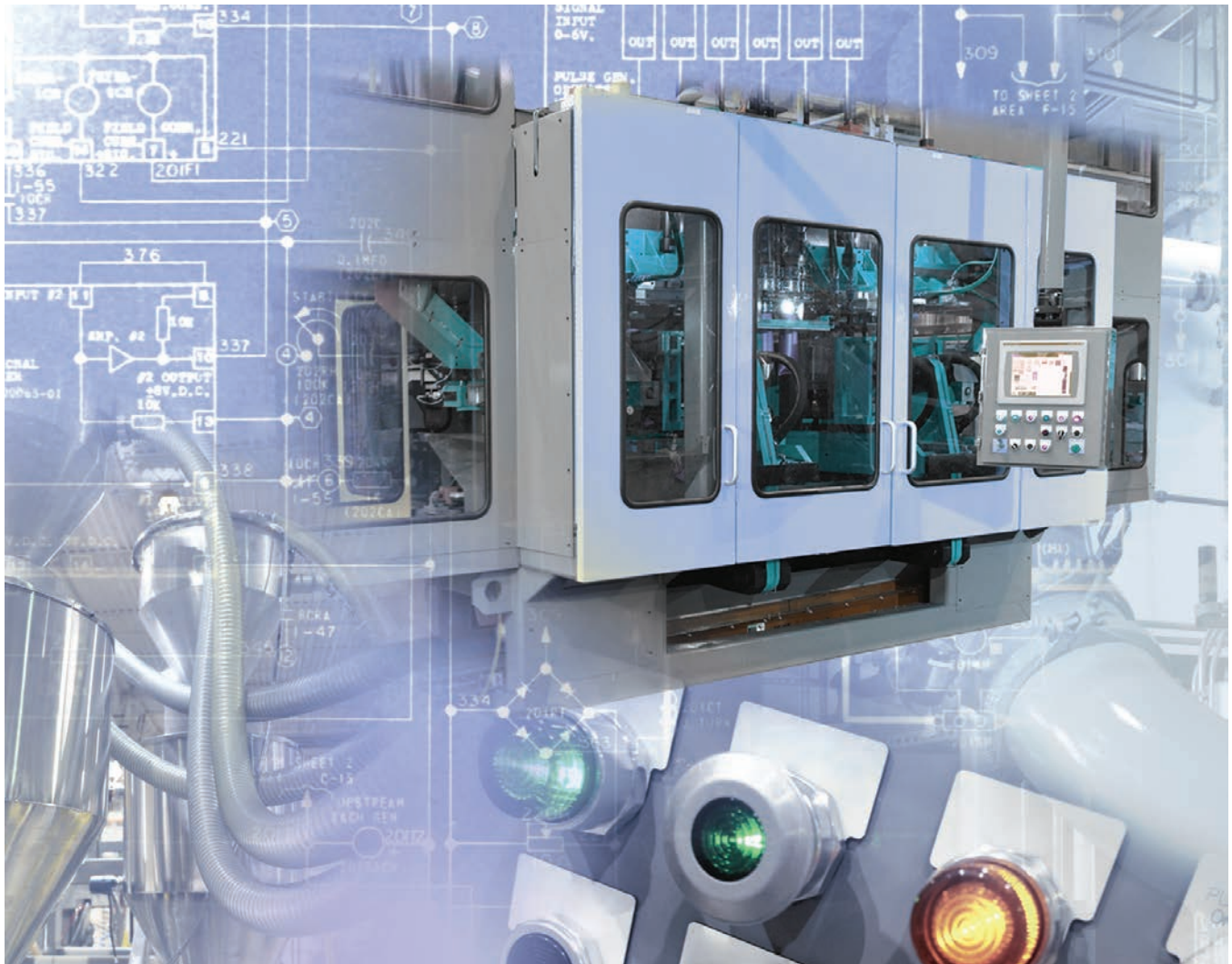


## Power and Energy Management

Catalog Numbers 1407, 1408, 1411, 1413, 1420, 1425, 1426, 9307



LISTEN.  
THINK.  
SOLVE.

# What's Inside

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# Additional Resources

Resource	Description
PowerMonitor 5000 Unit User Manual, publication <a href="#">1426-UM001</a>	Provides installation instructions, wiring diagrams, configuration, and specifications for PowerMonitor 5000 units.
PowerMonitor 5000 Optional Communication Modules Installation Instructions, publication <a href="#">1426-IN002</a>	Provides instructions for installing and removing optional communication modules.
PowerMonitor 1000 Unit Installation Instructions, publication <a href="#">1408-IN001</a>	Provides installation instructions and wiring diagrams for PowerMonitor 1000 units.
PowerMonitor 1000 Unit User Manual, publication <a href="#">1408-UM001</a>	Provides configuration and specifications for PowerMonitor 1000 units.
PowerMonitor 500 Unit User Manual, publication <a href="#">1420-UM001</a>	Provides installation instructions, wiring diagrams, configuration, and specifications for PowerMonitor 500 units.
PowerMonitor W250 Unit User Manual, publication <a href="#">1425-UM001</a>	Provides installation instructions, wiring diagrams, configuration, and specifications for PowerMonitor W250 units.
PowerPad Portable Power Monitor User Manual, publication <a href="#">1412-UM001</a>	Provides the features, operation, and specifications for the PowerPad Portable power monitor.
Combination Generator Control Module User Manual, publication <a href="#">1407-UM001</a>	Provides installation, configuration, start-up, and operation instructions for the CGCM unit.
FactoryTalk® EnergyMetrix™ Software User manual, publication <a href="#">FTALK-UM001</a>	Provides installation, configuration, and usage information for the software.
Capacitor Bank Controller User Manual, publication <a href="#">1413-UM001</a>	Provides installation, configuration, and operation information for the Capacitor Bank Controller.
Current Transformers Selection Matrix, publication <a href="#">1411-SG001</a>	Provides selection information for choosing your current transformers.
Current Transformers Technical Data, publication <a href="#">1411-TD001</a>	Provides dimension and accuracy information for the current transformers.

# Power and Energy Management Overview

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Which PowerMonitor product suits your application?

Are you interested in power and energy management, power quality management, or both?

Power Management

- Do you have an energy savings initiative within your company?
- Do your utility bills currently exceed \$100,000 a month?
- Is energy more than 15% of your operating costs?
- Do you plan to buy electricity in the competitive market?
- Do you want to understand where your energy is consumed?

Power Quality Management

- Do you have unplanned downtime?
- How much are you spending on downtime?
- Are you able to identify the cause of downtime?
- Are there electronics failing in your facility with no known cause?
- Do you have a good understanding of the power quality in your plant?

If you answered yes to any of these questions, we can provide a solution.

## Power Management Metering

The PowerMonitor 500 unit and the PowerMonitor 1000 unit provide a power management metering option. These meter options provide a solution for customers who are in these situations:

- You are beginning an energy savings initiative.
- You notice a spike in utility bills.
- You need demand and consumption measured.
- You have meters implemented currently and are looking for a sub-metering option.
- You want to monitor individual processes and subprocesses.
- You want to communicate this metered data back to your network via optional communication (Ethernet/IP or Serial).

## Wireless Power Management Metering

Does a basic metering option suit your needs; however, a wireless option would be more useful due to ease of installation and eliminated networking costs?

The PowerMonitor W250 unit provides consumption and demand data with wireless communication (with FactoryTalk EnergyMetrix software).

## Power Quality and Power Management Metering

Do you need a more advanced metering option with power quality features?

Do you require Class 0.2 Revenue Grade Accuracy?

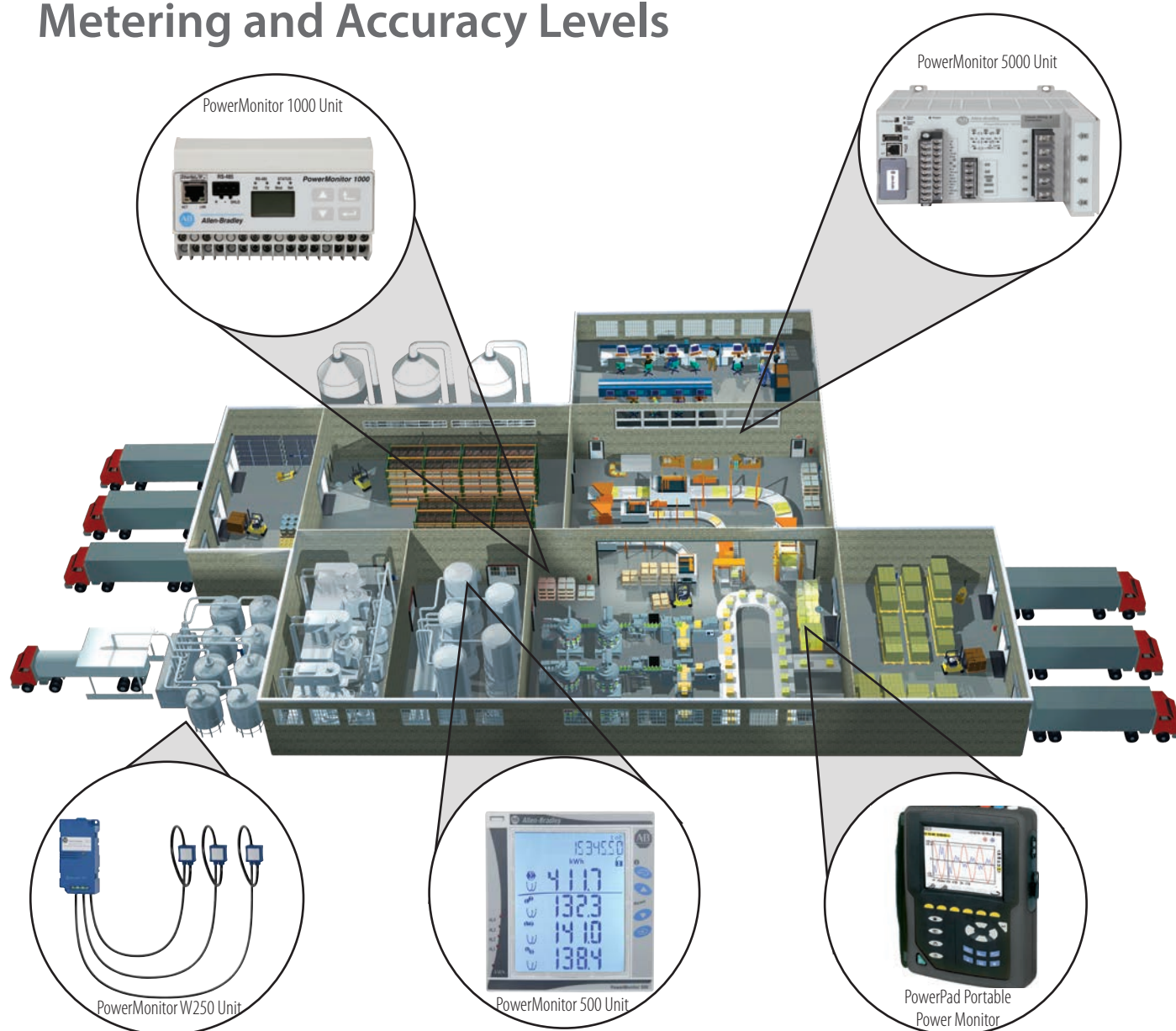
Do you have compliance initiatives within your organization?

Do you require waveform capture or advanced PQ measurements?

Choose the PowerMonitor 5000 unit if you are in one or more of these areas:

- Systems integrators focusing on a power quality and/or total system energy projects
- Semi-conductor industry
- Customers with power quality issues
- Lighting industry
- Monitoring main incoming power to the facility

# Metering and Accuracy Levels



Metering Levels	PowerMonitor W250	PowerMonitor 500	PowerMonitor 1000	PowerPad	PowerMonitor 5000
Consumption	X	X	X	X	X
Demand	X	X	X	X	X
Power factor		X	X	X	X
Power quality (sag/swell, harmonics, transients)				X	X
Waveform capture				X	X
<b>Accuracy levels (per standard EN62053-22)</b>					
Class 1, 1% energy accuracy	X	X	X		
Class 0.5, 0.5% energy accuracy				X	
Class 0.2, 0.2% energy accuracy					X

# Connectivity

## PowerMonitor 5000

(page 6)

### OUTPUTS:

Digital signal  
EtherNet/IP  
DeviceNet  
ControlNet  
KYZ signal

### INPUTS:

Digital signal



## PowerMonitor 500

(page 9)

### OUTPUTS:

Digital signal  
Analog signal (0...20 mA)  
Modbus RTU  
EtherNet/IP



## PowerMonitor 1000

(page 12)

### OUTPUTS:

Modbus RTU  
EtherNet/IP  
KYZ signal

### INPUTS:

Digital signal

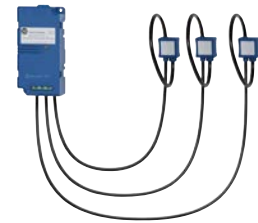


## Wireless PowerMonitor W250

(page 16)

### OUTPUTS:

Wireless



## PowerPad Portable PowerMonitor Unit

(page 19)

A lightweight portable unit allowing you to monitor power anywhere in your facility with superior functionality and accuracy.



## Combination Generator Control Module

(page 22)

### OUTPUTS:

ControlNet

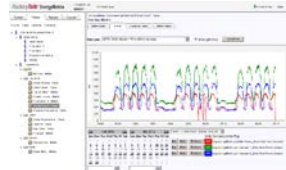


## FactoryTalk EnergyMetrix Software

(page 26)

### INPUTS:

Wireless  
Digital signal  
Analog signal  
Modbus RTU  
EtherNet/IP  
KYZ signal



## Capacitor Bank Controller

(page 30)

### OUTPUTS:

Modbus RTU  
EtherNet/IP  
KYZ signal

### INPUTS:

Digital signal



## Current Transformers (CTs)

(publication 1411-SG001)

Low voltage transformers for various power measurement devices and applications, including protective relays, analog devices, transducers, and PowerMonitor products.



# Bulletin 1426 - PowerMonitor 5000 Unit

## Overview

Do you need a more advanced metering option with power quality features?

Do you have compliance initiatives within your organization?

The PowerMonitor 5000 unit is the next generation of high-end electric metering products from Rockwell Automation. This new family of meters provides advanced technology, new functionality, faster response, and superior accuracy. The M5 model is the base version and provides an extensive range of metering functionality. The PowerMonitor 5000 unit communicates power and energy parameters to controllers, HMI software, and applications such as FactoryTalk EnergyMetrix software over the Ethernet network or other optional networks. The PowerMonitor 5000 unit works with controllers or software applications to address key customer applications including the following:

- Load profiling
- Cost allocation
- Billing and sub-billing
- Power system monitoring and control
- Demand management
- Demand response



## Features

**PowerMonitor 5000 Unit Features**

Feature	1426-M5	1426-M6	1426-M8
Voltage inputs	X	X	X
Current inputs	X	X	X
Frequency	X	X	X
Power	X	X	X
Energy	X	X	X
Demand	X	X	X
Unbalance measurements	X	X	X
Crest factor	X	X	X
K-Factor	X	X	X
THD	X	X	X
Logs	X	X	X
Setpoints	X	X	X
Time Sync	X	X	X
Ethernet/IP	X	X	X

**PoweMonitor 5000 Unit Features**

Feature	1426-M5	1426-M6	1426-M8
DeviceNet	X	X	X
ControlNet	X	X	X
Revenue Accuracy	X	X	X
USB data Export	X	X	X
Virtual wiring correction	X	X	X
Alarming	X	X	X
Configurable via webpage	X	X	X
Harmonics		X	X
Oscillography		X	X
Event Sync		X	X
Flicker			X
Interharmonics			X
Transient Detect			X

## Product Selection

Cat. No.	Description
1426-M5E-A	PowerMonitor 5000 M5 unit with native Ethernet communication network
1426-M5E-CNT-A	PowerMonitor 5000 M5 unit with native Ethernet and optional ControlNet network communication
1426-M5E-DNT-A	PowerMonitor 5000 M5 unit with native Ethernet and optional DeviceNet network communication
1426-M6E-A	PowerMonitor 5000 M6 unit with native Ethernet communication network
1426-M6E-CNT-A	PowerMonitor 5000 M6 unit with native Ethernet and optional ControlNet network communication
1426-M6E-DNT-A	PowerMonitor 5000 M6 unit with native Ethernet and optional DeviceNet network communication
1426-M8E-A	PowerMonitor 5000 M8 unit with native Ethernet communication network
1426-M8E-CNT-A	PowerMonitor 5000 M8 unit with native Ethernet and optional ControlNet network communication
1426-M8E-DNT-A	PowerMonitor 5000 M8 unit with native Ethernet and optional DeviceNet network communication

**Accessories**

Cat. No.	Description
1426-COMM-DNT	DeviceNet optional communication module
1426-COMM-CNT	ControlNet optional communication module
1426-UPGR-56	M5 to M6 firmware upgrade
1426-UPGR-58	M5 to M8 firmware upgrade
1426-UPGR-68	M6 to M8 firmware upgrade
1426-DM	PanelView™ Component C400 terminal with factory-installed applications

# Specifications

## Accuracy and Range

Accuracy in % of Reading at 25 °C (77 °F) 50/60 Hz Unity Power Factor			
Attribute		Applies to 1426-M5	Rating, nom/Metering Range, max
Voltage sense inputs: V1, V2, V3, VN	±0.1%	X	Line-neutral rms: 398V AC/15...660V AC Line-line rms: 690V AC/26...1144V AC
VG		X	Connect to power system earth ground only. This is a functional ground.
Current sense input: I1, I2, I3, I4	±0.1%	X	5 A / 0.05 - 15.6 A rms
Frequency	±0.05 Hz	X	50 or 60 Hz / 40...75 Hz
Power functions: kW, kVA, kVAR Demand functions: kW, kVA, kVAR Energy functions: kWh, kVAh, kVARh	<ul style="list-style-type: none"> <li>ANSI C12.20 -2010 Class 0.2 <sup>(1)</sup> Clause 5.5.4</li> <li>EN 62053-22 -2003 Class 0.2 <sup>(1)</sup> Accuracy Clause 8</li> </ul>	X	
Metering update rates	One update per line cycle; 1024 samples per cycle per channel	X	

(1) For catalog number 1426-M5E (PN-54351) units manufactured from July 2012...January 2013, the accuracy is Class 0.5 not Class 0.2. All other characteristics and products are not impacted. The impacted units are those with manufacturing date codes of 0712, 0812, 0912, 1012, 1112, 1212, 0113.

## General Specifications

Attribute	Maximum Rating
Voltage terminal blocks	18...14 AWG (0.75...2.5 mm <sup>2</sup> ), 75 °C (167 °F) min copper wire only Recommended torque 1.5 N•m (13.3 lb•in)
Current sensing input	12 AWG (4 mm <sup>2</sup> ), 75 °C (167 °F) min copper wire only Recommended torque N/A
Control power terminal block	22...14 AWG (0.25...2.5 mm <sup>2</sup> ), 75 °C (167 °F) min copper wire only Recommended torque 0.63 N•m (5.6 lb•in)
Input/output (I/O) terminal block	20...14 AWG (0.5...2.5 mm <sup>2</sup> ), 75 °C (167 °F) min copper wire only Recommended torque 0.63 N•m (5.6 lb•in)
Temperature, operating	-20...70 °C (4...158 °F)
Temperature, storage	-40...85 °C (-40...185 °F)
Humidity, noncondensing	5...95%
Vibration	2 g
Shock, operating	30 g
Shock, nonoperating	50 g
Dielectric withstand	UL61010, EN61010
Installation location	Indoor use only
Altitude	2000 m (6560 ft) max
UL/CUL	UL 61010 listed, File E345550, for Measuring, Testing and Signal-generation Equipment and CUL Certified.
CE Certification	If this product bears the CE marking, it is approved for installation within the European Union and EEA regions. It has been designed to meet the following directives.

# Bulletin 1420 - PowerMonitor 500 Unit

## Overview

The PowerMonitor 500 unit is an AC power monitor with a built-in advanced configuration system and LCD data display. The unit is designed for measurement of electrical parameters in a variety of three-phase and single-phase circuits. The unit is enclosed in a modular housing for panel mounting, with IP65 degree of protection in front of the panel. The power monitor can be provided with analog or digital outputs. These outputs can be selected to output a pulse proportional to the real and reactive energy measured, or to annunciate alarms. The instrument can also be equipped with a serial RS-485/RS-232 port, an EtherNet/IP port, and analog outputs.



Equipped with an optional communication port, the unit communicates power and energy parameters to applications, such as FactoryTalk EnergyMetrix software. The power monitor works with these software applications to address these key customer applications:

- **Load profiling** - log power parameters, such as real energy, apparent power, and demand, for analysis of power usage by loads over time
- **Cost allocation** - reporting actual energy cost by department or process to integrate energy information into management decisions
- **Billing and sub-billing** - charging users of energy the actual usage cost rather than allocating by square footage or other arbitrary methods
- **Power system monitoring and control** - display and control power flow and energy utilization

## Features

PowerMonitor 500 Unit Features

Feature	Availability
Voltage	X
Current	X
Frequency	X
Consumption	X
Demand	X
Voltage unbalance	X
Current unbalance	X
kW	X
kVAR	X
kVA	X
True Power Factor	X
kWh	X
kVARh	X
kVAh	X
kW Demand	X
kVAR Demand	X

**PowerMonitor 500 Unit Features**

Feature	Availability
kVA Demand	X
Demand Power Factor	X
Analog Output (0...20 mA)	X <sup>(1)</sup>
Pulse (digital) Output	X <sup>(1)</sup>
RS-485	X <sup>(1)</sup>
EtherNet/IP	X <sup>(1)</sup>

(1) These features are optional.

## Product Selection

**Available Product**

Cat. No.	Description
1420-V1	PowerMonitor 500 power meter indicator, 240V AC V-LL 120V AC V-LN/240V AC V-LL
1420-V1P	PowerMonitor 500 power meter, 240V AC V-LL 120V AC V-LN/240V AC V-LL, pulse (digital) output
1420-V1A	PowerMonitor 500 power meter, 240V AC V-LL 120V AC V-LN/240V AC V-LL, analog output
1420-V1-ENT	PowerMonitor 500 EtherNet/IP power meter, 240V AC V-LL 120V AC V-LN/240V AC V-LL
1420-V1P-485	PowerMonitor 500 serial power meter, 240V AC V-LL 120V AC V-LN/240V AC V-LL, pulse (digital) output
1420-V1P-ENT	PowerMonitor 500 EtherNet/IP power meter, 240V AC V-LL 120V AC V-LN/240V AC V-LL, pulse (digital) output
1420-V1P-485	PowerMonitor 500 serial power meter, 240V AC V-LL 120V AC V-LN/240V AC V-LL, pulse (digital) output
1420-V1A-ENT	PowerMonitor 500 EtherNet/IP power meter, 240V AC V-LL 120V AC V-LN/240V AC V-LL, analog output
1420-V1A-485	PowerMonitor 500 serial power meter, 240V AC V-LL 120V AC V-LN/240V AC V-LL, analog output
1420-V2	PowerMonitor 500 power meter indicator, 400V AC V-LN and 600V AC V-LL
1420-V2P	PowerMonitor 500 power meter, 400V AC V-LN and 600V AC V-LL, pulse (digital) output
1420-V2A	PowerMonitor 500 power meter, 400V AC V-LN and 600V AC V-LL, analog output
1420-V2-ENT	PowerMonitor 500 EtherNet/IP power meter, 400V AC V-LN and 600V AC V-LL
1420-V2-485	PowerMonitor 500 serial power meter, 400V AC V-LN and 600V AC V-LL
1420-V2P-ENT	PowerMonitor 500 EtherNet/IP power meter, 400V AC V-LN and 600V AC V-LL, pulse (digital) output
1420-V2P-485	PowerMonitor 500 Serial power meter, 400V AC V-LN and 600V AC V-LL, pulse (digital) output
1420-V2A-ENT	PowerMonitor 500 EtherNet/IP power meter, 400V AC V-LN and 600V AC V-LL, analog output
1420-V2A-485	PowerMonitor 500 serial power meter, 400V AC V-LN and 600V AC V-LL, analog output

# Specifications

## General Specifications

Attribute	Value
Temperature, operating	-25...55 °C (-13...131 °F) (R.H. from 0...90% noncondensing @ 40 °C) according to EN62053-21, EN50470-1 and EN62053-23
Temperature, storage	-30...70 °C (-22...158 °F) (R.H. < 90% noncondensing @ 40 °C) according to EN62053-21, EN50470-1 and EN62053-23
Installation category	Cat. III (IEC60664, EN60664)
Dielectric strength	4 kV AC rms for 1 minute
Noise rejection CMRR	100 dB, 48...62 Hz
EMC	According to EN62052-11
Electrostatic discharge	15 kV air discharge
Immunity to radiated electromagnetic fields	Test with current: 10V/m from 80...2000 MHz
	Test without any current: 30V/m from 80...2000 MHz
Burst	On current and voltage measuring inputs circuit: 4 kV
Immunity to conducted disturbances	10V/m from 150 KHz...80 MHz
Surge	On current and voltage measuring inputs circuit: 4 kV; on 'L' auxiliary power supply input: 1 kV
Radio frequency suppression	According to CISPR 22

## Standard Compliance

Safety	IEC60664, IEC61010-1 EN60664, EN61010-1
Metrology	EN62052-11, EN62053-21, EN62053-23, EN50470-3. MID 'annex MI-003'
Pulse output	DIN43864, IEC62053-31
Approvals	CE, cULus (E56639)
Connections	Screw-type
Cable cross-section area	2.5 mm <sup>2</sup> (14 AWG) max
	Screw tightening torque: 0.4 N•m min/0.8 N•m max
	Suggested screw tightening torque: 0.5 N•m

## Housing DIN

Dimensions (WxHxD), approx	Module holder: 96 x 96 x 50 mm 'A' and 'B' type modules: 89.5 x 63 x 16 mm 'C' type module: 89.5 x 63 x 20 mm
Depth behind panel, max	81.7 mm (3.2 in.)
Material	ABS, self-extinguishing: UL 94V-0
Mounting	Panel mounting
Pollution degree	2
Front	IP65, NEMA4x, NEMA12
Screw terminals	IP20
Weight, approx	400 g (0.88 lb) (packing included)

# Bulletin 1408 - PowerMonitor 1000 Unit

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## Overview

The PowerMonitor 1000 unit is a compact, cost-effective, electric power and energy metering device intended for use in industrial control applications, such as distribution centers, industrial control panels, and motor control centers. The power monitor measures voltage and current in an electrical circuit, meeting revenue accuracy standards. The power monitor communicates power and energy parameters to applications, such as FactoryTalk EnergyMetrix, over Ethernet or serial networks. The power monitor works with these software applications to address the following key customer applications:



- **Load profiling** – log power parameters, such as real power, apparent power, and demand, for analysis of power usage by loads over time
- **Cost allocation** – reporting actual energy cost by department or process to integrate energy information into management decisions
- **Billing and sub-billing** – charging users of energy the actual usage cost rather than allocating by square footage or other arbitrary methods
- **Power system monitoring and control** – display and control power flow and energy utilization

# Features

## PowerMonitor 1000 Unit Features

Features	TR1	TR2	EM1	EM2	EM3
Voltage	X	X			X
Current	X	X			X
Frequency	X	X			X
Consumption					X
Demand					X
Analog output					X
Pulse (digital) output					X
Voltage unbalance	X	X			X
Current unbalance	X	X			X
kW		X			X
kVAR		X			X
kVA		X			X
True Power Factor					X
kWh			X	X	X
kVARh				X	X
kVAh				X	X
kW demand				X	X
kVAR demand				X	X
kVA demand				X	X
Projected kW demand				X	X
Projected kVAR demand				X	X
Projected kVA demand				X	X
Demand power factor				X	X
Energy log			X	X	X
Min/Max log	X	X		X	X
Load factor log				X	X
Status log	X	X	X	X	X
RS-485	X	X	X	X	X
Ethernet	X	X	X	X	X

# Product Selection

## Available Product

Cat. No.	Description
1408-TR1A-485	PowerMonitor 1000 voltage and current transducer with serial network communication
1408-TR1A-ENT	PowerMonitor 1000 voltage and current transducer with Ethernet network communication
1408-TR2A-485	PowerMonitor 1000 voltage, current, and power transducer with serial network communication
1408-TR2A-ENT	PowerMonitor 1000 voltage, current, and power transducer with Ethernet network communication
1408-EM1A-485	PowerMonitor 1000 KWh submeter with serial network communication
1408-EM1A-ENT	PowerMonitor 1000 KWh submeter with Ethernet network communication
1408-EM2A-485	PowerMonitor 1000 energy and demand monitor with serial network communication
1408-EM2A-ENT	PowerMonitor 1000 energy and demand monitor with Ethernet network communication
1408-EM3A-485	PowerMonitor 1000 energy, demand, and power monitor with serial network communication
1408-EM3A-ENT	PowerMonitor 1000 energy, demand, and power monitor with Ethernet network communication

# Specifications

## Technical Specifications

Attribute	Accuracy in % of Reading at 25 °C (77 °F) 50/60 Hz Unity Power Factor						Nominal / Range
		Applies to					
		TR1	TR2	EM1	EM2	EM3	
Voltage sense inputs: V1, V2, V3	±0.5%	X	X			X	Line-neutral rms: 347V / 15...399V Line-line rms: 600V / 26...691V
Current sense input: I1, I2, I3	±0.5%	X	X			X	5A / 0.05...10.0 A rms
Frequency	±0.05 Hz	X	X			X	50 or 60 Hz / 40...75 Hz
Power functions: kW, kVA, kVAR	EN62053– 21:2003 Accuracy Requirement Class 1		X			X	
Demand functions: kW, kVA					X	X	
Energy functions: kWh, kVAh				kWh only	X	X	
Metering update rates	100 ms V, I, Hz 200 ms Power	X	X	X	X	X	

## Input and Output Specifications

Attribute	Value
Control power	85...264V AC 47...63 Hz 125...250V DC 4VA max
Voltage sense inputs: V1, V2, V3	Input impedance: 5 M $\Omega$ min Input current: 2 mA max
Current sense inputs: I1, I2, I3	Overload withstand: 15 A continuous, 200 A for 1/2 s Burden: 0.05V A Impedance: 0.002 W Max crest factor at 5 A is 3.0 Starting current: 5 mA
Status inputs	Contact closure (internal 24V DC)
KYZ output	80 mA at 240V AC / 300V DC

## Environmental Specifications

Attribute	Value	
Dielectric withstand	Control power	2500V
	Voltage inputs	2500V
	Current inputs	2500V
	Status inputs	2500V
	KYZ output	2500V
Terminal blocks	0.34...2.5 mm² (22...14 AWG), 75 °C (167 °F) min copper wire only Recommended torque 0.8 N•m (7 lb•in)	
Temperature, operating	-10...60 °C (14...140 °F)	
Temperature, storage	-40...85 °C (-40...185 °F)	
Humidity , noncondensing	5...95%	
Vibration	2.0 g 10...500 Hz	
Shock, operating	30 g peak each axis	
Shock, nonoperating	50 g peak each axis	

# Bulletin 1425 - PowerMonitor W250 Unit

## Overview

The PowerMonitor W250 family includes a selection of power monitors, receivers, and routers that communicate wirelessly in a mesh arrangement designed for robust, reliable energy data collection.

The PowerMonitor W250 unit consists of three main parts:

- **Wireless power monitor** - The PowerMonitor W250 unit is a sub-meter that measures and calculates several electrical parameters. The unit is equipped with pre-wired split core current transformers or Rogowski coils and embedded wireless data transmission capabilities.
- **Wireless PC receiver** - The receiver is a standalone gateway that manages the wireless network and collects data periodically sent by PowerMonitor W250 units. The receiver transmits data through its serial port to the data logging system for analysis. An optional, user-provided serial to Ethernet converter connects the receiver to your local area network.
- **Wireless router** - The router is a repeater that extends the distance of the wireless transmission range and can provide multiple signal paths between the PowerMonitor W250 unit and the receiver when needed.



## Features

Does a basic metering option suit your needs; however, a wireless option would be more useful due to ease of installation and eliminated networking costs?

**PowerMonitor W250 Unit Features**

Feature	Availability
Accuracy	X
Demand (requires RSEnergyMetrix® software version 1.8 software or later; or FactoryTalk EnergyMetrix software version 2.0 or later)	X
Consumption	X
Voltage in interval, min	X
Current in interval, max	X
Frequency	X
DIN rail mountable	X
Time stamp	X
Wireless	X
Ethernet connection	X
Serial connection	X
Integrated CTs	X

## Product Selection

Unlike other power monitor offerings, the PowerMonitor W250 unit comes with integrated current transformers, wiring mode, and voltage ratings. Be sure to select the appropriate meter for the electrical system being metered.

### Available Product

Cat. No.	Description
1425-D1002-MOD	PowerMonitor wireless, 100A, 300V delta
1425-D1002-MOD-480	PowerMonitor wireless, 100A, 480V delta
1425-W1003-MOD	PowerMonitor wireless, 100A, 300V wye
1425-D2002-MOD	PowerMonitor wireless, 200A, 300V delta
1425-W2003-MOD	PowerMonitor wireless, 200A, 300V wye
1425-D5002-MOD	PowerMonitor wireless, 500A, 300V delta
1425-D5002-MOD-480	PowerMonitor wireless, 500A, 480V delta
1425-W5003-MOD	PowerMonitor wireless, 500A, 300V wye
1425-D10002-MOD	PowerMonitor wireless, 1000A, 300V delta
1425-W10003-MOD	PowerMonitor wireless, 1000A, 300V wye
1425-D20002-MOD	PowerMonitor wireless, 2000A, 300V delta
1425-D20002-MOD-480	PowerMonitor wireless, 2000A, 480V delta
1425-GAT10	PowerMonitor wireless PC receiver, 10 nodes
1425-GAT100	PowerMonitor wireless PC receiver, 100 nodes
1425-GAT200	PowerMonitor wireless PC receiver, 200 nodes
1425-ADR1	PowerMonitor adapter, US
1425-ADR2	PowerMonitor adapter, EMEA
1425-ADR3	PowerMonitor adapter, UK
1425-W20003-MOD	PowerMonitor wireless, 2000A, 300V wye
1425-NOD	Wireless power monitor router
1425-ADR1	PowerMonitor router adapter, US
1425-ADR2	PowerMonitor router adapter, EMEA
1425-ADR3	PowerMonitor router adapter, UK

# Specifications

## PowerMonitor W250, Line Powered up to 300V AC rms

Attribute	Value
Primary nom current	20 ... 2000 A (depending on the model)
Primary voltage, measuring range (neutral/phase) (VPN)	90 ... 300V rms
Primary voltage, nom range (N/L) (VPN)	100 ... 272V rms
Absolute min/max input voltage (N/L)	90 ... 300V rms
Frequency	50/60 Hz
Power consumption, max	2 W
Supply current, max (N-L1)	0.2 A rms
Temperature, ambient operating (90% rH) (TA)	-10 ... 55 °C (14 ... 131 °F)
Altitude	Up to 2000 m (6562 ft)
Protection degree	IP2X (for indoor use only)
Pollution degree	PD2
Isolation	Isolation class II
IEC 61010-1 CAT III	300V rms

# Bulletin 1412 - PowerPad Portable Power Monitor

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## Overview

The PowerPad power monitor is a three-phase power quality analyzer that is easy-to-use, compact, and shock-resistant. It is intended for technicians and engineers to measure and carry out diagnostic work on one-, two-, or three-phase low voltage networks.



You can obtain instant waveforms of an electrical network's principal characteristics, and also monitor their variation over a period of time. The multi-tasking measurement system simultaneously handles all of the measurement functions of the various magnitudes, detection, continuous recordings, and their display without any constraints.

## Features

The PowerPad power monitor has the following features:

- Measurement of rms voltages up to 480V (phase-to-neutral) or 830V (phase-to-phase) for two, three, or four-wire systems
- Measurement of rms currents up to 6500 A rms
- Frequency measurement (10...70 Hz systems)
- Calculation of neutral current for wye configurations
- Calculation of Crest Factors for current and voltage
- Calculation of the K Factor for transformers
- Calculation of short-term flicker for voltage
- Calculation of the phase unbalance for voltage and current (3 phase systems only)
- Measurement of harmonic angles and rates (referenced to the fundamental or rms value) for voltage, current or power, up to 50th harmonic
- Calculation of overall harmonic distortion factors
- Monitoring of the average value of any parameter, calculated over a period running from 5 seconds to 2 hrs
- Measurement of active, reactive, and apparent power per phase and their respective sum total
- Calculation of the power factor, displacement power factor, and tangent factor
- Total power from a point in time, chosen by the operator
- Recording, time stamping, and characterization of disturbance (swells, sags, and interruptions, exceeding power and harmonic thresholds)
- Detection of transients and recording of associated waveforms

# Product Selection

Cat. No.	Description
1412-PP2127-48	PowerPad portable power monitor with MN93 240 A current probes
1412-PP2127-49	PowerPad portable power monitor with SR193 1200 A current probes
1412-PP2127-50	PowerPad portable power monitor with 24 in. AmpFlex 193-24 6500 A current probes
1412-PP2127-51	PowerPad portable power monitor with 36 in. AmpFlex 193-36 6500 A current probes

# Specifications

## General Specifications

Attribute	Reference Conditions
Temperature, ambient	23 °C $\pm$ 3 °C (73 °F $\pm$ 5 °F)
Humidity	45%
Atmospheric pressure	25.4 . . . 31.3 in. Hg (860 . . . 1060 hPa)
Phase voltage	230V rms and 110V rms $\pm$ 2% without DC
Clamp current circuit input voltage	0.03 . . . 1V rms without DC (<0.5%)
AmpFlex current circuit input voltage	11.8 . . . 118 mV rms without DC (<0.5%)
Frequency of electricity network	50 and 60 Hz $\pm$ 0.1 Hz
V/I phase shift	0° active power / 90° reactive power
Harmonics	<0.1%

## Mechanical Specifications

Attribute	Value
Dimensions, approx	240 x 180 x 55 mm (9.5 x 7.0 x 2.0 in.)
Weight, approx	2.1 kg (4.6 lb)
Altitude, operating	0 . . . 2000 m (6560 ft)
Altitude, nonoperating	0 . . . 10,000 m (32,800 ft)

## Voltage Inputs

Attribute	Value
Operating range	Phase-Phase - 960V rms AC/DC Phase-Neutral 480V rms AC/DC
Input impedance	340 k: between phase and neutral
Overload	1.2Vn permanently; 2Vn for 1 s (Vn = nom voltage)

## Current Inputs

Attribute	Value
Operating range	0 . . . 1V
Input impedance	100 k: for current probe circuit and 12.4 k: for AmpFlex circuit
Overload	1.7V

**Safety Compatibility**

Specification	Value
Electrical safety (per EN 61010-1)	Double insulation 600V rms, Category III, Pollution Degree 2

**Electromagnetic Compatibility**

Immunity and emission	EN 61236-1 amendment 1
Electrostatic discharges	IEC 1000-4-2
Radiation field resistance	IEC 1000-4-3
Fast transients resistance	IEC 1000-4-4
Electric shock resistance	IEC 1000-4-5
Conducted RF interference	IEC 1000-4-6

**Mechanical Protection**

Shock and vibration	EN 61010-1
IP 50	EN 60529 (electrical IP2X for the terminals)

# Bulletin 1407 - Combination Generator Control Module

## Overview

The Combination Generator Control Module (catalog number 1407-CGCM) is a programmable automatic generator controller that maintains the generator output voltage within specific limits by controlling the current applied to the exciter field of the generator. The controller consists of a single design to regulate brush-less permanent magnet excited generators and brush-less self excited generators.

The CGCM performs voltage regulation via control of exciter field current provided to the generator stator.



## Product Selection

The Combination Generator Control Module is a product specifically designed to protect and synchronize generators in control applications. This includes generator protection, excitation control, synchronization control, and full-function metering.

Cat. No.	Description
1407-CGCM	Combination Generator Control Module

## Features

The CGCM has the following features.

### Generator Regulation and Control Functions

- Four excitation control modes
- Automatic voltage regulation (AVR)
- Manual or field current regulation (FCR)
- Power factor (PF)
- Reactive power (VAR)
- Soft start voltage buildup with an adjustable ramp in AVR and FCR control modes
- Overexcitation (OEL) and underexcitation (UEL) limiting in AVR, VAR, and PF control modes
- Underfrequency compensation (Volts/Hertz)
- Line Drop Compensation
- Auto-tracking between operating modes and between redundant CGCM units
- Automatic transfer to a backup CGCM unit in redundant systems
- Generator paralleling with reactive droop compensation or crosscurrent (reactive differential) compensation
- Generator paralleling with real power load sharing
- Synchronizing for 1 or 2 circuit breakers

## Generator Protection Functions

- Loss of excitation current (40)
- Overexcitation voltage (59F)
- Generator overvoltage (59)
- Generator undervoltage (27)
- Loss of sensing (60FL)
- Loss of permanent magnet generator (PMG/Excitation power) (27)
- Reverse VAR (40Q)
- Overfrequency (81O)
- Underfrequency (81U)
- Reverse power (32R)
- Rotating diode monitor
- Phase rotation error (47)
- Generator overcurrent (51)

## Metering Functions

- Voltage
- Current
- Frequency
- Real power
- Apparent power
- Reactive power
- Power factor
- Real energy (kWh)
- Apparent energy (kVAh)
- Reactive energy (kVARh)
- Controller excitation current and voltage
- Diode monitor ripple level
- Load share error
- Synchronization parameters

## Inputs and Outputs

### Inputs

- Single-phase or three-phase true rms generator voltage sensing
- Single-phase dual bus or three-phase single bus voltage sensing
- Three-phase generator current sensing (1 or 5 A nominal)
- Single-phase cross current loop 1 or 5 A current transformer (CT) input
- Auxiliary  $\pm 10\text{V}$  DC input providing remote control of the setpoints
- DC power input

### Outputs

- Pulse-width modulated output power stage rated at 15 A
- Discrete redundancy relay output
- Discrete fault output driver
- Load sharing connection for use with Allen-Bradley® 1402-LSM Line Synchronization Module or compatible hardware

## Communication Interfaces

The CGCM has three communication ports:

- Redundant ControlNet connector
- RS-232 port for dedicated communication with a redundant CGCM
- RS-232 port for factory configuration and test (not for customer use)

## Specifications

### Control Power

Supply	Burden
18...32V DC (24V DC nom)	30 W
AC ripple, max	50%, 50...120 Hz

### Operating Power Requirements

Source	Phases	Wiring Configuration	Voltage	Frequency	VA (max)
PMG <sup>(1)</sup>	1-phase	PMG-A and PMG-C	79V rms, min 300V rms, max	50 Hz, min 240 Hz, max	3070
PMG	3-phase	Floating wye	137V rms L-L, min 300V rms L-L, max	50 Hz, min 240 Hz, max	3070
SE <sup>(2)</sup>	1-phase	PMG-A and PMG-C	79V rms, min 300V rms, max	50 Hz, min 240 Hz, max	3070
SE	3-phase	Floating wye	137V rms L-L, min 300V rms L-L, max	50 Hz, min 240 Hz, max	3070
SE	3-phase	Grounded wye (Grounded neutral)	137V rms L-L, min 300V rms L-L, max	50 Hz, min 240 Hz, max	3070
SE	3-phase	Floating delta	137V rms L-L, min 300V rms L-L, max	50 Hz, min 240 Hz, max	3070
SE	3-phase	Open delta, floating	137V rms L-L, min 300V rms L-L, max	50 Hz, min 240 Hz, max	3070

(1) PMG = Permanent Magnet Generator

(2) SE = Separately Excited

### Generator Voltage Sensing Values

Phase	Wiring Configuration	Grounded Connection Available	Voltage	Frequency
1-phase	V Gen A and V Gen C	No	57V rms, min 150V rms, max	20 Hz, min 90 Hz, max
3-phase	Floating wye	No	99V rms L-L, min 208V rms L-L, max	20 Hz, min 90 Hz, max
3-phase	Grounded wye (grounded neutral)	Yes	99V rms L-L, min 208V rms L-L, max	20 Hz, min 90 Hz, max
3-phase	Open delta, grounded 'B' phase	Yes	99V rms L-L, min 150V rms L-L, max	20 Hz, min 90 Hz, max

**Generator Current Sensing**

Attribute	Value
Type	3-phase plus cross current compensation input
Frequency	50/60 Hz
Range	1 A or 5 A max continuous
Burden	<0.1VA per phase for metering CTs <2.5VA per phase for cross current inputs

**Bus Voltage Sensing Values**

Phase	Wiring Configurations	Grounded Connection Available	Voltage	Frequency
1-phase	V Bus A and V Bus C	No	57V rms, min 150V rms, max	20 Hz, min 90 Hz, max
3-phase	Floating wye	No	99V rms L-L, min 208V rms L-L, max	20 Hz, min 90 Hz, max
3-phase	Grounded wye (Grounded neutral)	Yes	99V rms L-L, min 208V rms L-L, max	20 Hz, min 90 Hz, max
3-phase	Open delta, grounded 'B' phase	Yes	99V rms L-L, min 150V rms L-L, max	20 Hz, min 90 Hz, max

**Voltage Input**

Attribute	Value
Range	-10...10V DC
Input impedance	20k $\Omega$

# Bulletin 9307 - Power Management Software

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## Overview

Power and Energy Management software is available for simple and complex systems. This software helps you configure our products and access energy data in real time.

Our software also lets you capture, analyze, store, and share energy data across your entire enterprise through standard web browsers. This makes it easy for you to acquire and distribute the knowledge you need to optimize energy consumption and improve productivity while lowering energy costs.

## FactoryTalk EnergyMetrix Software

FactoryTalk EnergyMetrix software is sophisticated, web-enabled energy management software that puts critical energy information at your desktop. The FactoryTalk EnergyMetrix software suite combines data communication, client-server applications, and the Microsoft advanced .Net web technology to provide you with a complete energy management solution. FactoryTalk EnergyMetrix software captures, analyzes, stores, and shares energy data across your entire enterprise. By using a web browser, your energy information is now available on your company's LAN or WAN, presenting you with the knowledge necessary to optimize your energy consumption. The net result is improved productivity and lower energy costs.

# Selection Comparison

Application	FactoryTalk EnergyMetrix	RSView®
Load profiling	X	
Cost allocation	X	X
Power quality monitoring	X	X
Distribution system monitoring	X	X
Demand management	X	X
Energy load shedding	X	X
Power system control	X	X

## Product Selection

### FactoryTalk EnergyMetrix

Description	Cat. No.
FactoryTalk EnergyMetrix Manager with standard reports and charting capability. Includes 10 meters that can be used in any combination of Allen-Bradley meters and OPC. No SQL license.	9307-FTEMMENE
FactoryTalk EnergyMetrix Manager with standard reports and charting capability. Includes 10 meters that can be used in any combination of Allen-Bradley meters and OPC. Single Client SQL license.	9307-FTEMMDBCENE
FactoryTalk EnergyMetrix Manager with standard reports and charting capability. Includes 10 meters that can be used in any combination of Allen-Bradley meters and OPC. Unlimited Client SQL license.	9307-FTEMMDBPENE
FactoryTalk EnergyMetrix OPC license. Allows for use of OPC with manager above 10 meters. OPC meters are unlimited with this license but require purchase of additional meter bundles.	9307-FTEMOPC
FactoryTalk EnergyMetrix Real Time	9307-FTEMRT
FactoryTalk EnergyMetrix Charts Plus	9307-FTEMCHT
FactoryTalk EnergyMetrix Reports Plus	9307-FTEMRPT
FactoryTalk EnergyMetrix Bundle of 10 meters, requires Manager	9307-FTEM10
FactoryTalk EnergyMetrix Bundle of 50 meters, requires Manager	9307-FTEM50
FactoryTalk EnergyMetrix Bundle of 100 meters, requires Manager	9307-FTEM100
FactoryTalk EnergyMetrix Bundle of 500 meters, requires Manager	9307-FTEM500

# Features

## FactoryTalk EnergyMetrix Software

Base Package: FactoryTalk EnergyMetrix Manager

- Base package
- Set up groups, domains, roles, users, devices, meters
- Log data from Allen-Bradley devices
- Basic reports and charts
- Rate schedules and billing reports
- 10, 50, 100, or 500 meter licensing

Offered with or without Microsoft SQL Server 2005 Runtime license

### Optional Packages

FactoryTalk EnergyMetrix ReportsPlus	FactoryTalk EnergyMetrix ChartsPlus	FactoryTalk EnergyMetrix OPC Client	FactoryTalk EnergyMetrix RT
Optional package	Optional package	Optional package	Optional package
Enhanced reports	Enhanced charts	Enables OPC Client in Manager	Configure Allen-Bradley power monitors
	Flexible formatting tools for customizing	Requires customer provided OPC server	View real-time data from Allen-Bradley power monitors

## Scalability

FactoryTalk EnergyMetrix software interfaces to your existing systems through standard protocols and has the scalability to add additional components while maintaining your original investments:

- FactoryTalk EnergyMetrix Manager: The core data logging, reporting, charting, and billing package. Manager is a server-based, web-enabled application that runs on a Windows 2008 server or workstation. Microsoft Internet Explorer accesses and configures Manager. FactoryTalk EnergyMetrix Manager is available with 10, 50, 100, or 500 meters licenses.
- FactoryTalk EnergyMetrix RT: The real-time communication, configuration, and data display package of FactoryTalk EnergyMetrix software. RT is available with FactoryTalk EnergyMetrix Manager or as a standalone package.
- FactoryTalk EnergyMetrix OPC Client: Provides connectivity to meters other than Allen-Bradley power monitors. Like Manager, the 3PX package is offered in 10, 50, 100, and 500 meter licenses.
- FactoryTalk EnergyMetrix ReportsPlus: Creates custom reports beyond the standard reports included with Manager.
- FactoryTalk EnergyMetrix ChartsPlus: Creates custom charting capabilities above the standard charts included with Manager.

## Connectivity

Connect to metering points right from your desktop PC:

- Connectivity through RSLinx software: RS-232, RS-485, Ethernet, DeviceNet, remote I/O pass-thru, optical, and modem (RSLinx Lite software is included with the Manager package)
- Third-party connectivity - OPC

## Configuration

FactoryTalk EnergyMetrix software provides easy and flexible configuration:

- Configure electricity, gas, water, and steam meters or any energy or production related inputs
- Configure manual meters as placeholders in the database for manual data entry
- Configure user-defined data sources, such as standard PLC-5® or SLC™ hardware types or Generic OPC
- Flexible configuration lets you do the following:
  - Name your devices
  - Name your groups
  - Create sub-groups
  - Put meters in multiple groupings for cost allocation
- Set and change meter configuration values remotely
- Multi-level password protection and privileges

## Monitoring and Analysis

FactoryTalk EnergyMetrix software is a powerful load profiling, cost allocation, and billing analysis tool

- Log usage, cost, and power quality data
- View any parameter in real time
- Create historical trend reports and charts
- View historical trending of individual meters and groups and save tabular data for further processing and analysis
- Establish consumption baseline and user-defined time of use periods
- Create custom rate plans by using the rate plan menu and line item scripting
- Assign rate plans to meters or groups of meters
- Import and export rate schedules in XML format
- Create and print daily or monthly cost and billing reports by the following:
  - Meter
  - Business group
  - Department
  - Site
- Create energy budgets and forecasts
- Compare and contrast alternative utility rates; do 'what-if' for other rate structures
- Print and store all reports and charts

## Guidelines for Server

- Windows 2003 Server or Windows 2008 Server, Application Server role. For 64-bit operating systems, RSLink Classic software, version 2.57 CPR9 SR3 or later, must be installed. Windows 2000 Server is not supported.
- Microsoft SQL Server 2005 or 2008, installed with mixed-mode authentication (Windows and SQL). TCP/IP access must be enabled. A system administrator SQL login must be used for the FactoryTalk EnergyMetrix software installation.
- You must have machine administrator privileges to install FactoryTalk EnergyMetrix software.

# Bulletin 1413 - Capacitor Bank Controller

## Overview

Designed for various capacitor bank control applications, the Allen-Bradley Bulletin 1413 Capacitor Bank Controller is a pre-engineered, PLC-based solution. It combines standard, off-the-shelf, Allen-Bradley hardware with application programming necessary to perform power factor correction in one single package. The Capacitor Bank Controller is unique in its flexibility and adaptability compared with other standard, fixed-function capacitor control products available in the market today. Start using this powerful, affordable, and easy to use solution to help reduce power factor penalties, kW demand charges, and release kVA loading.

The Capacitor Bank Control system consists of a MicroLogix™ 1400 controller, one or more PowerMonitor 1000 units, a standard that is built-in the MicroLogix 1400 controller, and an optional Human-Machine Interface (HMI). Pre-engineered programming in the controller gathers real and reactive power data from up to four power feeds including utility feeds and/or generators. The logic operates on the data in standard engineering units of kVAR and kW and acts to minimize imported and exported reactive power by switching up to 10 individually-switched capacitor groups. This strategy controls power factor within specified limits while providing the flexibility to modify the system to meet the specific requirements of the application.

## Product Selection

Cat. No.	MicroLogix 1400	PowerMonitor 1000	PanelView Component C600
1413-CAP-ME	Ethernet	Ethernet	None
1413-CAP-ME-PE	Ethernet	Ethernet	

## Benefit

- Basic and advanced control of capacitor banks to help reduce power factor penalties and kVA demand charges
- Ability to monitor and control VARs to multiple feeders
- Advanced VAR control modes for precise power factor control
- Simple addition of I/O for additional steps and functionality (for example, alarming)
- Local and remote communication capabilities for programming, viewing, sending information, and alarming for real time electrical system status
- Easy to configure and view through an optional display module
- Full functioning real time power and energy monitoring (hundreds of parameters captured, logged, and available within the PowerMonitor unit for taking action and/or passing to other systems displayed locally and/or remotely)
- Open system architectures using the familiarity with PLCs and standard off-the-shelf hardware
- Seamless integration into Rockwell Automation and third- party HMI and SCADA systems

## Features

- Auto and/or manual step size configuration
- Discharge timer on each step
- Selectable operating modes
  - Manual operation
  - First-in, Last-out (FILO)
  - Balanced – Distribute usage of capacitor steps
  - Best Fit – Finds best match of capacitor step size to system kVA needs
- Alarms
  - Bad step, indicates blown fuse, capacitor failure
  - Target power factor not achieved
  - High/Low voltage
- Power monitor data concentrated into the MicroLogix controller and displayed with an optional HMI
- Metering phase current, line voltage, frequency, real and reactive power, and power factor

## Options

- Up to three additional power monitors to aggregate up to four total feeds
- PanelView Component HMI terminal with Ethernet communication

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