator and Current Transformer: DN-800 Series

DN-800 series is a Voltage Attenuator and Current Transformer designed for used in high-voltage applications. The current can be converted into +/-10 Vpp attenuated signal, so that a general electronic measuring device is able to read the signals. Compared to ICP DAS power meter products (PM-3033, PM-3133, PM-4324, etc.), in addition to AC signals, the DN-800 series can convert DC signals as well.

The users can use appropriate ICP DAS Remote I/O Modules such as: M-7017R, I-87017RW, or ET-7217 to measure the converted +/-10 VDC signal via DN-800 series. And use M-7017RMS or I-87017W-RMS, etc. to measure the AC signals.

By using DN-800 series, the power data of all kinds of machines and AC/DC motors can be easily measured and retrieved, and then the analyzed data can be used to develop a model to build a failure warning system.

📁 Applications

The operating current of AC or DC motor of the machines is converted into +/-10 Vpp attenuated signal via DN-844, and then the +/-10 Vpp signal is converted based on Modbus/RTU protocol for seamless integration with all kinds of PLC or SCADA.
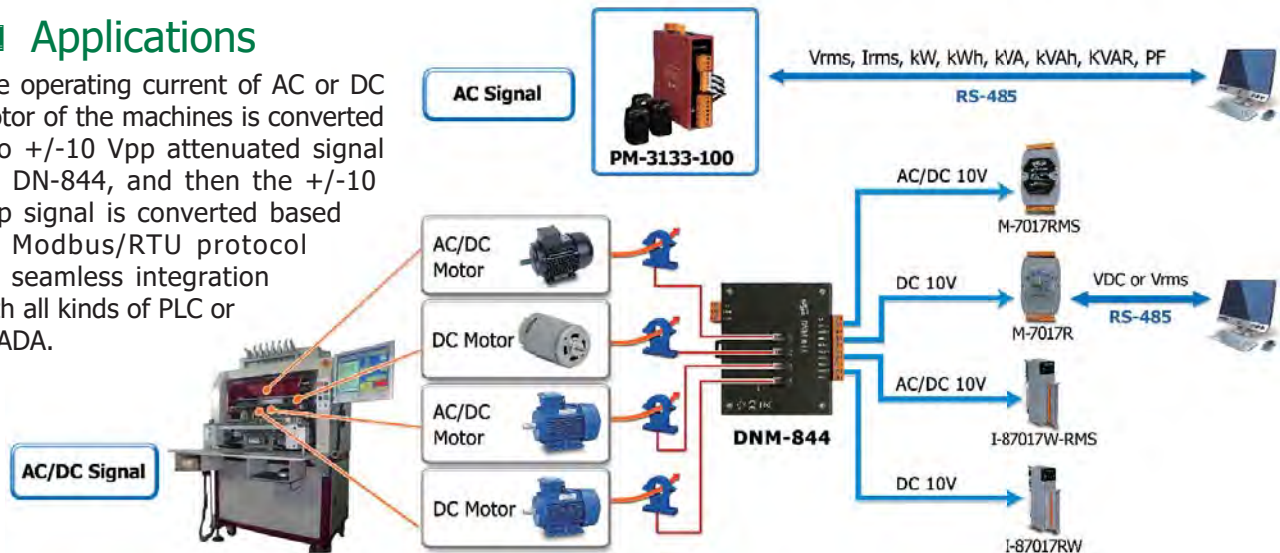
📁 Appearance & Specifications

Model		Input Channel	Input Type	Input Range	CT Type	Cable	Output
	DNM-831I-100V-50A DNM-831I-100V-200A DNM-831I-100V-500A	1 × Voltage, 1 × Current	AC/DC	±100 Vpp, ±50 A	Clip-on Ø21 mm	1.5 m/2.5 m	±10 Vpp
				±100 Vpp, ±200 A			
				±100 Vpp, ±500 A			
	DNM-831I-100V-1000A DNM-831I-100V-2000A			±100 Vpp, ±1000 A	Clip-on Ø40.5 mm	1.5 m	
				±100 Vpp, ±2000 A			
	DNM-844-50A DNM-844-200A DNM-844-500A	4 × Current	AC/DC	±50 A	Clip-on Ø21 mm	1.5 m/2.5 m	±10 Vpp
				±200 A			
				±500 A			
	DNM-844-1000A DNM-844-2000A			±1000 A	Clip-on Ø40.5 mm	1.5 m	
				±2000 A			
	DN-843VI-600V	3 × Voltage	AC/DC	±600 Vpp	N/A	N/A	±10 Vpp
	DN-848VI-10V DN-848VI-80V DN-848VI-150V	8 × Voltage	AC/DC	±10 Vpp	N/A	N/A	±10 Vpp
				±80 Vpp			
				±150 Vpp			
	DN-843I-CT-1 DN-843I-CT-10 DN-843I-CT-20 DN-843I-CT-50	3 × Current	AC/DC	±1 A	Solid Core (closed)	N/A	±1.6 Vpp, ±10 Vpp, ±10 Vpp, ±4 Vpp
				±10 A			
				±20 A			
				±50 A			

Ch8. iWSN Solution
iWSN Series (Industrial Wireless Sensor Network)
Semiconductor, electronics manufacturing

8.1 Overview

With the trend toward smart manufacturing and flexible manufacturing, the production process is becoming increasingly complicated, and each production stage is interlocked. The condition of the equipment is evaluated using the concept of predictive maintenance to maintain the operation of the production line. In response to the Internet of Things (IoT), big data analysis, Industry 4.0, energy-saving and carbon-reduction requirements, ICP DAS has developed the "Industrial Wireless Sensor Network" solution. In addition to integrating current, temperature measurement, and wireless transmission functions into a single module, the ultralow power consumption can be matched with a current transformer (CT) for inductive charging, it can meet the supply and demand balance of working power and supply the required continuous uninterrupted measurement equipment parameters with sufficient power. The settings can be completed using a DIP switch, which not only doesn't affect the production process, but also greatly saves system construction time and reduces maintenance costs. To meet the power consumption needs of monitoring equipment, predictive maintenance and power panel temperature monitoring, it's helpful to maintain the production line equipment and prevent accidents caused by the aging of power panel equipment and cables.

8.2 Comparison between Traditional and iWSN methods

Item	Traditional Meter	iWSN Series
Main function	Measuring power parameter data	Measuring current, temperature and DI (Continuous development of vibration, gas detection, etc.)
Accuracy	<1%	<3% or ±0.3A
Cycle	At least once per second	1/10/30/60 seconds
Power	DC power provides an additional transformer AC power provides power lines	CT charging, battery storage (Easy to install and maintain, and easy to build)
Power configuration	100% (7W) (Wireless Module + Meter + Power Supply)	0.3% (20mW) Power saving design
Parameter setting	Software Utility	DIP switch setting
Hardware cost	General	Low
System defect	Long construction time, system needs to be powered off to be built, complicated to set up, and difficult to maintain	Easy functions, low data update speed
Application	Monitoring system, electricity billing, energy efficiency actuarial or power quality analysis	Big data analysis, system monitoring, trend analysis and predictive maintenance

## 8.3 AC cable current required for supply and demand balancing

The built-in lithium battery in the iWSN is charged via the tiny current induced by the CT from the power line, and the power consumption of the lithium battery is related to the iWSN's wireless signal transmission period and whether thereis an expansion module connected to the iWSN-700 module. Therefore, when building an iWSN data acquisition scheme, the current of the power line to be measured must be greater than the current value of the "balance between supply and demand". The current values for the supply and demand balance under different conditions are as follows:

Transmission Interval	iWSN-1110X iWSN-1120X	iWSN-1121-DI	iWSN-1131	iWSN-1110X+iWSN-750P iWSN-1120X+iWSN-750P	iWSN-1110X+iWSN-757P iWSN-1120X+iWSN-757P
1s	11A	12A	19A	20A	21A
10s	3A	5A	12A	12A	13A
30s	3A	4A	5A	11A	12A
60s	3A	4A	5A	11A	12A

8.4 Features

Wireless Sensing

The iWSN wireless signal sensing module is fastened to the circuit being measured wire via the CT. The CT is usually in charging mode and can store the current received from the charging circuit in the battery. When the charging energy is greater than or equal to the power consumption, the wireless sensing module can operate continuously. If it is necessary to measure the current information from the power line, the module will automatically switch to operating mode to introduce the current signal into the circuit being measured. The result and state parameters for the module will be transmitted to the iWSN concentrator via wireless communication, and then the module will switch back to the charging state until the next measurement.
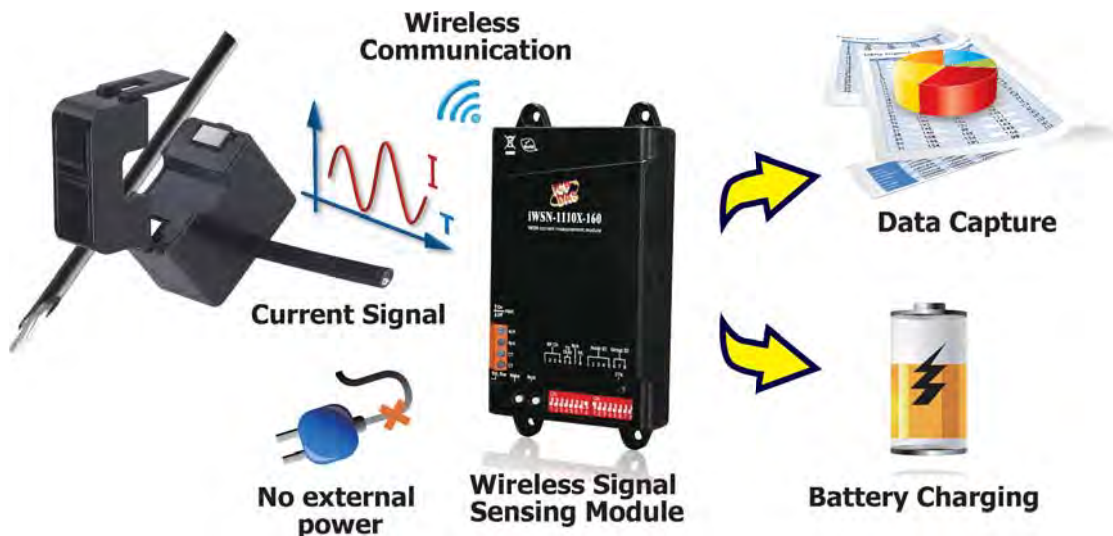

Rapid Deployment

8.5 System Structure

The iWSN network system includes a wireless data concentrator and a wireless sensing module. If there are more signal points to be collected, the IO interface on the iWSN I/O expansion module can be used to connect to these devices. The information collected by the iWSN data concentrator can be used to provide information to the field personnel through the ICP DAS touch panel controller, or the data can be sent to the cloud via a WISE series IIOT smart controller, or even connecting to instant messaging software. For the connection between the field communication network and the backbone of the network, ICP DAS also provides a series of converters, allowing data to be instantly uploaded to the control center for subsequent big data analysis.
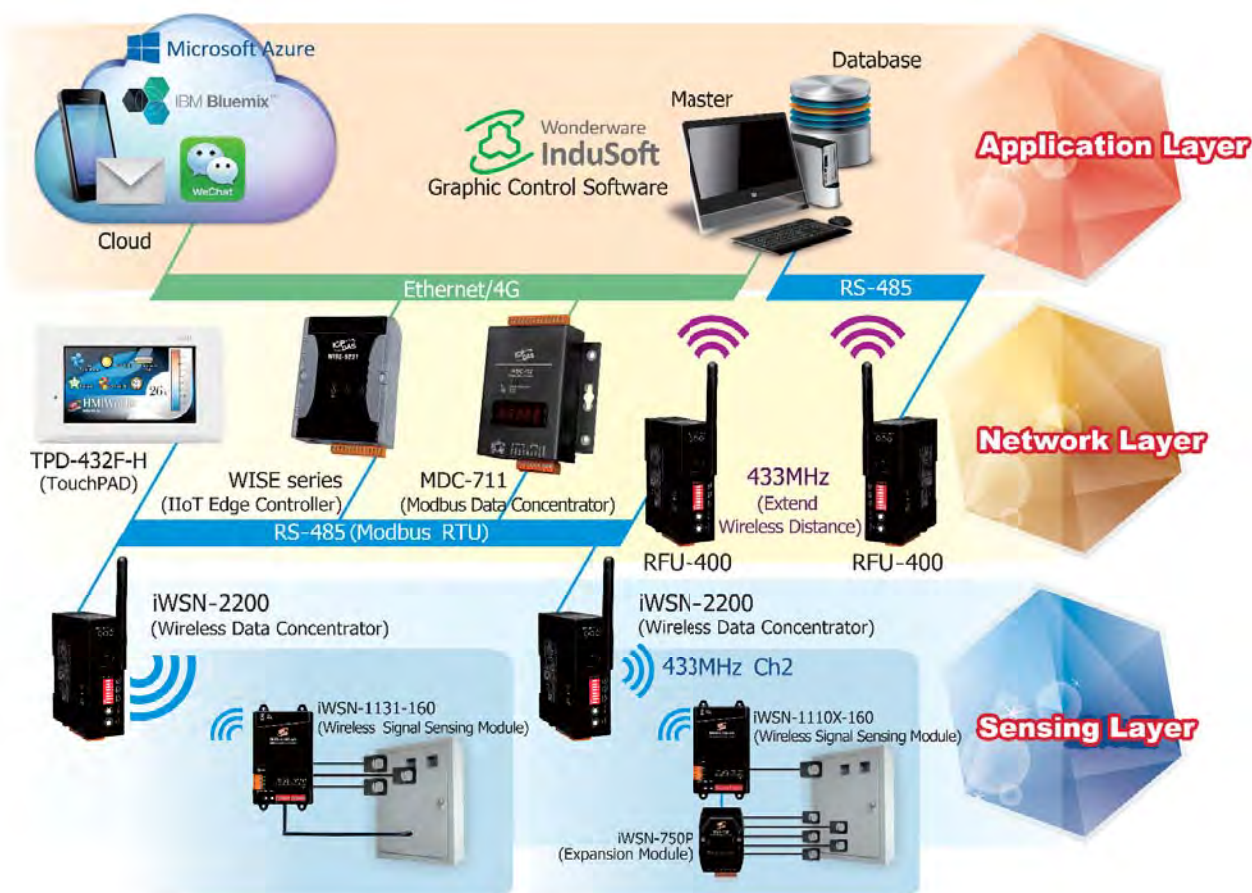
The functions of each device in an iWSN network system are described as follows:

Wireless Data Concentrator: iWSN-2200 series

The iWSN-2200 series collects and returns data from the sensor, and includes the Modbus RTU or Modbus TCP standard communication protocol that allows you to connect with upper system or graphics control software.

Wireless Signal Sensing Module: iWSN-1100 series

In addition to the acquisition of energy data via the connected CT, the current value on the cable on the CT is also measured and transmitted back to the data concentrator via wireless communication. Depending on the model, channels or expansion interfaces such as a split-core type CT, a Rogowski coil, temperature, and DI dry contact methods are also available.

I/O expansion module: iWSN-700 series

The iWSN-700 series is an expandable CT and temperature measurement interface, which series connects to the sensing module via wireless communication, and transmits the value collected by the expansion module to the sensing module, or, further, to the data concentrator.

8.6 Applications

💾 *Machine Diagnosis*

- **Use the iWSN-1110X-160 with the iWSN-757P to monitor current and temperature data.**
- **If a machine is working abnormally or is overloaded, and based on the relationship between the temperature of the machine and the current power consumption over an extended duration, an alarm will be issued and the fault can be eliminated to prevent more serious damage or loss of the machine caused by forced operations.**

If the operation of the machine is not normal, both the current and the temperature follow certain rules. Abnormal data is very likely to indicate that the machine is not operating properly. If the machine is not immediately scheduled for maintenance, more serious damage may be caused to the machine, and may even affect the safety of the operator, resulting in accidents.

If it is discovered that the parts are worn out after the machine is repaired, you can prepare a maintenance plan and order the spare parts in advance so that the production capacity for the production line can be properly planned so as to prevent accidental production line stagnation and loss of raw materials.
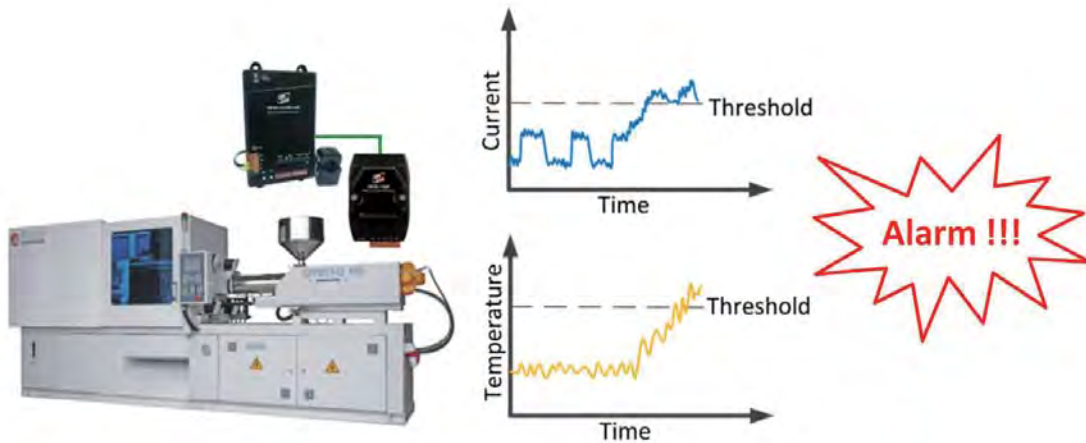
💾 *Monitoring the Utilization of a Machine*

- **Use the iWSN-1121-DI-240 module to monitor the current data on the panel.**
- **The two CT channels on the iWSN-1121-DI-240 module are used to detect the total current consumption of both the device and the main motor so as to determine whether the machine is in either standby or running condition.**

The floorspace of some factories is large and contains a lot of equipment. If the owner of the factory can keep track of the production status of each machine, the problem where the waiting time or standby time is too long can be avoided. The traditional method is for the employees to fill in the operating time themselves. Not only does it take time to organize this information, it is also impossible to control the artificial floating time behavior and dynamically understand the productivity of the production line machine. The iWSN network system provides the staff with an instant understanding of the operating status of the field production line, while, in addition, also giving an indication where any necessary raw materials need to be immediately replenished, allowing the machine to continue to operate efficiently and achieve optimal production capacity.

8.7 Wireless Data Concentrator

iWSN-2200 Series Features

- Supports 433 MHz Radio Frequency
- Provides 16 RF Channels
- Support Modbus RTU Protocol (Slave)
- Temporary storage for 31 sets of iWSN wireless signal sensing modules
- ESD Protection: +/- 4 kV Contact
- Isolation: 3000 VDC for DC-to-DC, 2500 Vrms for photo-couple
- DIN-Rail Mounting
- Operating Temp.: -25 to +75 °C

Optional Accessories

Antenna Base: NT-Base-02
Antenna Base/1500 mm

External Cable: 3S001-1
RG58A/U 1 Meter Long RP-SMA male to RP-SMA Female

Magnetic installation

Module Name	iWSN-2200	iWSN-2200-E
RF interface		
Radio Frequency	433 MHz	
Channels	0 ~ 15 (set by DIP/Rotary Switch)	
Transmission Distance (LoS)	100 m	
Connectivity	Supports up to 31 iWSN wireless signal sensing modules	
Communication		
Interface	RS-232 or RS-485 x 1	Ethernet x 1
Protocol	Modbus RTU	Modbus TCP
Baud Rate	1200 ~ 115200 bps, N81, O81, E81	10/100 Mbps
Mechanical		
Dimensions (L x W x H)	108 mm x 84 mm x 33 mm (without antenna)	
Antenna Dimensions (L x Ø)	108 mm x 10 mm	
Installation	DIN-Rail Mounting	
Other		
Input Voltage Range	10 ~ 30 V_{DC}	
Power Consumption	0.5W	1W
Operating Temperature	-25 °C ~ +75 °C	
Certification	CE+RED	CE

8.8 Wireless Signal Sensing Module

iWSN-1100 Series Features

- Built-in rechargeable Li-ion battery power supply
- Li-ion battery can be charged using the CT
- The CT is easy to mount
- Supports up to 1000 amps of cable current
- Supports 433 MHz Radio Frequency
- Provides 16 RF channels
- Provides extended interface for flexibility and scalability
- Wall-mounting and magnetic mechanism for installation

iWSN-1110X   **iWSN-1131**

Module	iWSN-1110X iWSN-1110X-160 iWSN-1110X-240 iWSN-1110X-360	iWSN-1121-DI-160 iWSN-1121-DI-240 iWSN-1121-DI-360	iWSN-1131P iWSN-1131-160 iWSN-1131-240 iWSN-1131-360	iWSN-1120X-360-RCT1000P iWSN-1120X-240-RCT1000P
RF Interface				
Radio Frequency	433 MHz			
Channels	0 ~ 15 (set via DIP Switch)			
Transmission Distance (LoS)	100 m			
Split-Core CT specifications				
CT Channels	1	2	3	1 (For charging only)
CT Input Voltage	50Hz / 60Hz，500V 以下			
CT Type	Φ16mm (100A)、Φ24mm (200A) and Φ36mm (400A) (Note 1)			Φ24mm (200A)
CT Error	<3% or 0.3A			-
Rogowski Coil Channel	-			1
Rogowski Coil Input Voltage	-			50Hz / 60Hz，500V 以下
Rogowski Coil Type	-			Φ80mm (1000A)
Rogowski Coil Error	-			3% or 2A
Thermistor (Optional)				
Channels	-	1	1	-
Measurement Range	-	0 °C ~ 80 °C	0 °C ~ 80 °C	-
Temperature Error	-	< 2 °C	< 2 °C	-
DI specification				
Channels	-	1	-	-
Type	-	Dry contact	-	-
Mechanical				
Dimensions (L x W x H)	152 mm x 85 mm x 36 mm			
Installation	Wall-mounting or magnetic mounting			
Other				
Battery	3.7V, 800mAh with 1.25mm connector (UV, OV, Short protection)			
Operating Temperature	0 °C ~ +45 °C			
Expansion Interface (Supports the iWSN-700 series)	Yes	-	-	Yes
Certification	CE + RED	CE only	CE only	CE + RED

Note 1: The accessories for the iWSN-11□□□-160, iWSN-11□□□-240 and iWSN-11□□□-360 are Φ16 mm (100 A), Φ24 mm (200 A), and Φ36mm (400 A).

8.9 I/O Expansion module

iWSN-700 Series Features

- Supports Multi-channel I/O Expansion
- Supports Split-Core CT using different measurement ranges
- Power is provided by the iWSN-1100X or iWSN-1120X sensing module
- Easy-to-maintain detachable screw terminal block
- Rail-mounting and magnetic mounting

Magnetic rail

iWSN-750P   **iWSN-757P**

Module	iWSN-750P	iWSN-757P
Split-Core CT specifications (Optional)		
Channels	5	
Input Voltage	50Hz / 60Hz, up to 500V	
Type	Φ16mm (100A)、Φ24mm (200A) and Φ36mm (400A)	
Error	<3% or 0.3A	
Form	Split-Core	
Thermistor (Optional)		
Channel	-	7
Measurement Range	-	0 °C ~ 80 °C
Temperature Error	-	< 2 °C
Mechanical		
Dimensions (L x W x H)	115 mm x 72 mm x 35 mm	
Installation	Wall-mounting or magnetic mounting	
Other		
Operating Temperature	0 °C ~ +45 °C	
Certification	CE	

Optional accessories

CA-SCT16I-100A-L080
8 m, 100 A, Φ16 mm Split-Core CT

CA-SCT24I-200A-L080
8 m, 200 A, Φ24 mm Split-Core CT

CA-SCT36I-400A-L080
8 m, 400 A, Φ36 mm Split-Core CT

CA-TM-M200-L050P
5 m Magnetic Plug Thermistor

CA-TM-M100-L050P
5 m Metal Plug Thermistor

CA-TM-P100-L020P
2 m Black Plastic Plug Thermistor

CA-TM-P100-L050P
5 m Black Plastic Plug Thermistor

Ch9. Portable Power Monitoring Suitcase

PPMS-133D-500P

Features

- True RMS Power Measurements
- Energy Analysis for 3P4W, 3P3W, 1P3W, 1P2W
- Voltage Measurements Up to 500 V
- Current Measurements up to 500 A
- Harmonic data capture (up to 31th order)
- Provide 7" Touch Panel for On-Site operations
- Support SNMP Protocol
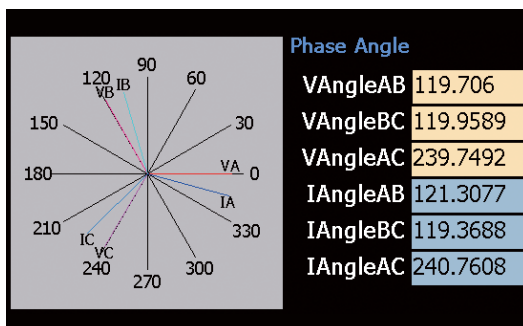- Temperature and Humidity Data Logger

Introduction

Portable Power Management Suitcase can measuring single to three-phase lines with a high degree of precision and accuracy. The PPMS-133D-500P is clamp on power meters designed to measure demand and harmonics, which are important for energy management, as well as basic electrical parameters such as voltage, current, power, power factor, and integrated power (watthours).
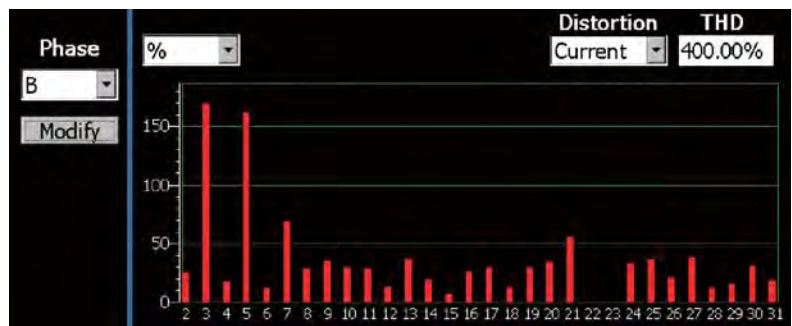
PPMS-133D-500P is equipped with built-in Web Server that allows direct connections via browsers to the PPMS-133D-500P for viewing power data and setting up the system parameters. PPMS-133D-500P also offers Modbus TCP/RTU Slave function that allows SCADA software to connect to PPMS-133D-500P to get real-time power data of the devices via Modbus TCP/RTU protocol.

Applications

Phase Angle	
VAngleAB	119.706
VAngleBC	119.9589
VAngleAC	239.7492
IAngleAB	121.3077
IAngleBC	119.3688
IAngleAC	240.7608

▲Phase angle detector

▲Harmonic data capture

Ordering Information

PPMS-133D-500P	Portable Power Monitoring Suitcase

Wireless Solution

- Voice Alert Module
- WLAN Products
- Radio Modems
- 3G/4G Products
- NB-IoT Solution
- GPS Products
- Bluetooth LE Converters
- ZigBee Products
- Infrared Wireless Modules
- Modbus Data Concentrators
- WLS (Wireless Locating System)
- iWSN Solution

IIoT Product

- IoTstar : cloud management software
- UA-5200 : communication server
- WISE series : IIoT host
- iCAM series : IP camera
- MQ-7200M series : MQTT I/O module
- Sensors : temperature, humidity, CO2, PM2.5,...

Industrial Fieldbus

- RS-485
- Industrial Ethernet
- Profinet
- CAN bus
- CANopen
- Devicenet
- J1939
- PROFIBUS
- HART
- Ethernet/IP
- BACnet

IIoT Cloud Solution - UA SERIES : IIoT Communication Server

- Built-in OPC UA Server Service
- Built-in MQTT Broker Service
- Support Logic Control IFTTT
- Support IoT Cloud Platforms Connection and IoTstar Cloud Management
- IIoT Factory Application of MES
- Pumping Station IoT Application
- BA Smart Building IoT Application
- Robotic Arm Co-operation Application

Machine Automation

- Motionnet Solutions
- EtherCAT Motion Control Solutions
- Ethernet Motion Control Solutions
- Serial Communication Motion Control Solutions
- PC-based Motion Control Cards
- PAC Solutions - Motion Modules

Smart Building, Smart Home Automation

- Video Intercom & Access Control
- Touch HMI - TouchPAD Series
- Smart Lighting Control
- Energy Saving - PM/PMC Series
- Environmental - DL/CL Series
- Motion Detector - PIR Series
- Wi-Fi Wireless - WF Series
- Infrared Wireless - IR Series
- ZigBee Wireless - ZT Series
- IIoT Server & Concentrator
- LED Display - iKAN Series

TouchPAD HMI Solutions

- Introduction
- TPD/VPD Products Series
- Video Intercom & Access Control Series
- TPD/VPD Application

PC-based I/O Boards

- PCI Express Bus Data Acquisition Boards
- PCI Bus Data Acquisition Boards
- ISA Bus Data Acquisition Boards

Local Distributor