# Multilin™ EPM 9900

## ADVANCED POWER QUALITY METER

## High Performance Power Quality and Transient Recorder Meter

## KEY BENEFITS

- Auto-calibrating metrology means the meter maintains its accuracy over temperature and time
- Large memory makes it possible to view years of the 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, modular I/O and field upgradable firmware allow the meter to be easily adapted to changing applications

## APPLICATIONS

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

## FEATURES

### Communications

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

### Measuring and 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

## 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:

- Technology specifically designed for Utilities and Industrial applications
- 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.

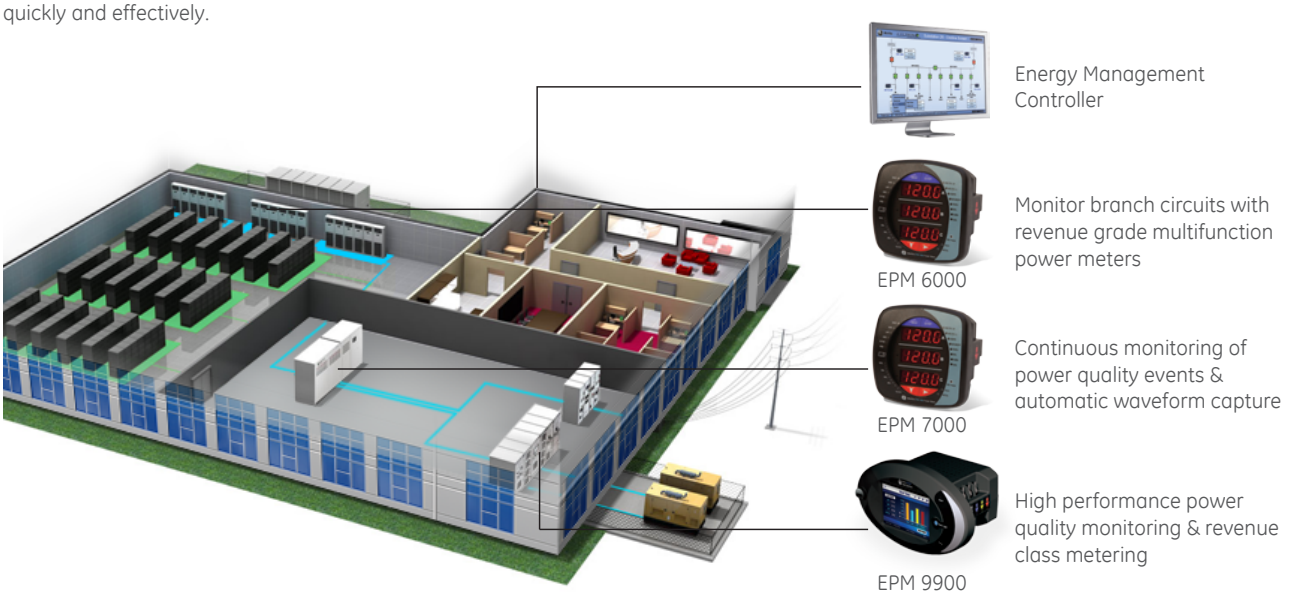
## Multiple Programmable Memory Logs

### 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

### 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. No long wait time to retrieve data

## 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)*

## 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

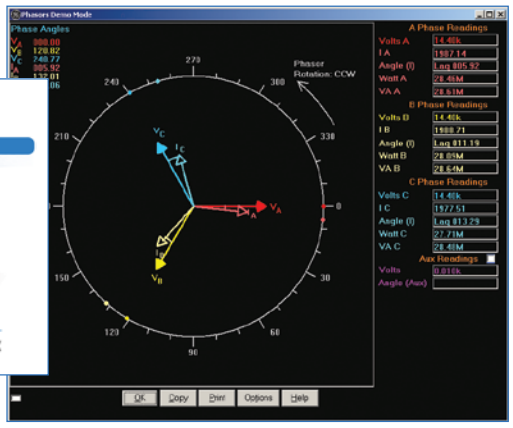
### Digital Solid State Pulse Outputs

- 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.

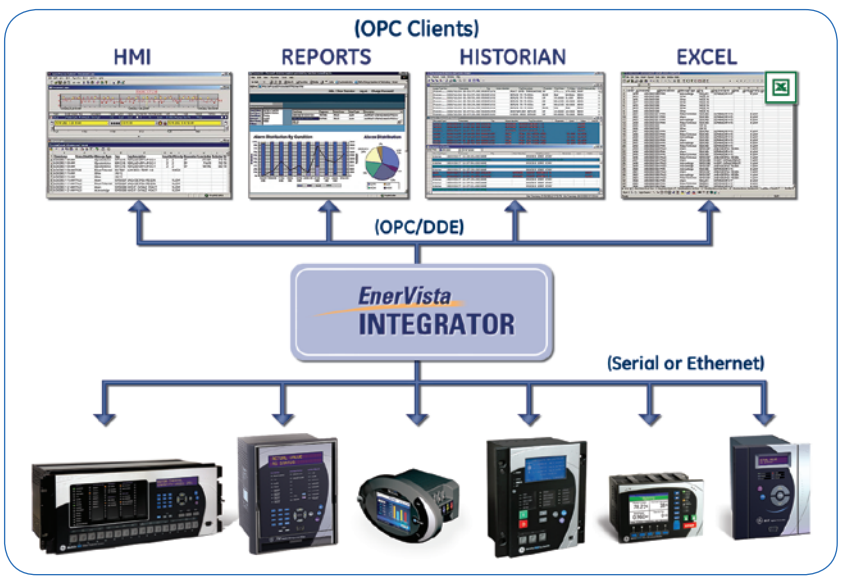
EnerVista Launchpad allows configuration of devices in real-time by communicating using RS232, RS485, Ethernet or modem connections. Using Launchpad as the single interface to the setup and analysis software makes it easy to enter set points, read metered values, monitor status and evaluate power quality.

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

## 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 |

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

### CONTROL POWER REQUIREMENTS
- (Suffix -HI): (90–265)VAC, (100-370)VDC
- 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
- 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

## Ordering

| PL9900 | ** | * | * | * | * | ** | ** | ** | Description |
|---|---|---|---|---|---|---|---|---|---|
| Control Power | AC | | | | | | | | 100 - 240 VAC Power Supply |
| | HI | | | | | | | | 90-265 VAC or 100-370 VDC |
| Frequency | | 6 | | | | | | | 60 Hz |
| | | 5 | | | | | | | 50 Hz |
| Current Inputs | | | 5A | | | | | | 5 Amps |
| | | | 1A | | | | | | 1 Amp |
| Software | | | | A | | | | | 128 MB memory with 512 samples / cycle |
| | | | | B | | | | | 1 GB memory with 1024 samples / cycle |
| | | | | C | | | | | 1 GB memory, 1024 samples / cycle + 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 |

### 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) |
|---|---|---|---|---|---|---|---|---|---|---|

### Visit GEDigitalEnergy.com/EPM9900 to:

- View Guideform Specifications
- Download the instruction manual
- Review applications notes and support documents
- Buy an EPM 9900 online

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imagination at work



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