



Power Quality and Energy Management

Bulletin Numbers 1400, 1408, 1411, 1420, 1426, 1606, 1608, 4983, 9307



Allen-Bradley

by ROCKWELL AUTOMATION

Selection Guide

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What's New

Topic	Page
Removed references to and sections for Bulletin 1407, 1608S, and 9307	Throughout
Updated the PowerMonitor Accessory Kit photo and added PowerMonitor Display Module, FactoryTalk® Energy Manager™, and Mitigation Solutions products to the Power Quality and Energy Management Portfolio – Overview section	5...6
Added Bulletin 905203C – FactoryTalk Energy Manager section	25
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Which PowerMonitor™ product suits your application? Are you interested in energy management, power quality management, or both?

Energy Management

- Do you have an energy savings initiative within your company?
- Do your utility bills currently exceed \$100,000 USD 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?

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

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.

Energy 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).

Power Quality and Energy Management

- 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 power quality 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



PowerMonitor 500 Unit

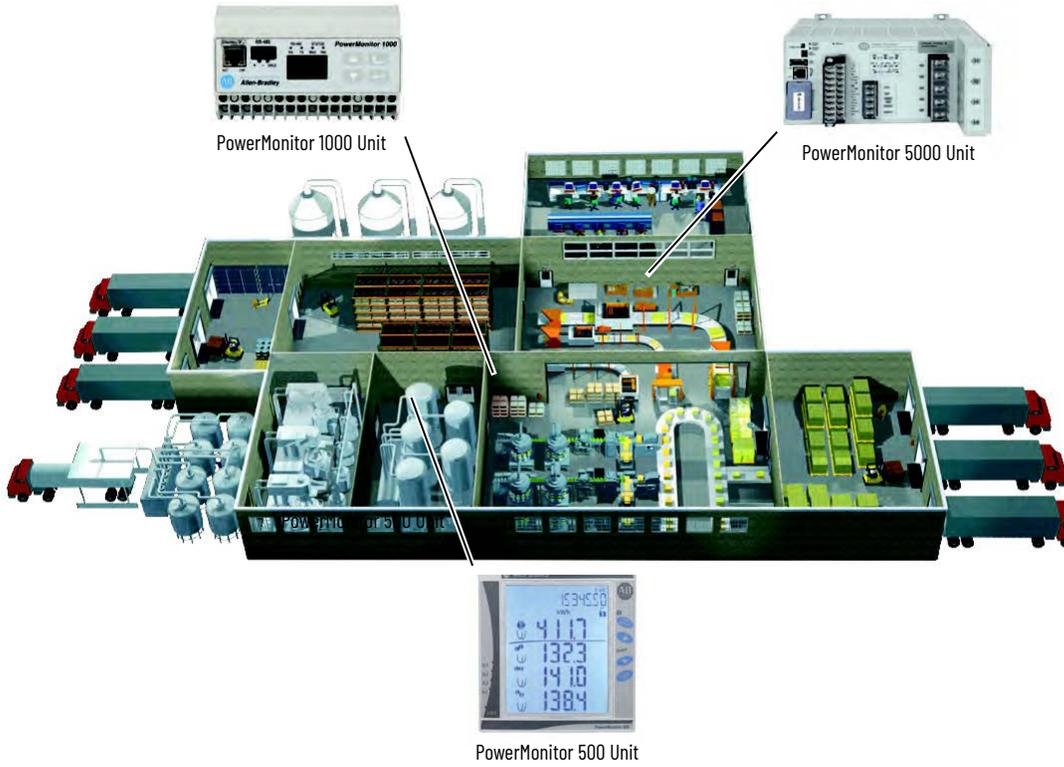


PowerMonitor 1000 Unit



PowerMonitor 5000 Unit

Metering and Accuracy Levels



Metering Levels		PowerMonitor 500	PowerMonitor 1000	PowerMonitor 5000
Energy (Consumption) (kWh)		✓	✓	✓
Demand (kW)		✓	✓	✓
Power Factor		✓	✓	✓
Power Quality Aspects (Sag/swell detection, harmonics, and transients)		–	–	✓
Waveform Capture		–	–	✓
Door-mounted Display		✓	Optional ⁽¹⁾	Optional ⁽²⁾
Ethernet/IP Network Communication		✓	✓	✓
Configurable Using Webpage		–	✓	✓
Accuracy Levels (per standard EN62053-22)	Class 1, 1% Energy Accuracy	✓	✓	–
	Class 0.2, 0.2% Energy Accuracy	–	–	✓

(1) The PowerMonitor 1000 unit has an LCD display option and can be used with any Rockwell Automation® operator interface.

(2) The PowerMonitor 5000 unit can include a door-mounted display module as an accessory, catalog number 1426-DM.

Power Quality and Energy Management Portfolio

Monitoring



PowerMonitor 500 <i>Energy monitor with built-in display and compact design</i>	PowerMonitor 1000 <i>DIN-mount scalable energy monitor with internal logging</i>	PowerMonitor 5000 <i>High accuracy energy and power quality monitor</i>
Communication: <ul style="list-style-type: none"> • EtherNet/IP • Modbus RTU • Modbus TCP/IP 	Communication: <ul style="list-style-type: none"> • EtherNet/IP • Modbus RTU • Modbus TCP/IP • Serial DFI, DH485 	Communication: <ul style="list-style-type: none"> • EtherNet/IP • DeviceNet • ControlNet
Outputs: <ul style="list-style-type: none"> • Digital signal • Analog signal (0...20 mA) 	Outputs: <ul style="list-style-type: none"> • KYZ signal 	Outputs: <ul style="list-style-type: none"> • Digital signal • KYZ signal
—	Inputs: <ul style="list-style-type: none"> • Digital signal 	Inputs: <ul style="list-style-type: none"> • Digital signal
For more information, see page 7 .	For more information, see page 11 .	For more information, see page 15 .



PowerMonitor Accessory Kit	Current Transformers	PowerMonitor Display Module
<p>IMPORTANT: All PowerMonitor units should be wired with an accessory kit to safely and correctly wire to the electrical system.</p> <p>Accessory kit includes:</p> <ul style="list-style-type: none"> • One 1-pole fuse holder, one 3-pole fuse holder, fuses, and one shorting block. 	<ul style="list-style-type: none"> • Low voltage current transformers (CTs) for various power measurement devices and applications • Metering grade which provides enough resolution to enable comprehensive analysis of energy consumption and identify nuanced usage trends • 5 A secondary output allows for integration with the current terminations of PowerMonitor products • For new (solid core) or existing (split core) installations 	<ul style="list-style-type: none"> • Optional 4.3 inch touchscreen display to view data from one, two, or three PowerMonitor modules • Functions as the operator's dashboard where real-time information (such as peak voltages, reactive power, and the power factor electrical data) of a given installation can be accessed through several factory-installed applications
For more information, see page 19 .	For more information, see page 21 .	For more information, see page 16 .

Software



FactoryTalk® Energy Manager™

- Information Technology/Operational Technology (IT/OT) convergence platform-based energy monitoring application.
- Provides energy and production information based on an energy plant model of the underlying process at a plant, process area, line and machine level.
- Allows you to understand where, when and how your facilities use energy to establish the necessary scope of their energy savings efforts and define key metrics.
- Provides functionalities to monitor, analyze and report on consumption, demand, intensity, costs, and emissions in form of key performance indicators (KPIs).

For more information, see [page 25](#).

Mitigation Solutions



1606-XLS Power Supplies with UPS	Capacitor-based DC Power Supplies	Buffer Modules with Capacitor Storage
<ul style="list-style-type: none"> Power supplies with DC UPS can bridge power failures or voltage fluctuations and help maintain supply voltage to the 24V DC bus for a certain period Designed for high efficiency, robust performance, and excellent reliability with a mean time between failures (MTBF) of up to 1,490,000 hours. Suitable for applications starting and handling heavy loads. Provides a 150% power boost to handle start-up currents and load spikes and large starting currents. Feature DC-ok relay and LED indicator for easy monitoring. 	<ul style="list-style-type: none"> Designed to provide a reliable DC power source and backup power for industrial application. Suitable for various industrial applications requiring a reliable DC power source with backup capabilities. Act as a buffer, ensuring a continuous power supply to a DC load in the event of a mains power failure. Shorter backup time compared to standard (battery-based) DC power supplies. Uses built-in capacitors to store energy and provide a temporary backup power supply. 	<ul style="list-style-type: none"> Designed for power supply stabilization in industrial applications, a supplementary device for regulated DC 24V power supplies. Stores energy in integrated electrolytic capacitors during periods of sufficient supply voltage. Buffers load currents during typical mains faults and switching events or load peaks. Extends the hold-up time (the time a power supply can maintain output after power loss) by providing energy to the load during interruptions.
For more information, see page 28 .	For more information, see page 29 .	For more information, see page 29 .



Dynamic Sag Correctors (DySCs)	Surge Protective Devices (SPDs)	Filtering Devices
<ul style="list-style-type: none"> Designed to protect against voltage sags and momentary outages, preventing damage to sensitive electrical equipment. Environmentally friendly and energy efficient, with over 99% efficiency and battery-free, contributing to lower energy consumption, 	<ul style="list-style-type: none"> Designed to protect electrical equipment from damaging voltage transients and noise disturbances. Compact, modular design, suitable for DIN rail mounting. Features visual indicators on the unit itself with the capability for remote status indication, allowing for monitoring of the device's operational status. 	<ul style="list-style-type: none"> Designed to provide surge and filter protection for sensitive electronic equipment. Provides protection against sensitive equipment from damaging voltage surges (transients) and disruptive electrical line noise. Features Islatrol® technology which actively monitors the AC power line and cleans the waveform of noise, ensuring a clean and reliable power supply. Minimizes downtime and costs associated with equipment failure caused by power quality issues.
For more information, see page 29 .	For more information, see page 30 .	For more information, see page 31 .

The PowerMonitor 500 unit is an AC power monitor with a built-in advanced configuration system and LCD data display. It is designed for measurement of electrical parameters in a variety of three-phase and single-phase circuits. This unit is enclosed in a modular housing for panel mounting with IP65 degree of protection in front of the panel.

The PowerMonitor 500 unit is available 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 and an EtherNet/IP™ port.

Equipped with an optional communication port, the unit communicates power and energy parameters to applications, such as FactoryTalk® Energy Manager™ software. The PowerMonitor supports 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

Feature		Availability	
Electrical Parameters	Voltage (V)	✓	
	Current (A)	✓	
	Frequency (Hz)	✓	
Energy Management	Power	Power (kW)	✓
		Reactive Power (kVAR)	✓
		Apparent Power (kVA)	✓
		True Power Factor	✓
	Consumption	Real Power Consumption (kWh)	✓
		Reactive Power Consumption (kVARh)	✓
		Apparent Power Consumption (kVAh)	✓
	Demand	Demand (kW, kVAR, kVA, A)	✓
Demand Power Factor		✓	
Communication	EtherNet/IP and Modbus TCP/IP	Optional	
	RS-485 (Modbus RTU)	Optional	
Inputs/Outputs	Analog Output (0...20 mA)	Optional	
	Pulse (Digital) Output	Optional	
Other Features	Configurable via Software Tool	✓	
	Configurable Alarms	✓	
	Voltage Rotation (phase sequence)	✓	

Product Selection

Voltage Sensing Level	Communication	Inputs/Outputs	Cat. No.	
240V AC V-LL, 120V AC V-LN/240V AC V-LL	–	–	14020-V1	
		Analog Output	1420-V1A	
		Pulse (Digital) Output	1420-V1P	
	Serial	–	–	1420-V1-485
		Analog Output	–	1420-V1A-485
		Pulse (Digital) Output	–	1420-V1P-485
	Ethernet/IP	–	–	1420-V1-ENT
		Analog Output	–	1420-V1A-ENT
		Pulse (Digital) Output	–	1420-V1P-ENT
400V AC V-LN and 600V AC V-LL	–	–	1420-V2	
		Analog Output	1420-V2A	
		Pulse (Digital) Output	1420-V2P	
	Serial	–	–	1420-V2-485
		Analog Output	–	1420-V2A-485
		Pulse (Digital) Output	–	1420-V2P-485
	Ethernet/IP	–	–	1420-V2-ENT
		Analog Output	–	1420-V2A-ENT
		Pulse (Digital) Output	–	1420-V2P-ENT

Specifications

General Specifications

Attribute		Value	
		<i>Accuracy (Display and RS-485) at 25 °C (77 °F) ± 5 °C (41 °F), R.H. ≤ 60%, 48...62 Hz</i>	
Electrical Parameters	V1 Model	I _{nom}	5 A
		I _{max}	6 A
		Line-neutral RMS	40...144V AC
		Line-Line RMS	70...250V AC
	V2 Model	I _{nom}	5 A
		I _{max}	6 A
		Line-neutral RMS	160...480V AC
		Line-Line RMS	277...830V AC
	All Models	Current	From 0.01...0.25 A: ± (1.0% of reading (RDG) + 2 digits) From 0.25...6 A: ± (0.5% RDG + 2 digits)
		Line-neutral Voltage	In the range V _{nom} : ± (0.5% RDG + 1 digit)
		Line-line Voltage	In the range V _{nom} : ± (1.0% RDG + 1 digit)
		Frequency	±0.1 Hz (45...65 Hz)
Power	Real and Apparent Power	From 0.05... 0.25 A, PF 1: ± (2% RDG + 1 digit) From 0.25...6A, PF 0.5L, PF1, PF 0.8C: ± (1.0% RDG+1 digit)	
	Power Factor (PF)	± [0.001+0.5% (1.000 - 'PF RDG')]	
Energy Management	Consumption	Reactive Power	From 0.5... 6 A, sin φ 0.5L/C: ± (2.0% RDG + 1 digit) From 0.25... 0.5 A, sin φ 0.5L/C: ± (2.5% RDG + 1 digit) From 0.25...6 A, sin φ 1.0: ± (2.0% RDG+1 digit) From 0.1... 0.25 A, sin φ 1: ± (2.5% RDG+1 digit) TIP: sin φ = VAR/VA
		Real Energy	Class 1 according to EN62053-21, ANSI C12.1 Class B according to EN50470-3
		Reactive Energy	Class 2 according to EN62053-23, ANSI C12.1
		Start Up Current	5 mA

Input/Output Specifications

Attribute		Value	
Voltage Sensing	V1	Nominal	120V AC LN, 208V AC LL
		Range	40...144V AC LN RMS, 70...250V AC LL RMS
	V2	Nominal	400V AC LN, 600V AC LL
		Range	160...480V AC LN RMS, 277...830V AC LL RMS
Current Sensing		Nominal	5 A
		Range	0.01...6 A
Control Power		Nominal	120/240V AC (50/60 Hz) or 120/240V DC
		Range	Range: 100...240V AC (48...62 Hz)
Sampling Rate		3840 samples per second at 60 Hz, 3200 samples per second at 50 Hz	
Rated Inputs		System Type	1, 2, or 3-phase
Current Range (by CT)		5 A nominal (6 A max)	
Voltage (by Direct Connection or VT/PT)	V1	120/208V LL	
	V2	400/600V LL	
Crest Factor		≤3 (15 A maximum peak)	

Environment Specifications

Attribute		Value
Temperature	Operating	-25...+40 °C (-13...+104 °F) R.H. from 0...90% noncondensing at 40 °C (104 °F) According to EN62053-21, EN50470-1 and EN62053- 23
	Storage	-30...+70 °C (-22...+158 °F) R.H. < 90% noncondensing at 40 °C (104 °F) 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 Common Mode Rejection Ratio (CMRR)		100 dB, 48...62 Hz
Electromagnetic Compatibility (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

Attribute		Value	
Safety		IEC60664, IEC61010-1 EN60664, EN61010-1	
Metrology		EN62052-11, EN62053-21, EN62053-23, EN50470-3	
Pulse output		DIN43864, IEC62053-31	
Approvals		CE, cULus (E56639)	
Connections		Screw-type	
Cable Cross Section Area	Maximum		2.5 mm ² (14 AWG)
	Screw Tightening Torque	Minimum	0.4 N•m (3.54 lb•in)
		Maximum	0.8 N•m (7.08 lb•in)
	Suggested Screw Tightening Torque		0.5 N•m (4.43 lb•in)

Housing DIN

Attribute	Value	
Approximate Dimensions (Width x Height x Depth)	Module Holder	96 x 96 x 50 mm (3.78 x 3.78 x 1.97 in)
	Digital and Analog Output Type Modules	89.5 x 63 x 16 mm (3.52 x 2.48 x 0.63 in)
	Serial and Ethernet Communication Type Modules	89.5 x 63 x 20 mm (3.52 x 2.48 x 0.79 in)
Maximum Depth Behind Panel	81.7 mm (3.2 in.)	
Material	ABS, self-extinguishing: UL 94 V-0	
Mounting	Panel mounting	
Pollution Degree	2	
Front	IP65, NEMA4x, NEMA12	
Screw Terminals	IP20	
Approximate Weight with Packaging	400 g (0.88 lb)	

Certifications

For a complete list of certifications, visit our Product Certifications website, rok.auto/certifications, and use '1420-CT' as your search term.

Attribute	Value
UL/CUL	cULus (E56639)
CE Certification	CE Certifications apply when product is marked. See our Product Certification site for Declarations of Conformity, certificates and other certification details

Bulletin 1408 – PowerMonitor 1000 Unit

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 PowerMonitor 1000 unit:

- measures voltage and current in an electrical circuit, meeting revenue accuracy standards.
- communicates power and energy parameters over the network to applications, such as FactoryTalk Energy Manager.

The PowerMonitor 1000 unit is compatible 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

Feature		1408-BC3A-xxx	1408-TS3A-xxx	1408-EM3A-xxx
Electrical Parameters	Voltage (V)	–	✓	✓
	Current (A)	–	✓	✓
	Frequency (Hz)	–	✓	✓
Energy Management	Power	Power (kW)	✓	✓
		Reactive Power (kVAR)	✓	✓
		Apparent Power (kVA)	✓	✓
		True Power Factor	✓	✓
	Consumption	Real Power Consumption (kWh)	✓	✓
		Reactive Power Consumption (kVARh)	✓	✓
		Apparent Power Consumption (kVAh)	✓	✓
	Demand	Demand (kW, kVAR, kVA, A)	–	–
		Demand Power Factor	–	–
		Projected Demand (kW, kVAR, kVA)	–	–
Power Quality	Voltage Unbalance	–	✓	
	Current Unbalance	–	✓	
Communication	EtherNet/IP and Modbus TCP/IP	Optional	Optional	
	RS-485 (Modbus RTU, DF1, DH485)	✓	✓	
Logs	Time of Use Log	✓	✓	
	Energy Log	✓	✓	
	Minimum/Maximum Log	✓	✓	
	Unit Status Log	✓	✓	
	Load Factor Log	–	–	
	Alarm Log	–	–	
Inputs/Outputs	Digital Output	–	✓	
	Energy Accuracy ⁽¹⁾	Class 1	Class 1	
	Status Inputs ⁽²⁾	–	✓	

Feature		1408-BC3A-xxx	1408-TS3A-xxx	1408-EM3A-xxx
Other Features	Configurable via Web Page	✓	✓	✓
	Display (Integrated LCD)	–	✓	✓
	Alarms	–	–	✓
	CIP Energy Object	✓	✓	✓

(1) Indicates the revenue metering accuracy class of the power monitor as it is shipped from the factory.

Product Selection

Description	Communication	Cat. No.
Basic Consumption Metering	Serial	1408-BC3A-485
	EtherNet/IP	1408-BC3A-ENT
Consumption, Voltage, and Current	Serial	1408-TS3A-485
	EtherNet/IP	1408-TS3A-ENT
Energy, Demand, and PowerMonitor	Serial	1408-EM3A-485
	EtherNet/IP	1408-EM3A-ENT

Specifications

General Specifications

Attribute		Accuracy in % of Reading at 25 °C (77 °F) 50/60 Hz Unity Power Factor				Nominal/Range
		Value	1408-BC3	1408-TS3	1408-EM3	
Voltage Sense Inputs	V1, V2, V3	±0.5%	–	✓	✓	Line-neutral rms: 347V / 15...399V Line-line rms: 600V / 26...691V
Current Sense Input	I1, I2, I3	±0.5%	–	✓	✓	5A / 0.05...10.0A rms
Frequency		±0.05 Hz	–	✓	✓	50 or 60 Hz / 40...75 Hz
Power Functions	kW, kVA, kVAR	EN62053-21:2003 Accuracy Requirement Class 1	✓	✓	✓	–
Demand Functions	kW, kVA, kVAR		–	–	✓	
Energy Functions	kWH, kVAH, kVARH		✓	✓	✓	
Metering Update Rates	Voltage, Current, Frequency	100 mS	✓	✓	✓	–
	Power	200 mS	✓	✓	✓	

Input/Output Specifications

Attribute	Value	
Control Power	85...264V AC, 47...63 Hz	
	125...250V DC	
	4VA maximum	
Voltage Sense Inputs (V1, V2, V3)	Input Impedance	5 MΩ minimum
	Input Current	2 mA maximum
Current Sense Inputs (I1, I2, I3)	Overload Withstand	15 A continuous, 200 A for 1/2 second
	Burden	0.05V A
	Impedance	0.002 Ω
	Maximum Crest Factor at 5 A	3.0
	Starting Current	5 mA
Status Inputs	Contact closure (internal 24V DC) (except BC3)	
KYZ Output	80 mA at 240V AC / 300V DC (except BC3)	

Environment Specifications

Attribute		Value
Temperature	Operating	-10...+60 °C (14...140 °F)
	Storage	-40...+85 °C (-40...+185 °F)
Humidity	Non-condensing	5...95%
Dielectric Withstand		UL61010, EN61010; Pollution Degree 2
Terminal Blocks	Wire	0.34...2.5 mm ² (22...14 AWG), 75 °C (167 °F) minimum copper wire only
	Recommended Torque	0.8 N•m (7 lb•in)
Vibration		2 g, 10...500 Hz
Shock	Operating	30 g peak each axis
	Non-operating	50 g peak each axis

Certifications

For a complete list of certifications, visit our Product Certifications website, rok.auto/certifications, and use '1408-CT' as your search term.

Attribute	Description
UL/CUL	UL 508 listed, File E56639, for Industrial Control Equipment and CUL Certified.
CE Certification	<p>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:</p> <p>EMC Directive This product is tested to meet Council Directive 2004/108/EC Electromagnetic Compatibility (EMC) and the following standards, in whole, documented in a technical construction file. EN55011 – Radiated Electromagnetic Emissions EN55011 – Conducted Emissions EN 61326-1 Electrical Equipment for Measurement – EMC Requirements EN61000 – Immunity</p>

Notes:

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 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, human-machine interface (HMI) software, and applications such as FactoryTalk Energy Manager 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**
- **Power Quality Event Identification**
- **Power Reliability**
- **Power Quality Analysis**

Features

Feature		1426-M5E-xxx	1426-M6E-xxx	1426-M8E-xxx	
Electrical Parameters	Voltage (V)				
	Current (A)	✓	✓	✓	
	Frequency (Hz)				
Energy Management	Power	Power (kW)			
		Reactive Power (kVAR)			
		Apparent Power (kVA)	✓	✓	✓
		True Power Factor			
		Displacement Power Factor			
	Consumption	Real Power Consumption (kWh)			
		Reactive Power Consumption (kVARh)	✓	✓	✓
		Apparent Power Consumption (kVAh)			
		Current Consumption (kAh)			
	Demand	Demand (kW, kVAR, kVA, A)			
		Demand Power Factor	✓	✓	✓
		Projected Demand (kW, kVAR, kVA)			
		Projected Amps Demand			
Power Quality Management	Voltage Unbalance				
	Current Unbalance				
	Crest Factor	✓	✓	✓	
	K-Factor				
	Voltage Sag and Swell Detection				
	Individual Harmonics (DC-63rd)	–	✓	✓	
	Individual Harmonics (DC-127th)	–	–	✓	
	Total Harmonic Distortion (THD)	✓	✓	✓	
	Interharmonics				
	Transient Detect	–	–	✓	
	Flicker				
Waveform Capture	–	✓	✓		
EN 61000-4-30 10/12 Cycle Metering	–	–	✓		

Feature		1426-M5E-xxx	1426-M6E-xxx	1426-M8E-xxx
Communication	EtherNet/IP	✓	✓	✓
	ControlNet	Optional	Optional	Optional
	DeviceNet	Optional	Optional	Optional
Logs	Waveform Log	–	✓	✓
	Energy Log	✓	✓	✓
	Minimum/Maximum Log			
	Load Factor Log			
	Time of Use Log			
	Alarm Log	✓	✓	✓
	Event Log			
	Setpoint Log			
	Data Log			
	Power Quality Log			
	Trigger Data Log	–	✓	✓
	Snapshot Log			
	EN 50160 Weekly and Yearly Log	–	–	✓
Inputs/Outputs	Status Inputs (4)	✓	✓	✓
	Pulse (digital) Output (Relay and KYZ)			
Other Features	Configurable via Webpage			
	Revenue Accuracy	✓	✓	✓
	Virtual Wiring Correction			
	Setpoint Programming			
	Logical Setpoint Programming	–	✓	✓
	Time Sync	✓	✓	✓
	Waveform Synchronization Broadcast	–	✓	✓
	CIP Energy Object	✓	✓	✓

Product Selection

Description	Communication	Cat. No.
Base Power Monitor	Native Ethernet	1426-M5E
	Native Ethernet and Optional ControlNet Network	1426-M5E-CNT
	Native Ethernet and Optional DeviceNet Network	1426-M5E-DNT
Basic Power Quality Monitor	Native Ethernet	1426-M6E
	Native Ethernet and Optional ControlNet Network	1426-M6E-CNT
	Native Ethernet and Optional DeviceNet Network	1426-M6E-DNT
Advanced Power Quality Monitor	Native Ethernet	1426-M8E
	Native Ethernet and Optional ControlNet Network	1426-M8E-CNT
	Native Ethernet and Optional DeviceNet Network	1426-M8E-DNT

Accessories

Description	Cat. No.	
Catalog Number Upgrade	<ul style="list-style-type: none"> Add capabilities to your PowerMonitor <ul style="list-style-type: none"> Example: A M5 unit can be promoted to a M6 or M8 unit Use the ControlFLASH™ utility Contact your local Rockwell Automation representative or Allen-Bradley® distributor to purchase 	M5 to M6 1426-UPGR-56
		M5 to M8 1426-UPGR-58
		M6 to M8 1426-UPGR-68
 <ul style="list-style-type: none"> PowerMonitor Display Module 4.3 inch Touch Screen HMI with factory-installed application Displays key information from one, two, or three PowerMonitor units. Reads data directly from the PowerMonitor over the Ethernet IP network Does not require a controller 	1426-DM	

Specifications

General Specifications

Attribute	Value <i>Accuracy in % of Reading at 25 °C (77 °F) 50/60 Hz Unity Power Factor</i>		Nominal Rating/Metering Range
Voltage Sense Inputs (V1, V2, V3, VN)	± 0.1%		Line-neutral rms: 398V AC / 15...660V AC Line-line rms: 690V AC / 26...1144V AC
Input Voltage (VG)	–		Connect to power system earth ground only This is a functional ground
Current Sense Input	I1, I2, I3, I4		5 A / 0.05 – 15.6 A rms
Frequency	±0.05 Hz		50 or 60 Hz / 40...70 Hz
Power Functions (kW, kVA, kVAR)	ANSI C12.20 -2010	EN 62053-22 -2003	–
Demand Functions (kW, kVA, kVAR)	Class 0.2 ⁽¹⁾	Class 0.2 Accuracy	
Energy Functions (kWH, kVAH, kVARH)	Clause 5.5.4	Clause 8	
Metering Update Rates	One update per line cycle; 1024 samples per cycle per channel		

(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.

Input/Output Specifications

Attribute	Value	
Control Power	L1, L2	Maximum rating: 85...264V AC 47...63 Hz or 106...275V DC; Nominal value: 120/240V AC or 120/240V DC
	24V DC	Maximum rating: 22.8...25.2V DC Nominal value: 24V DC
Voltage Sense Inputs (V1, V2, V3, VN)	Input Impedance	5 MΩ minimum
	Input Current	1 mA maximum
Current Sense Inputs (I1, I2, I3)	Overload Withstand	22 A continuous, 200 A for 1 second
	Burden	Negligible
	Impedance	Negligible
	Maximum Crest Factor at 5 A	4
	Starting Current	5 mA
Status Inputs	Contact closure (internal 24V DC)	
KYZ Output	Solid State KYZ	80 mA at 240V AC/V DC
Control Relay	ANSI C37.90 Trip Duty	2005

Environment Specifications

Attribute	Value	
Temperature	Operating	-20...+70 °C (-4...158 °F)
	Storage	-40...+85 °C (-40...+185 °F)
Humidity	Non-condensing	5...95%
Dielectric Withstand	UL61010, EN61010; Pollution Degree 2	
Vibration	2 g	
Shock	Operating	30 g peak each axis
	Non-operating	50 g peak each axis
Installation Location	Indoor use only	
Altitude [m (ft)]	Maximum	2000 (6560)

Certifications

For a complete list of certifications, visit our Product Certifications website, rok.auto/certifications, and use '1426-CT' as your search term.

Attribute	Description
UL/CUL	UL 61010 listed, File E345550, for Measuring, Testing and Signal-generation Equipment and CUL Certified
CE/UKCA Certification	<p>If this product bears the CE and UKCA markings, the product is approved for installation within the European Union, United Kingdom, and EEA regions. This product has been designed to meet the following directives/statutory instruments.</p> <p>EMC Directive This product is tested to meet Directive 2014/30/EU and UKSI 2016/1091 Electromagnetic Compatibility (EMC) and the following standards, in whole, which is documented in a technical construction file. <i>EN-61326-1:2013</i> This product is a class A product that is intended for use in an industrial environment. In a residential, commercial, or light industrial environment, this product can cause radio interference. This product is not intended to be installed in a residential environment. In a commercial and light industrial environment with connection to the public mains supply, you can take adequate measures to reduce interference.</p> <p><i>Low Voltage Directive</i> This product is tested to meet Directive 2014/35/EU and UKSI 2016/1101 Low Voltage, by applying the safety requirements of EN 61010-1:2010. This equipment is classified as open equipment and must be installed (mounted) in an enclosure during operation as a means of providing safety protection International Standard IEC 60529 / NEMA / UL 50E Degree of Protection The bulletin 1426 PowerMonitor 5000 unit is rated as IP10 degree of protection per International Standard IEC 60529. The unit is considered an open device per NEMA and UL 50E. Follow the recommended installation guidelines to maintain these rating</p>
ANSI/IEEE Tested	Meets or exceeds the C37.90 Trip Duty: 2005 for protective relays and relay systems on all power- connection circuit terminations.

Bulletin 1400 – PowerMonitor Accessory Kit

The PowerMonitor accessory kit, catalog number 1400-PM-ACC, is built specifically for PowerMonitor wiring. Wire all PowerMonitor units with this accessory kit to safely and correctly wire to the electrical system.

The contents of the PowerMonitor accessory kit include the following items:

- 8-pole shorting block, quantity of 1
- 10 amp fuses (for the voltage sensing inputs), quantity of 3
- 1 amp fuse (for the control power), quantity of 1
- 1492-FB3C30 fuse holder (3-pole, 30 A, Class CC fuse), quantity of 1
- 1492-FB1C30 fuse holder (1-pole, 30 A, Class CC fuse), quantity of 1



Current transformers (CT) require shorting blocks to be used when the CTs are being installed or serviced.

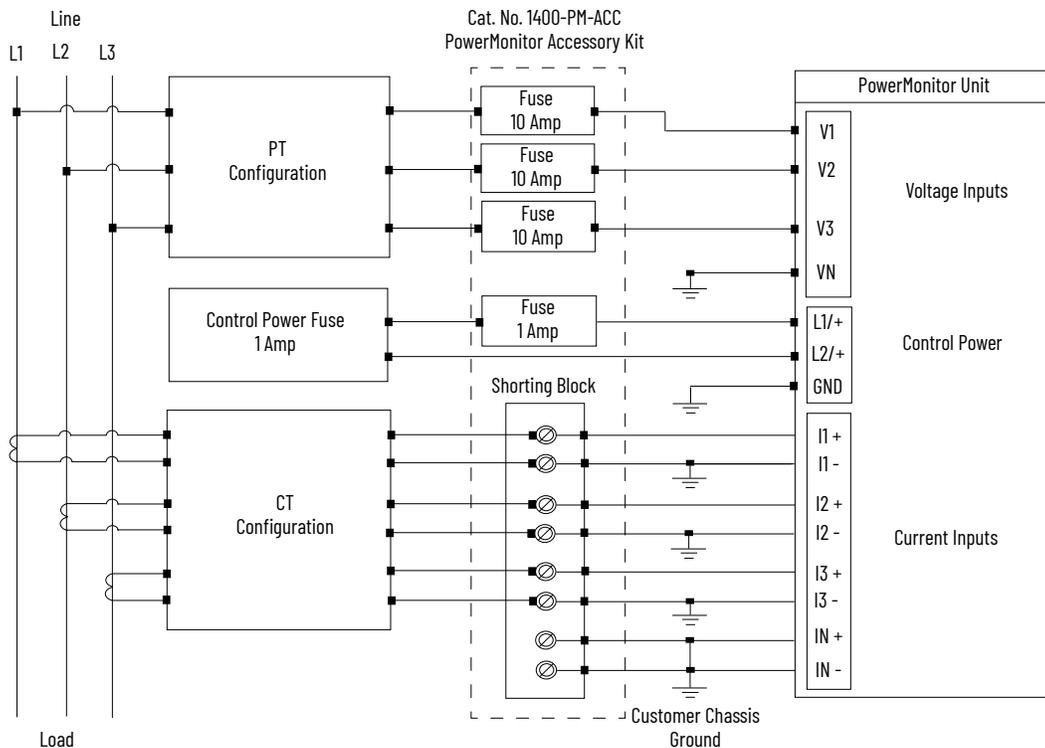
If CTs are open circuited on the secondary side, extremely high voltage can be generated that can cause fire, severe injury, or fatal injury. Consequently, before removing a load, such as a power monitor, short circuit the CT. An easy and efficient way of providing a short circuit is through the use of a shorting terminal block, which short circuits the CT if the load is removed.

The shorting block and grounding the secondary of the CT is required to limit the maximum voltage to ground for safety purposes. Ground CT secondary circuits at either the CT or the shorting terminal block.

We recommend that control power is from a separate source other than the voltage inputs.

To find your specific wiring mode (delta, Wye, open delta, direct connect) for potential transformer (PT) configuration and CT configuration, see the following publications:

- PowerMonitor 500 Unit User Manual, publication [1420-UM001](#)
- PowerMonitor 1000 Unit User Manual, publication [1408-UM002](#)
- PowerMonitor 5000 Unit User Manual, publication [1426-UM001](#)



Product Selection

In ProposalWorks™ software, this kit is listed as an option named PowerMonitor Protective Connection Kit (catalog number 1400-PM-ACC) under Accessories for the respective PowerMonitor units.

Notes:

All applications require the installation of current transformers (CTs) for proper power and energy. For ease of procurement and application, we provide a range of CTs that are most typically applied in conjunction with our PowerMonitor energy monitors. Proper current transformer selection is required, based on customer application.



Features

- **Low voltage (600V AC):** Suitable for energy management applications at manufacturing and production facilities and compatible with Allen-Bradley energy-monitoring products. This offering provides a 5 A secondary output for integration with the current terminations of the PowerMonitor 500, PowerMonitor 1000, and PowerMonitor 5000 product.
- **Metering grade:** Provides enough resolution to enable comprehensive analysis of energy consumption and identify nuanced usage trends.
- **Variety of types:** Able to be used around a wide range of conductor sizes with the option of rectangular-shaped or round-shaped CTs. Split core models are two piece CTs that can be installed without removing conductors.

Selection Considerations

When selecting the appropriate catalog number for CTs, consider these questions:

- Are the CTs for a new or existing facility?
 - Solid core CTs are best suited for new wiring installations (known as Greenfield) because the conductor can be threaded through the CT during the circuit installation process.
 - Generally, split core CTs are used for retrofit or existing installations (known as Brownfield) because they can be installed without disconnecting the conductor.
- What is the current ratio?
 - It is suggested to select the CTs per the circuit breaker protection current. CTs are sized based on the breaker current so that we can measure a high current or fault current condition.
 - As an example, if the circuit breaker is rated for 600 amps, use 600 amp CTs. CTs have a typical 5 amp output that is scaled on the basis of proportion primary current. The current ratio for this example would then be 600:5.
 - CTs are sized to the circuit breaker's protection current to be able to measure over-current and not just the nominal current.
- What is the required CT window size?
 - Choose a window size slightly bigger than the size of the busbar from the table applicable to your installation provided in the [Product Selection on page 22](#).
- What is the desired CT shape (rectangular or round, if specified)?
 - Other criteria includes physical shape (round, square, rectangle). Generally, rectangular-shaped CTs fit better around busbars and round-shaped CTs fit better around conductors.
- How many CTs are needed?
 - The guideline for determining the minimum number of CTs needed is:
Wye systems typically require three CTs, whereas delta systems can use two CTs.
- What is the catalog number?
 - See the table applicable to your installation provided in the [Product Selection on page 22](#) to build the catalog string for the CT where: Catalog Number = 1411 + Module Designation + Ratio Designation
 - Example: If you are selecting a 'solid core CT' with a '3000 amp circuit breaker protection current' and '4 inch busbar':
 - Using the top portion of the [Table 1 on page 22](#), find the '3000:5' row within the 'Current Ratio' column, then look across the row to see available options.
 - Go up the column and pick the 'Window Size' that will accommodate the '4 inch busbar size'.The result of this example will be '1411-125-302', where '125' corresponds to the 'Module Designation' code and '302' is the 'Ratio Designation Code'.

Product Selection



Catalog Number Selection = 1411 + Model Designation + Ratio Designation
 Example: 1411-8RL-401



A new facility would use a solid-core (Greenfield) CT. An existing facility would use a split-core (Brownfield) CT.

Table 1 - Solid Core (Single Piece) Product Selection

Description	Model Designation										
	-AL	-2DRL	-2SFT	-2SHT	-180RL	-180SHT	-8RL	-8SHT	-125	-126	
Window Size	1.05 in	1 in	1.13 in	1.13 in	2.5 in	2.5 in	3.25 in	3.25 in	6.31 in	8.25 in	
Outside Diameter Shape	Round	Round	Rectangular	Rectangular	Round	Rectangular	Round	Rectangular	Rectangular	Rectangular	
Mounting Included	–	–	Built-in	–	–	–	–	–	–	–	
Ratio Designation											
Current Ratio	50:5	-500	-500	-500	-500	-500	-500	–	–	–	–
	80:5	-800	-800	-800	-800	–	–	–	–	–	–
	100:5	-101	-101	-101	-101	-101	-101	–	–	–	–
	150:5	-151	-151	-151	-151	-151	-151	–	–	–	–
	200:5	-201	-201	-201	-201	-201	-201	-201	-201	–	–
	300:5	-301	-301	-301	-301	-301	-301	-301	-301	–	–
	400:5	-401	–	–	–	-401	-401	-401	-401	–	-401
	600:5	–	–	–	–	-601	-601	-601	-601	–	-601
	1000:5	–	–	–	–	-102	-102	-102	-102	-102	-102
	1600:5	–	–	–	–	-162	-162	-162	-162	-162	-162
	2000:5	–	–	–	–	-202	-202	-202	-202	-202	-202
	3000:5	–	–	–	–	–	–	-302	-302	-302	-302
	4000:5	–	–	–	–	–	–	-402	-402	-402	-402
6000:5	–	–	–	–	–	–	–	–	–	-602	

Table 2 - Split Core (Two Piece) CT Product Selection

Description	Model Designation								
	-600	-601	-604	-606	-608	-615	-616	-617	
Window Size	2 x 5.5 in	4.5 x 4.5 in	1.42 x 1.53 in	2.75 x 2.7 in	2.6 x 6.25 in	1.3 x 1.6 in	1.3 x 2.15 in	2 x 3.5 in	
Outside Diameter (Shape)	Rectangular	Rectangular	Rectangular	Rectangular	Rectangular	Rectangular	Rectangular	Rectangular	
Mounting Included	–	–	–	–	–	–	–	–	
Ratio Designation									
Current Ratio	100:5	–	–	-101	–	–	-101	–	–
	150:5	–	–	-151	–	–	–	–	–
	200:5	–	–	-201	-201	–	-201	-201	–
	300:5	-301	-301	-301	-301	–	-301	–	–
	400:5	-401	-401	-401	-401	–	-401	-401	-401
	600:5	-601	-601	–	-601	-601	–	–	–
	800:5	–	–	–	–	-801	–	-801	-801
	1000:5	-102	-102	–	-102	-102	–	–	-102
	1020:5	–	–	–	-122	–	–	–	-122
	1600:5	-162	-162	–	–	-162	–	–	–
	2000:5	-202	-202	–	–	-202	–	–	–
	3000:5	–	–	–	–	-302	–	–	–
	3200:5	–	–	–	–	-322	–	–	–

Specifications

See Bulletin 1411 Current Transformers Technical Data, publication [1411-TD001](#), for specifications.

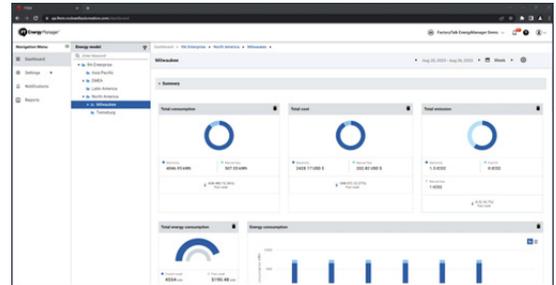
Certifications

For a complete list of certifications, visit our Product Certifications website, rok.auto/certifications, and use '1411-CT' as your search term.

Attribute	Description
UL/CUL	UL 508 listed, File E56639, for Industrial Control Equipment and CUL Certified.
CE Certification	<p>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:</p> <p>EMC Directive This product is tested to meet Council Directive 2004/108/EC Electromagnetic Compatibility (EMC) and the following standards, in whole, documented in a technical construction file.</p> <ul style="list-style-type: none"> EN55011 – Radiated Electromagnetic Emissions EN55011 – Conducted Emissions EN 61326-1 Electrical Equipment for Measurement – EMC Requirements EN61000 – Immunity

Notes:

The FactoryTalk Energy Manager solution is a comprehensive, cloud-based energy management application that puts critical energy information at your desktop. FactoryTalk Energy Manager captures, analyzes, stores, and shares energy data across your entire enterprise. This solution allows for access to data to understand where, when, and how your facilities use energy to establish the scope of their energy savings efforts and define key metrics. This makes it easy to acquire and distribute the knowledge you need to optimize energy consumption and improve productivity while lowering energy costs.



FactoryTalk Energy Manager offers the following capabilities:

- **Real-time data acquisition and monitoring:** Continuously capture and monitor energy data in real-time.
- **Flexible and customizable energy model:** Tailor the energy model to fit your specific needs and requirements.
- **Pre-built dashboards:** Access ready-to-use dashboards to report on key energy performance indicators
- **Contextualize energy data:** Integrate energy data with OT data to understand energy and emissions intensity.
- **Energy Baseline Identification:** Establish a baseline for energy consumption to measure improvements.
- **Charting and no-code analytics:** Utilize intuitive charting tools and no-code analytics for data analysis.
- **Alerts and notifications:** Receive alerts and notifications via email to stay informed about energy usage.

Scalability

FactoryTalk Energy Manager can be leveraged for a single site, multi-site, or enterprise-level energy management.

Connectivity

FactoryTalk Energy Manager is built on the Industrial DataOps Platform, FactoryTalk® DataMosaix™. It includes pre-built operational technology (OT) and IT data extractors to access operational, energy, and process data wherever it resides.

Monitoring and Analysis

FactoryTalk Energy Manager is a comprehensive energy management solution that can report on the most critical energy performance indicators.

- **Total Energy Consumption [kWh]:** The total amount of energy consumed over a given period.
- **Specific Energy Consumption [kWh]:** Energy consumed for specific processes or equipment.
- **Energy Intensity [kWh/Unit of Output]:** Energy consumed per product or unit of production volume.
- **Peak Demand [kW]:** The highest level of power usage during a specific period.
- **Power Quality [Power Factor]:** The ratio indicating how efficiently electrical power is being used.
- **Total Carbon Emissions [tCO2e/kWh]:** The amount of greenhouse gas emissions (Scope 1 and Scope 2).
- **Emissions Intensity [tCO2e/Unit of Output]:** The amount of greenhouse gas emissions per unit of output.
- **Total Energy Cost (\$ per kWh):** The financial cost associated with energy consumption.
- **Energy Savings [kWh Savings]:** The amount of energy saved through efficiency measures.

Product Selection

The following FactoryTalk Software-as-a-Service (SaaS) products are available

SaaS Product	Description	Cat. No.
FactoryTalk Energy Manager	<ul style="list-style-type: none"> Cloud-enabled industrial energy management and optimization solution that helps to improve energy awareness, reduce energy costs, and achieve sustainability goals Leverages FactoryTalk DataMosaix to enable contextualized analytics to monitor, analyze, and optimize energy performance across the enterprise 	Site Subscription <ul style="list-style-type: none"> Pre-requisite: FactoryTalk DataMosaix Industrial DataOps Platform subscription 95203C-FTEMT12
FactoryTalk DataMosaix	<ul style="list-style-type: none"> Cloud-based for multi-site, enterprise-wide access for people and applications Enables controlled access to relevant and contextualized data An Industrial DataOps solution that provides flexible and scalable tools to accelerate data usability by domain experts and analysts 	Standard Subscription <ul style="list-style-type: none"> Intended for small scale implementations Allows you to connect 1000 time series data sources to FactoryTalk DataMosaix Limited to 2 applications in addition to any Rockwell Automation supplied applications 9318C-FTDMSTDT12
		Enterprise Subscription <ul style="list-style-type: none"> Intended for larger multi-site implementations Includes the standard tier plus unlimited applications and 2D/3D CAD file support 9318C-FTDMENTT22

Recommended Products



An alternative option to the recommended products below is FactoryTalk Energy Manager Private Cloud. This software must be implemented by Kalypso professional services. See the Rockwell Automation [Software Ordering Options](#) for more information.

Product	Description	Cat. No.
FactoryTalk® Optix™ Runtime	For FactoryTalk Edge applications with additional features NOTE: The number of tokens included in the license is determined by features implemented in the application. The runtime license must be applied to a single application. Feature tokens cannot be split.	5 tokens = Runtime XS 9702C-OPXRTXST22
		8 tokens = Runtime S 9702C-OPXRTSMT32
		11 tokens = Runtime M 9702C-OPXRTMDT42
		15 tokens = Runtime L 9702C-OPXRTLGT52
		21 tokens = Runtime XL 9702C-OPXRTXLT62
FactoryTalk® Linx Gateway	<ul style="list-style-type: none"> Adds a classic OPC DA and OPC UA server interface to deliver information collected by FactoryTalk Linx from Logix5000™ and other Allen-Bradley® controllers to external OPC clients, permitting third-party software to coexist with FactoryTalk® software An OPC UA / DA Server interface for FactoryTalk Linx Scalable for both tag capacity and server architecture Enables third-party software to share data with FactoryTalk software OPC UA / DA Server interface for FactoryTalk Linx 	Basic License <ul style="list-style-type: none"> Supports up to 1000 tags from a single local FactoryTalk Linx Server 9355C-FTLNKGWT12
		Standard License <ul style="list-style-type: none"> Supports up to 5000 tags from a single local FactoryTalk Linx server 9355C-FTLNKGWT22
		Distributed License <ul style="list-style-type: none"> Supports up to 32,000 tags from multiple distributed and/or redundant FactoryTalk Linx servers 9355C-FTLNKGWT32
		Professional License <ul style="list-style-type: none"> Maximum tags from multiple distributed and/or redundant FactoryTalk Linx servers Includes FactoryTalk Linx DataBridge with a capacity of up to 200,000 tags 9355C-FTLNKGWT42
KEP Server Enterprise Manufacturing Suite	Based on KEPServerEX Manufacturing Suite by PTC®, provides an Open Platform Communications Data Access (OPC DA) and Unified Architecture (UA) interface for data in equipment from other vendors.	9301M-KSET12

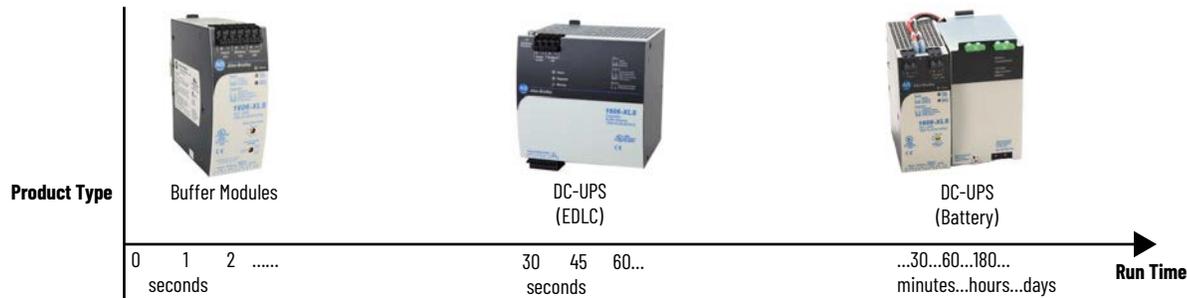
Bulletin 1606, 1608, and 4983 – Mitigation Products

Rockwell Automation brings expertise and Allen-Bradley products that can mitigate the problems and help you avoid the consequences associated with power quality issues. Available mitigation product selection should be selected by power issue.

Mitigation Product	Power Issue				Bulletin Number
	Sag	Interrupt	Harmonics	Transients	
DC Power Supplies	✓	✓			1606
Dynamic Sag Corrector (DySC)	Mini	✓	✓	–	1608N
	Pro	✓	✓	–	1608P
	Mega	✓	✓	–	✓
Surge Protective Device (SPD)	–	–	–	✓	4983-DH, 4983-DS
Filtering Device	–	–	✓	–	4983-PF
Combination SPD and Filtering Device	–	–	✓	✓	4983-DC

DC Power Supplies

Depending on the nature of application and desired runtimes during brownout or blackout events, select the right solution.



Buffer Modules with Capacitor Storage

A buffer module is a supplementary device for regulated DC 24 V power supplies. It stores energy from the DC circuit in integrated electrolytic capacitors. This energy is then provided to the DC bus through a controlled process in the event of a voltage dip or loss.

These buffer modules with capacity storage are supplementary devices for regulated 24V DC power supplies. It buffers load currents during typical mains faults and switching events or load peaks. In times when the power supply provides sufficient voltage, the buffer unit stores energy in integrated electrolytic capacitors. In case of a mains voltage fault, this energy is released again in a regulated process.



Features

- Buffering of 24V loads
- DIN rail mount
- Minimum hold-up time of 0.2 seconds at 20 A
- Longer hold-up time at lower loads
- Clear status indication by status LED and signaling terminals
- Quick-connect spring-clamp terminals

Product Selection

Attribute	1606-XLS960BUFFER	1606-XLSBUFFER24	1606-XLSBUFFER48
Power	0.32 kW	0.20 kW	0.20 kW
Typical Buffer Time	250 ms at 40 A	310 ms at 20 A	150 ms at 20 A
Output	Voltage	24V	48V
	Amps	40 A	20 A

Specifications

See Switched Mode Power Supply Specification Technical Data, publication [1606-TD002](#) for specifications.

Capacitor-based DC Power Supplies

These capacitor-based 24 A DC power supply with capacitor storage uses built-in capacitors, specifically electrochemical double-layer capacitors (EDLCs) or super-capacitors, to store energy and provide a temporary backup power supply. These capacitors act as a buffer, ensuring a continuous power supply to a DC load in the event of a mains power failure. A ventilated cabinet is not required.



6 kW Power
1606-XLSCAP24-6

12 kW
1606-XLSCAP24-12

Features

- Shorter backup time compared to standard (battery-based) DC power supplies
- Wide temperature range, -40...+60 °C (-40...+140 °F), suitable for many applications
- Active balancing for longest life and buffer times
- Short charging time
- Regulated output voltage in buffer mode
- Output is decoupled from the input to separate load
- Circuits into buffered and non-buffered sections

Product Selection

Attribute		1606-XLSCAP24-6	1606-XLSCAP24-12
Power		6 kW	12 kW
Typical Buffer Time		9 seconds at 15 A	18 seconds at 15 A
Output	Voltage	24V	24V
	Amps	20 A	40 A

Specifications

See Switched Mode Power Supply Specification Technical Data, publication [1606-TD002](#) for specifications.

Performance Switched Mode Power Supplies with UPS

Performance switched mode power supplies with battery-based DC UPS bridge power during temporary mains failures, voltage fluctuations, or unexpected system shutdowns. If the mains voltage fails, the DC UPS along with a battery takes over the load current and can buffer it for a certain amount of time. The duration depends on the size of the battery and load power. Bulletin 1606-XLS performance switched mode power supplies use a technology that significantly reduces unit size yet delivers a 150% power boost per 5 seconds.



1606-XLS240-UPS
1606-XLS240-UPSC
1606-XLS240-UPSE

1606-XLS240-UPS
1606-XLS480-UPS

Features

- Compact size for panel space savings
- Single/multi-phase input voltage
- Screw/spring terminations
- Comprehensive monitoring
- Includes rated outputs between 80...960 W (3.3...40 A at 24V DC)
- Features 150% power boost to handles start-up loads
- Provides buffer modules for a short boost function, buffering load currents during typical main

Product Selection

Attribute		1606-XLS240-UPS	1606-XLS240-UPSC	1606-XLS240-UPSD	1606-XLS240-UPSE	1606-XLS480-UPS
Battery	External, 12V	✓	✓	✓ with additional 12V output	✓	✓
	Internal, 12V	–	✓	–	–	–
	Ampere Hour	3.9...40 Ah	5 Ah	3.9...40 Ah	17...130 Ah	3.9...150 Ah
Output	Voltage	24 V				
	Current	10 A				20
Connection Terminals		Spring				Screw

Specifications

See Switched Mode Power Supply Specification Technical Data, publication [1606-TD002](#) for specifications.

DySC

Bulletin 1608 DySCs are unique and exclusive industrial power quality solutions that protect against voltage sags and momentary outages that account for a significant amounts of manufacturing downtime and damaged equipment. Each Bulletin 1608 DySC uses patented double conversion inverter technology that protects against voltage sags and momentary outages.

Thoughtfully designed with no batteries, no moving parts, and virtually no maintenance, these DySCs are ideal for critical manufacturing processes and sensitive electronics that require sag ride-through protection for up to 5 seconds. The DySC is so efficient that it virtually pays for itself in energy savings alone, when compared to other power quality technologies. If you want to maximize facility uptime, you'll want to look at DySC solutions.

Features

- Prevents downtime: Protects against short-term voltage sags and interruptions that can impact production.
- Prevents damage to equipment: Poor power quality can cause immediate and/or long-term damage to sensitive electrical equipment.
- Scalable solution: Machine to facility-wide protection as well as single-phase and three-phase portfolio.
- Up to 5 seconds of ride-through: Most power quality events are of a short duration and a DySC solution can protect equipment against the vast majority of these events
- Protects to 0 volts: DySC can protect against brief, complete voltage loss
- Battery-free solution: Eliminates requirement to swap batteries every 3 to 5 years, which is environmentally friendly



Product Selection

Attribute	Bulletin 1608N Mini DySC	Bulletin 1608P Pro DySC	Bulletin 1608M Mega DySC
Amp Range [A]	1...50	25...200	400...2400
Voltage Range [V]	120...240	208...480	208...480
Power Range [kVA]	0.25...14	10...165	333...2000
Mounting	DIN rail/panel	Panel/floor	Floor
Phases	1 phase	3 phase	3 phase
Applications	Controls, component level	Small machines, drives	Process, bus level
Energy Efficiency	96+%	99+%	99+%
Enclosure	NEMA 1 (IP20)		
Operating Temperature	0...40 °C (32...104 °F)		

Specifications

For technical data, see Dynamic Voltage Sag Corrector Specifications Technical Data, publication [1608-TD001](#).

For ordering information, see Bulletin 1608 Power Quality Products Product Profile, publication [1608-PP002](#)

Surge Protective Devices and Filter Protection

Surge protective devices (SPDs) and filter protection products are designed to meet industrial protection requirements, crucial for protection against internally generated transient and high frequency noise. Any load switching that creates a spark has the potential to produce damaging transients within your system. These transients can destroy equipment if not addressed.

SPDs

Rockwell Automation offers two main types of Allen-Bradley SPDs: heavy duty (Bulletin 4983-DH) for locations with significant amount of lightning and standard duty (Bulletin 4983-DS) adequate for most applications. These SPDs are used in the main power distribution panel on the load side of the main disconnect.

Features

- Parallel/DIN rail mounted Type 2
- Visual status indicator on the unit
- Remote status indicator
- Connection modes: neutral, line/neutral and neutral/ground
- One conductor per terminal



Product Selection

Attribute	Bulletin 4983-DH	Bulletin 4983-DS
Application	• Heavy duty	• Standard duty
Installation Site	• For use in locations that have a significant amount of lightning or have specific standards requirements (in some IEC regions)	• For use in locations where more common surges are created inside a facility; main electrical panel for the protection of 1-phase and 3-phase systems • Use at the entrance of each specific panel as power is distributed into electrical sub-distribution panels or machine control panels
Design	• Extraordinarily robust, handle a significant amount of energy, combines a high-energy varistor (MOV) network with a gas discharge tube to increase performance in protection level, life duration, and suppression of leakage current	• A compact modular design, meets basic surge protection needs
Connection	• Connected in parallel	• Connected in parallel and use an MOV to clamp high-voltage surges
Waveform Test	• Tested to a 10/350 μ s waveform – Rated to handle a surge spike that reaches 90% of its peak in 10 μ s and diminishes to 50% of its peak in 350 μ s. • Meant to simulate a huge surge spike, similar to the energy created during direct lightning strike.	• Tested to a 8/20 μ s waveform – Rated to handle a surge spike that reaches 90% of its peak in 8 μ s and diminishes to 50% of its peak in 20 μ s. • Meant to simulate a more typical surge spike, similar to that of an indirect lightning strike.

Specifications



For detailed technical data for Bulletin 4983, see Surge Protector Devices and Filter Specifications Technical Data, publication [4983-TD001](#).

Attribute	Bulletin 4983-DH	Bulletin 4983-DS
Conductor Material	Cu, solid or stranded	
Conductor Range	#9...3 AWG (6...35 mm ²)	#10...4 AWG (4...28 mm ²)
Strip Length	16 mm (0.6 in)	10 mm (0.4 in)
Tightening Torque	3.5...4 N•m (31...35.4 lb•in)	2...2.5 N•m (17.8...22.1 lb•in)
Operating Temperature	-40...+80 °C (-40...176 °F)	
Certifications ⁽¹⁾ and Standards Compliance	cURus recognized, CE marked, CSA UL 1449, CSA 22.2, No.8, IEC 61643-1, EN 61643-11	

(1) For a complete list of certifications, visit our Product Certifications website, rok.auto/certifications, and use '4983-CT' as your search term.

Filtering Devices

Rockwell Automation offers two main types of Allen-Bradley filtering devices, DIN rail mount (Bulletin 4983-DC) and panel mount (Bulletin 4983-PF). These filtering devices:

- protect sensitive electronic equipment from damaging transients and disruptive electrical line noise,
- constantly monitor the AC power line and ensure that only clean power is getting to equipment, and
- reduce the stress on components of connected equipment by lowering the clamping voltage and the rate of voltage change by removing the high frequency elements of transients.



DIN Rail Mount
Bulletin 4983-DC



Panel Mount
Bulletin 4983-PF

Features

- Built with Islatrol™ filter technology, providing an attenuation range to 90 dB, continuously monitors and responds to unwanted disturbances to the input signal
- Modes of protection: line/neutral, line/line, line/PE, neutral/PE

Product Selection

Attribute	Bulletin 4983-DC	Bulletin 4983-PF
Design	<ul style="list-style-type: none"> • Combination filtering device and SPD <ul style="list-style-type: none"> - the filter cleans the wave of noise - the SPD shunts high-energy transients away from vulnerable equipment 	<ul style="list-style-type: none"> • Filtering device <ul style="list-style-type: none"> - Designed to clean the AC power sine wave of lower level voltage transients and high frequency noise - Functions as noise protection, monitoring and cleaning the wave of high frequency noise disturbances that can cause premature aging

Specifications



For detailed technical data for Bulletin 4983, see Surge Protector Devices and Filter Specifications Technical Data, publication [4983-TD001](#).

Attribute		Bulletin 4983-DC	Bulletin 4983-PF
Mounting Type		DIN rail mount	Panel (flange) mount
Connection		Series wired	
Enclosure		Metal, DIN rail mount, product label	Grey, high-impact plastic, 94V-0, product label
Approximate Weight		3 A: 0.45 kg (1 lb)	2.5 A: 0.68 kg (1.5 lb)
		5 A: 0.45 kg (1 lb)	5 A: 0.68 kg (1.5 lb)
		10 A: 0.68 kg (1.5 lb)	15 A: 1.81 kg (4 lb)
		20 A: 0.68 kg (1.5 lb)	30 A: 2.95 kg (6.5 lb)
Ringwave Rating	Typical Cat. A	< 60V peak	< 10V peak
	Typical Cat. B	< 100V peak	< 50V peak
Status Indication		Single green LED indicating MOV integrity Single form C contact (10 A at 250V AC, 5 A at 100V DC)	Single green LED for power indication
Response Time	Normal Mode	< 0.5 nanosecond	
	Common Mode	< 5 nanosecond	
Operating Temperature		-40...+60 °C (-40...140 °F) derate linearly to 60% at 70 °C (158 °F)	
Fusing		Appropriate external fusing is required	
Frequency Response (Forward – Reverse)	Normal Mode	100 kHz...50 MHz: 90 dB minimum	100 kHz...50 MHz: 90 dB minimum
	Common Mode	5...50 MHz: 60 dB minimum	100 kHz...50 MHz: 60 dB minimum
	Cut-off Frequency	50 kHz	3 kHz
Certifications ⁽¹⁾		UR Recognized, CSA, CE Marked	UR recognized component, CE Marked

(1) For a complete list of certifications, visit our Product Certifications website, [rok.auto/certifications](#), and use '4983-CT' as your search term.

Notes:

Additional Resources

These documents contain additional information concerning related products from Rockwell Automation. You can view or download publications at rok.auto/literature.

Resource	Description
PowerMonitor Products Application Guide Application Technique, publication 1400-AT001	Provides information to determine business goals, perform a plant walk-through, analyze energy assessment, and effectively monitor and measure energy data.
PowerMonitor 500 Unit User Manual, publication 1420-UM001	Provides installation instructions, wiring diagrams, configuration, and specifications for PowerMonitor 500 units with catalog numbers 1420-V1, 1420-V2, 1420-V1x, 1420-V2x, 1420-V1-xxx, 1420-V2-xxx, 1420-V1A-xxx, 1420-V2Axxx, 1420-V1P-xxx, and 1420-V2P-xxx.
PowerMonitor 1000 Unit User Manual, publication 1408-UM002	Provides installation instructions, wiring diagrams, configuration, and specifications for PowerMonitor 1000 units with catalog numbers 1408-BC3A-485, 1408-BC3A-ENT, 1408-TS3A-485, 1408-TS3A-ENT, 1408-EM3A-485, and 1408-EM3A-ENT.
PowerMonitor 1000 Legacy Unit Installation Instructions, publication 1408-UM001	Provides installation configuration for PowerMonitor 1000 legacy units with catalog numbers 1408-TR1A-485, 1408-TR2A-485, 1408-EM1A-485, 1408-EM2A-485, 1408-EM3A-485, 1408-TR1A-ENT, 1408-TR2A-ENT, 1408-EM1A-ENT, 1408-EM2A-ENT, and 1408-EM3A-ENT.
PowerMonitor 5000 Unit User Manual, publication 1426-UM001	Provides installation instructions, wiring diagrams, configuration, and specifications for PowerMonitor 5000 units.
PowerMonitor 5000 Optional Communication Modules Installation Instructions, publication 1426-IN002	Provides instructions for installing and removing optional communication modules.
Bulletin 1411 Current Transformers Technical Data, publication 1411-TD001	Provides specifications and technical data for Bulletin 1411 current transformers (CTs).
PowerMonitor Accessory Kit Installation Instructions, publication 1400-IN004	Provides instructions for installing and description of contents of kit for PowerMonitor units.
Designing More Reliable 24VDC Systems Application Technique, publication 1606-AT003	Describes redundancy, buffer modules, UPS, and converter device functionality and their addition into a power supply system to help improve the reliability.
Switched Mode Power Supply Specification Technical Data, publication 1606-TD002	Provides technical data for Bulletin 1606 performance switched mode power supplies and buffer modules with capacity storage.
Dynamic Voltage Sag Corrector Specifications Technical Data, publication 1608-TD001	Provides technical data for Dynamic Voltage Sag Correctors (DySCs).
Bulletin 1608 Power Quality Products Product Profile, publication 1608-PP002	Provides an overview of Bulletin 1608 Power Quality Products.
Surge Protector Devices and Filter Specifications Technical Data, publication 4983-TD001	Provides technical data for Bulletin 4983 surge protective device (SPD) and filtering device mitigation products to be used with PowerMonitor units.
FactoryTalk Edge Manager User Manual, publication 95055-UM007	Provides information to use the FactoryTalk Edge Manager platform for initializing or starting to work on the FactoryTalk Edge Manager.
Safety Guidelines for the Application, Installation, and Maintenance of Solid-state Control, publication SGI-1.1	Designed to harmonize with NEMA Standards Publication No. ICS 1.1-1987 and provides general guidelines for the application, installation, and maintenance of solid-state control in the form of individual devices or packaged assemblies incorporating solid-state components.
Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1	Provides general guidelines for installing a Rockwell Automation industrial system.
Rockwell Automation Software Ordering Options website, Software Ordering Options	Provides access to the myRockwellAutomation portal for software to include: FactoryTalk Energy Manager, FactoryTalk Energy Manager Private Cloud, FactoryTalk DataMosaix, FactoryTalk Optix Runtime S, and FactoryTalk Linx Gateway.
Product Selection and Configuration tools, rok.auto/systemtools	Helps configure complete, valid catalog numbers and build complete quotes based on detailed product information.
Rockwell Automation Global SCCR tool, rok.auto/sccr	Provides coordinated high-fault branch circuit solutions for motor starters, soft starters, and component drives.
Product Certifications website, rok.auto/certifications	Provides declarations of conformity, certificates, and other certification details.

Rockwell Automation Support

Use these resources to access support information.

Technical Support Center	Find help with how-to videos, FAQs, chat, user forums, Knowledgebase, and product notification updates.	rok.auto/support
Local Technical Support Phone Numbers	Locate the telephone number for your country.	rok.auto/phonesupport
Technical Documentation Center	Quickly access and download technical specifications, installation instructions, and user manuals.	rok.auto/techdocs
Literature Library	Find installation instructions, manuals, brochures, and technical data publications.	rok.auto/literature
Product Compatibility and Download Center (PCDC)	Download firmware, associated files (such as AOP, EDS, and DTM), and access product release notes.	rok.auto/pcdc

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