GE
Digital Energy



Multilin™ EPM 9900

High Performance Power Quality and Transient Recorder Meter

The EPM 9900 is one of the most advanced monitoring products on the market today, providing you with the total picture of energy usage and power quality from any metered point in a power distribution network.

Precision Measurement, 10MHz Transient Recorder, Advanced Communication, and up to 1GB of memory. With a color touch screen display and high speed (1024 samples/cycle) waveform recorder EPM 9900 meter is perfect for industrial and utility substation automation applications where both power quality monitoring and extremely high accuracy are required.

Key Benefits

- Auto-calibrating metrology means the meter maintains its accuracy over temperature and time
- Large memory makes it possible to view years of circuit's history
- Capture the fastest events with 10MHz transient recording
- Ideal for monitoring industrial power centers, data centers, and hospitals due to high accuracy disturbance recording (up to 1024 samples/cycle) and extremely high accuracy 0.06% Watt/Hr metering
- Operators can quickly extract recorded data with download speeds 20 times faster than existing technology
- Flexible communications supporting simultaneous Modbus, DNP and IEC 61850 for a multitude of metering applications
- Standardize setup, commissioning, ongoing maintenance using 61580 settings files
- Increased communications flexibility with simultaneous Modbus, DNP and IEC 61850
- Upgradable through modular I/O and field upgradable firmware allowing the meter to be easily adapted for changing applications

Applications

- Advanced power quality monitoring
- Revenue class energy and power billing with 0.06% accuracy
- Control of external devices using output modules

Monitoring & Metering

- 0.06% Energy Accuracy
- 10MHz Transient Recorder (over 166,000 samples/cycle)
- 8 Channel Waveform Recorder
- Voltage Surge, Sag and Transient Recording
- Current Fault Signatures and Analysis
- Up to 1 GB of Memory
- EN61000-4-30 Class A Support

Advanced Communications

- Standard 10/100BaseT Ethernet Port
- Expandable Serial Ports (Dual RS485 Ports)
- Modbus ASCII, Modbus TCP, DNP 3.0 Level 2, IEC 61850
- 8 Simultaneous Connections via Ethernet
- Optional Second Ethernet Port
- Up to 16 Relay Outputs
- Up to 40 Digital Status Inputs

imagination at work

Overview

The EPM 9900 is one of the most advanced monitoring products on the market today, providing you with the total picture of energy usage and power quality from any metered point in a power distribution network. This allows you to make power related decisions quickly and effectively.

This advanced power quality meter offers:

- Metering technology specifically designed for Utilities and Industrial applications with flexible communications supporting simultaneous Modbus, DNP and IEC 61850
- Real-time monitoring and analysis identifies power quality and reliability events quickly
- Management of peak demand electrical power usage
- Reliable and fast data using Ethernet or serial communications
- Advanced transient analysis for critical power systems
- The perfect solution for circuit breaker or transformer monitoring

Revenue Metering

The EPM 9900 features 8 independent high-speed 16-Bit A/D converters providing 0.06% energy and power accuracy. The meter maintains its accuracy over temperature, measured through an internal sensor, and time through GE's unique auto-calibration technology. This technology improves the long term stability of the device and relies on precision internal DC references to maintain this accuracy.

Max/Min Integration and Recording

The unit offers time stamped max and min values for every measured reading. kW readings are integrated using:

- Block (fixed) window
- Thermal window
- Rolling (sliding) window
- Predictive Window

Time of Use (TOU) Capability:

EPM 9900 offers comprehensive time of use capability. Standard features include:

- Bi-directional consumption and demand quantities
- 20-year calendar – 4 seasons/yr, 12 holidays/yr
- 4 TOU schedules/seasons
- Prior month, prior season storage
- Present month, present season storage

Transformer Loss and Line Loss Compensation:

The unit compensates for transformer and line losses. Power reading compensation is conducted for both iron and copper losses.

Load Aggregation/Universal Metering:

Using the status inputs, EPM 9900 has the ability to count pulses and aggregate different loads providing a total picture of the load and its component parts. This can be used to accumulate and aggregate other utilities such as water and gas data.

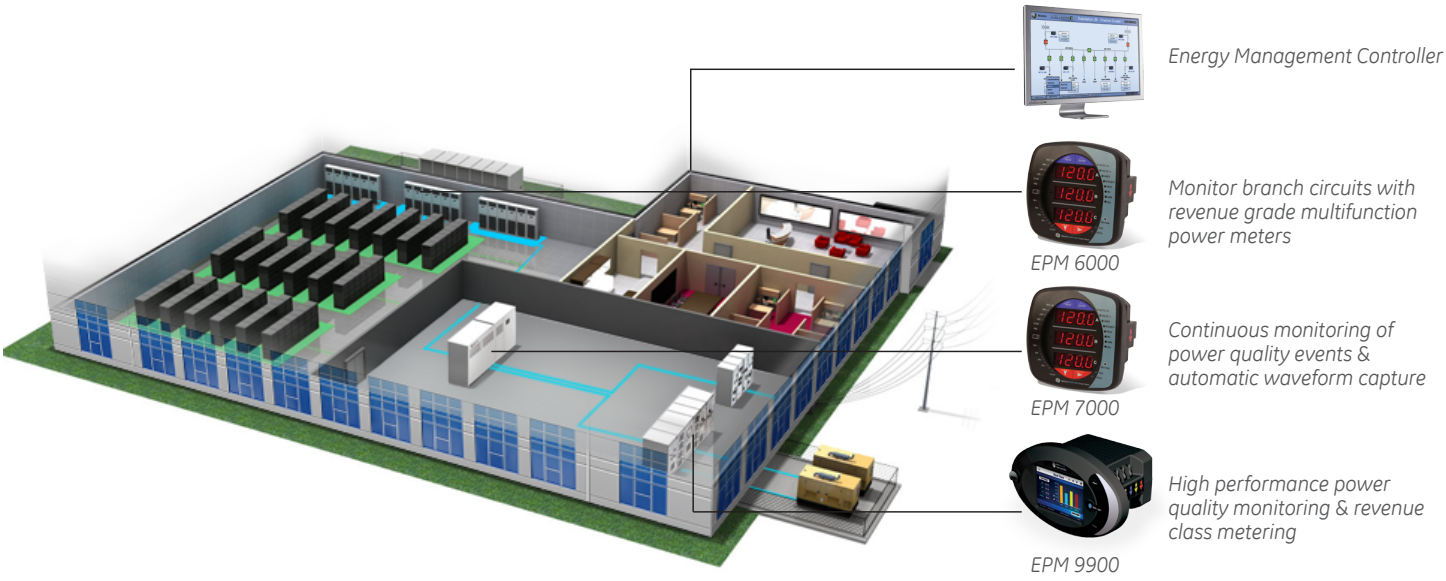
Multiple Programmable Memory Logs

Virtually Unlimited Historical Trending Logs

The EPM 9900 includes vast amounts of memory. This memory may be partitioned for log storage by setting up both the number of logs and the number of parameters per log. Eight (8) independent historical logs with up to 64 parameters per log are available. This extensive meter will allow the meter to log for years.

Multifunction Metering & Power Quality Monitoring

The EPM 9900 can provide a total picture of power usage and power quality at different points within a power distribution network, allowing users to make power related decisions quickly and effectively.



Out of Limit Log

The unit offers an independent out of limit log. This allows a user to download out of limit information to obtain a sequence of events for any occurrence. Utilizing the 1msec clock resolution, the logs can be combined with different metered points throughout a distribution system to provide an accurate system-wide depiction of a power disturbance.

Event-Triggered Waveform Recording Log

The EPM 9900 meter records waveforms with a resolution of up to 1024 samples/cycle. The amount of waveform recording is based on the amount of memory installed.

The unit records the waveform when a value goes out of limit and when the value returns to normal. All information is time-stamped to the nearest 1msec. 8 on-board high-speed inputs can be tied to the waveform recording.

- Compare relay trip and breaker timing graphically
- Provides fault and breaker integrity analysis

The unit can be programmed to take more than one recording every time an event occurs. Thousands of cycles can be recorded per event.

ITIC/CBEMA Log

The EPM 9900 meter stores a separate CBEMA log that records magnitude and duration of voltage and current surges and sags for every power quality event. This allows the user to conduct real time CBEMA analysis without downloading all stored waveforms. The separate CBEMA log also allows the unit to provide a more comprehensive picture of power quality over time.

System Events Log

The EPM 9900 meter logs extensive usage information for detection of unauthorized access. The unit records:

- Resets
- Programming changes
- Password access changes
- Time changes
- Power up / power down
- Change of firmware

Input Status Log

This log allows the user to record when the internal inputs change status.

Uploadable Flash Memory

The EPM 9900 meter utilizes uploadable flash memory technology on all processors and DSPs located in the unit. This insures that the unit can be upgraded without removing it from service.

Set Limit Control

The EPM 9900 power monitor provides programmable set points for user settings. This feature allows a user to configure the meter to be used as a control device for many applications such as:

- Capacitor control
- Load shedding
- Automatic transfer schemes
- Transformer monitoring & control
- Redundant protection (not designed for primary over-current protection)
- Many other control functions

Waveform / Transient Logs

The EPM 9900 can log waveform, utilizing its programmable memory for all surges, sags and transients with the scope of what it sees. Thousands of events can be logged with resolution up to 1024 samples/cycle and transients at 10MHz resolution.

Custom Allocatable Memory Structure

A user can define log sizes within the meter. Thus the full memory can be allocated specifically to the desired function.

Detailed Power Quality Analysis and Waveform Recording

The EPM 9900 meter is a premier fault and voltage disturbance recorder. This instrument captures a comprehensive picture history of voltage reliability and power quality events within mass memory for detailed and extensive forensic engineering analysis.

16 Bit Waveform and Fault Recorder

- Record up to 1024 samples/cycle consisting of transient captures at over 166,000 samples/cycle
- Voltage and current recording with pre and post-event analysis
- Fault recording offers 8 times full scale capture capability
- 16 bit A/D converter provides precise waveform resolution
- Both hardware and software triggers available
- View harmonic magnitudes to 512th order for each voltage and current channel
- Real time harmonic magnitudes are resolved to the 128th order
- Percent THD and K-Factor
- Conduct power quality analysis at the high end of the harmonic magnitude spectrum

High-Speed Status Input Triggers

- Waveforms are recorded at time of status change
- Input change and waveform recording are time-stamped to a 1msec resolution

EN61000-4-15 Flicker Meter

- Flicker compliant with EN61000-4-15 standard
- Operates on both 220 Volt/50Hz and 120Volt/60Hz voltages throughout standard test points
- EN61000-4-30 Reporting

Subcycle 10MHz Transient Recorder (C Software Option)

Transients often cause intermittent, expensive periods of downtime. The subcycle transient recorder allows you to:

- Record subcycle transients at 10MHz resolution
- Monitor switching noise from capacitors, static transfer switches, SCRs and other devices that negatively impact power quality
- This feature is essential for critical applications such as hospitals, wafer-fabs plants, data centers and other highly power quality sensitive applications

Independent ITIC/CBEMA Log Plotting

Quickly view total surges, sags, and average duration in the independent ITIC/CBEMA log.

Phasor Analysis

The monitor reads a phase angle analysis between the voltage and current channels, allowing you to analyze efficiency and system integrity.

On-Board Communication for Every Application

Standard Communications

- 100 BaseT Ethernet RJ45 Port
- ANSI Optical Port and USB 2.0 port

8 Built-In Digital High-Speed Status Inputs

- Inputs automatically sense whether the circuit is externally wetted
- If externally wetted, input up to 150VDC is accepted
- If internally wetted, the meter supplies the necessary voltage for the control application

Sync. Check-Aux. Volt Input—High-speed Vaux input can be used for

- Neutral to ground or aux voltage readings
- Synchronizing schemes
- Obtain the freq, magnitude, and phase angle on both sides of a switch, or between generator and bus voltage for synch schemes

Optional RS485 and Second Ethernet Port

- Two identical built-in serial ports: Up to 115k baud
- Standard protocols include Modbus RTU/ ASCII and DNP 3.0 Level 2
- Also available, second Ethernet port, either RJ45 or Fiber Optic
- Separate MAC address and configuration for each Ethernet port

Industry Leading DNP 3.0 Level 2 Plus

- Complies with DNP Level 1 and Level 2 certification requirements, plus
- Up to 136 measurements (64 binary inputs, 8 binary counters, 64 analog inputs) can be mapped to DNP static points in the customizable DNP Point map
- Up to 16 relays and 8 resets can be controlled though DNP
- 250 available events, of combinations of four events (binary input change, frozen counter, counter change, analog change)
- Available freeze commands: Freeze, Freeze/ No-Ack, Freeze with Time, Freeze with Time/ No-Ack
- Freeze with time command enables the meter to have internal time driven frozen counter and frozen counter event data
- Programmable secondary scale allows users to maximize 16 bit analog input resolution precisely around the desired parameters providing enhanced resolution to SCADA

IEC 61850 Protocol Server

- Available with Software Option B, C
- Simultaneous Modbus, DNP and IEC 61850 communications
- Support for 61850 functionality including:
  - Multiple Logical Nodes
  - Polled Operation Mode (Queried Reports)
  - Buffered and Unbuffered Reports

Download data over 20 times faster than existing EPM meter technology

- 10/100BaseT Ethernet allows for 8 simultaneous connections of Ethernet Modbus TCP protocol. Two sockets for DNP 3.0 protocol are also available
- Utilizing a novel Modbus TCP approach, the meter will download up to 20 times faster than existing EPM9450 and EPM 9650 meters reducing data retrieval time

Internal I/O

Relay Outputs

- R1: 6 Relay Outputs Card
- 5 amps/125 volts AC/DC rated
- Form C (Latching)

Pulse Outputs

- S: Dual RS485/Pulse Output Card
- 4 KYZ Pulses
- Pulse width: 5 msec
- Relay type: Solid State
- Dual RS485 Ports

Input Status

- D1: 16 Status Inputs card
- Used for alarm detect or pulse accumulation
- Up to 150 volts DC wetted, or
- non-wetted (24 volt DC nominal provided)

Note: The EPM 9900 meter provides one I/O slot for the S module (Slot 1), and two I/O slots for the R1 and D1 modules (Slots 3 and 4). Each I/O can be ordered as a separate upgradable part.

External I/O

Analog Outputs

- PL9000-1mAON4/PL9000-1mAON8: 4 or 8 Analog Outputs, 0-1mA, scalable, bidirectional
- PL9000-20mAON4/PL9000-20mAON8: 4 or 8 Analog Outputs, 4-20mA, scalable
- Wiring: Common Mode
- Accuracy: 0.1% of Full Scale
- Calibration: Self-calibrating
- Scaling: Programmable
- Ordering: Up to 4 Analog Output modules for each EPM 9900 meter.

Digital Dry Contact Relay Outputs

- PL9000-4RO1: 4 Relay Outputs, 5 amps, 125 AC/DC, Form C – Latching Relays
- Ordering: 1 module in addition to internal modules

Digital Solid State Pulse Outputs

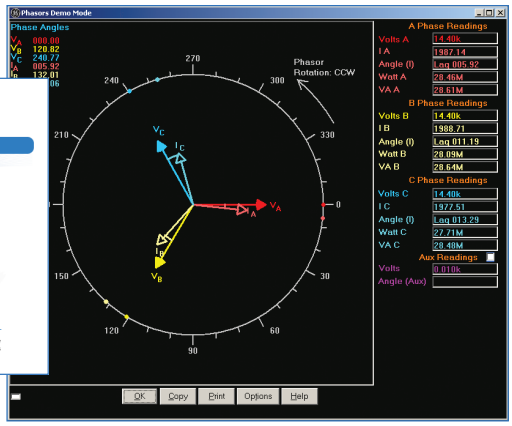
- Digital Output Modules (PL9000-4P01): 4 Solid State Pulse Outputs, Form A or C KYZ pulses
- Maximum Pulse Speed: 20 pulses per sec.
- Ordering: Up to 4 modules per meter

Output Module Accessories (Required)

- Auxiliary Power Supply (PL9000-PSIO): Required for using an external I/O module and must be ordered with the module. The EPM 9900 does not have internal power for external modules
- Mounting bracket for Output modules (PL9000-MBIO). Must be ordered with external module
- Option S: Dual RS485/Pulse Output Card, is required on the EPM 9900 to directly connect the modules to the meter



Simultneous Data Connection through Ethernet and Web Server



GE Communicator Software – Phasor Demo Mode

Software

GE Communicator Software

This software connects remote meters via Serial, Ethernet or Modem. It allows users to view real time metered data, configure and analyze collected information from remote EPM power meters. It works with the EPM 2200, EPM 6000, EPM 7000, EPM 9450, EPM 9650, EPM 9800 and EPM 9900 meters.

GE Communicator displays real time data from supported meters. The data is presented in a simple and powerful graphical format so that laymen access data easily. The software offers many screens, including:

- Voltage, Current, Power & Energy
- Time of Usage & Accumulations
- Power Quality
- Harmonics to the 255th Order
- Actual Real time Waveform Scopes
- Alarms & Limits
- Max. & Min. for Each Parameter
- I/O Device Information

EnerVista™ Launchpad

EnerVista Launchpad is a powerful software package that provides users a platform to access all of the setup and support tools needed for configuring and maintaining GE Multilin products.

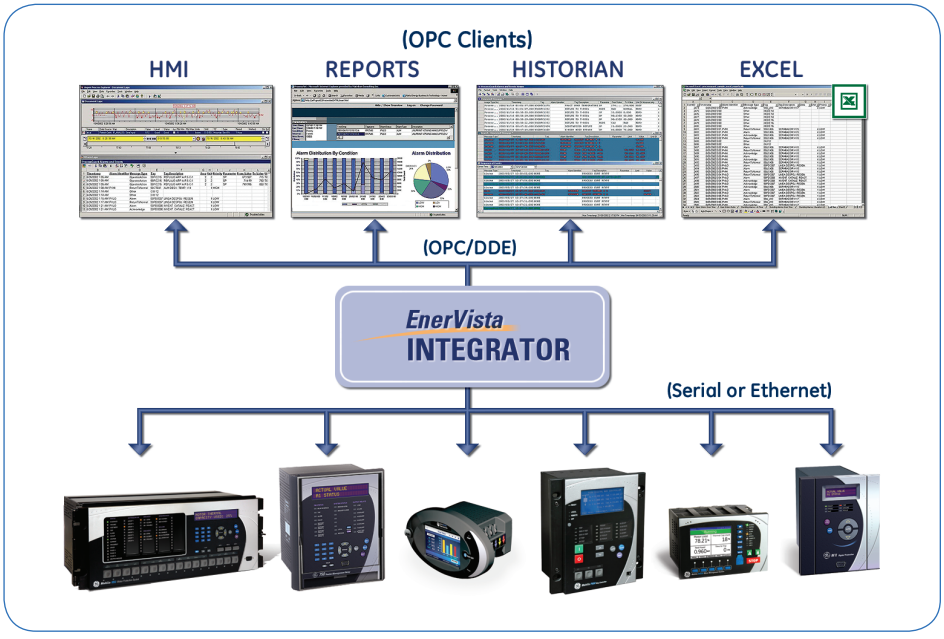
EnerVista Launchpad allows configuration of devices in real-time by communicating using RS232, RS485, Ethernet or modem connections. Using Launchpad as the single interface to the setup and analysis software makes it easy to enter set points, read metered values, monitor status and evaluate power quality.

Included in EnerVista Launchpad is a document archiving and management system that ensures critical documentation is up-to-date and available when needed by automatically checking for and downloading new versions of manuals, applications notes, specifications and service bulletins.

EnerVista Integrator

EnerVista Integrator is a toolkit that allows seamless integration of GE Multilin devices into new or existing automation systems by sending GE device data to HMI, DCS and SCADA systems. Included in EnerVista Integrator is:

- OPC/DDE Server
- GE Multilin Drivers
- Automatic Event Retrieval
- Automatic Waveform Retrieval

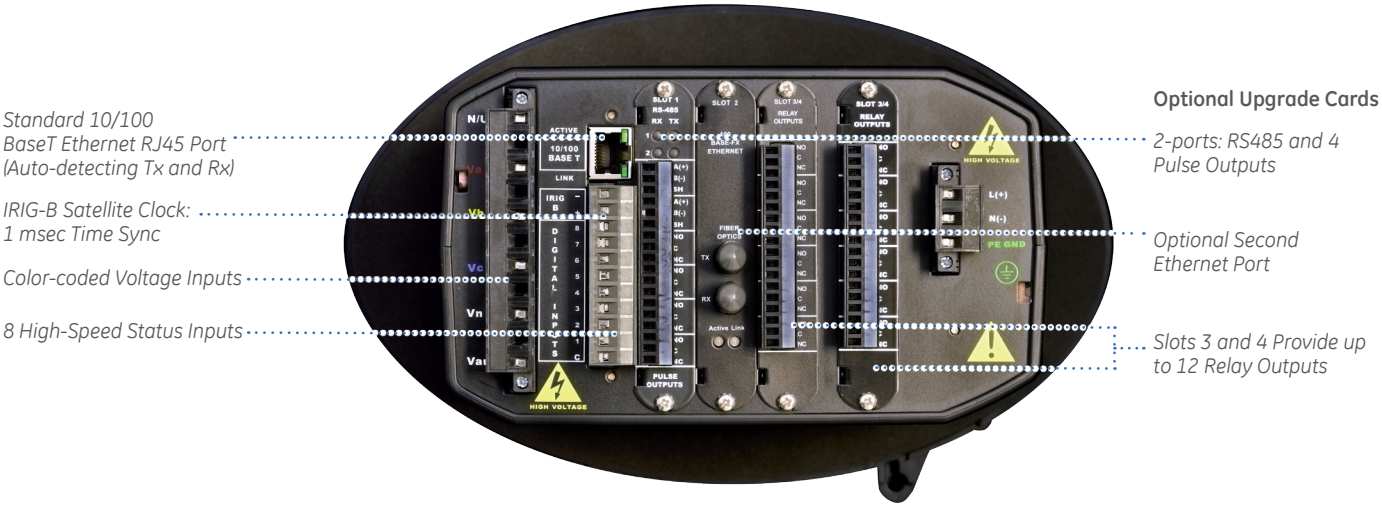


EPM 9900 Meter Face-Mounted Coms and Display



EPM 9900 Meter Rear Mounted Communication

Upgradeable and Powerful Inputs and Outputs



Technical Specifications

INPUT VOLTAGE RANGE
- (5-347)VAC, Line to Neutral
- (10-600)VAC, Line to Line

VOLTAGE INPUT WITHSTAND CAPABILITY
- Voltage Inputs isolated to 2500VAC
- Meets ANSI C37.90.1 (Surge Withstand Capability)

INPUT CURRENT RANGE
- 5 Amp Inputs 4x continuous programmable to any CT range
- Fault Current recording to 80 Amps peak secondary based on 5 Amp full scale

CURRENT INPUT WITHSTAND CAPABILITY
(AT 23°C)
- 100 Amps for 10 Seconds
- 300 Amps for 3 Seconds
- 500 Amps for 1 Second

BURDEN
- Voltage Inputs: 0.072W/Phase Max at 600 Volts, 0.003W/Phase Max at 120 Volts
- Current Inputs: 0.008VA per Phase Max at 20 Amps

ISOLATION
All inputs to outputs are isolated to 2500 VAC

TEMPERATURE RATING
- Operating Temperature: (-20 to +70)°C
- Humidity: Up to 95% RH Non-condensing
- Storage Temperature: (-30 to +80)°C

SENSING METHOD
- Up to 1024 Samples per Cycle (Programmable)
- Voltage Transient: 10MHz ±1.8kV ±10%
- 16 Bit A/D Resolution – Multiple Converters
- True RMS

UPDATE TIME
- 1 Second — Revenue Accurate Readings
- 100 msec — High Speed Readings

CONTROL POWER REQUIREMENTS
- AC: 100-240VAC
- HI: 90-265VAC or 100-240VDC
- LD: 18-60VDC (24-48VDC Systems)
- Burden: 25VA Max

FREQUENCY RANGE
45Hz–69.9Hz

COMMUNICATION FORMAT
- Programmable parity and stop bits
- Communication Protocols: Modbus TCP/IP, ASCII/RTU, DNP 3.0, IEC 61850 Edition 1
- ANSI Optical Port
- USB 1.1/2.0 Virtual COM Port
- RJ-45 Ethernet Port 10/100BaseT
- 2 RS485 Ports (optional)

SHIPPING
Total shipping weight: approx. 5 lbs (2.3 kgs)
Shipping container dimensions:
16" x 13" x 11"
(40.64cm x 33.02cm x 27.94cm)

COMPLIANCE
- ANSI C12.20 Class 0.2 and IEC 62053-22 (Accuracy)
- ANSI C62.41 (Burst)
- ANSI/IEEE C37.90.1 – Surge Withstand
- IEC 1000-4-2 – ESD
- IEC 1000-4-3 – Radiated Immunity
- IEC 1000-4-4 – Fast Transient
- IEC 1000-4-5 – Surge Immunity
- EN61000-4-15 – Flicker Meter
- EN61000-4-7 – Harmonics
- EN61000-4-30 – Class A
- CE Marked
- UL and cUL Listed, File E250818

Accuracy Rating

This unit complies with and exceeds ANSI C12.20 and IEC62053-22 accuracy requirements.

Parameter	100 msec*	1 second*	Display Resolution
Voltage (L-N)	0.10%	0.05%	5 Digit
Voltage (L-L)	0.10%	0.05%	5 Digit
Current	0.10%	0.025%	5 Digit
Frequency	0.03 Hz	0.01Hz	5 Digit
kW @ Unity PF	0.10%	0.06%	5 Digit
kW @ 0.5 PF	0.10%	0.10%	5 Digit
kVA	0.10%	0.08%	5 Digit
kVAR (0.5 – 0.9 PF)	0.10%	0.08%	5 Digit
PF	0.10%	0.08%	3 Digit
Harmonic Magnitudes	N/A	0.20%	3 Digit
kW-hours	N/A	0.06%	16 Digit
kVA-hours	N/A	0.08%	16 Digit
kVAR-hours	N/A	0.08%	16 Digit

Ordering

PL9900	**	*	*	*	*	**	**	**	Description
Control Power	AC								100 - 240
	HI								90-265 VAC or 100-370 VDC
	LD								18-60VDC (24-48VDC Systems)
Frequency		6							60 Hz
		5							50 Hz
Current Inputs			5A						5 Amps
			1A						1 Amp
Software				A					128MB memory with 512 samples/cycle
				B					1GB memory with 1024 samples/cycle, IEC 61850 Communications Protocol
				C					1GB memory with 1024 samples/cycle, IEC 61850 Communications Protocol and 10MHz Transient Recording
Slot 1					S				2-ports RS485 and 4 Pulse Outputs
					X				Empty Slot
Slot 2						E1			Second Ethernet Port, 10/100BaseTX, RJ45
						E2			Second Ethernet Port, 100FX, Multimode, ST connector
						X			Empty Slot
Slot 3							R1		6 Relay Outputs
							D1		16 Status Inputs
							X		Empty Slot
Slot 4								R1	6 Relay Outputs
								D1	16 Status Inputs
								X	Empty Slot

NOTE: Each I/O for Slots 1 through 4 can be ordered as a separate upgradable part. Consult the online store your factory for details.

External Output Modules

PL9000	*	*	*	*	*	*	*	0	0	Analog Output Modules
	1	M	A	O	N	4	O			4 Channel 0-1 mA Analog Outputs
	1	M	A	O	N	8	O			8 Channel 0-1 mA Analog Outputs
	2	O	M	A	O	N	4			4 Channel 4-20 mA Analog Outputs
	2	O	M	A	O	N	8			8 Channel 4-20 mA Analog Outputs

PL9000	*	*	*	*	*	*	*	0	0	Analog Input Modules
	8	A	I	1	0	0	0	0	0	8 Channel 0–1mA Analog Inputs
	8	A	I	2	0	0	0	0	0	8 Channel 0–20mA Analog Inputs
	8	A	I	3	0	0	0	0	0	8 Channel 0–5V DC Analog Inputs
	8	A	I	4	0	0	0	0	0	8 Channel 0–10V DC Analog Inputs

PL9000	*	*	*	*	0	0	0	0	0	Digital Output Modules
	4	R	O	1						4 Channel Control Relay Outputs
	4	P	O	1						4 Channel KYZ Solid State Pulse Outputs

PL9000	M	B	I	O	0	0	0	0	0	Auxiliary Mounting Bracket (Required for using external modules)

PL9000	P	S	I	O	0	0	0	0	0	Auxiliary Power Supply (Must be ordered with external modules)

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