Multilin™ EPM 9000

POWER QUALITY METER SERIES

High Performance Power Quality Analysis Device

KEY BENEFITS

- High-performance power quality and revenue class metering for critical power applications
- EN50160 flicker with up to 512 waveform samples per cycle and high-speed transient recording for complete power quality monitoring
- Fast response time to power quality events for diagnostics and maintenance
- Built-in GPS clock sync capability for accurate time stamping of events and alarms for complete synchronized system monitoring
- Exceeds ANSI C-12 and IEC 687 specifications for accuracy with auto calibration using temperature compensation
- Software and hardware triggers record waveform events. This allows the unit to be used for fault analysis, system apparatus monitoring and many other applications
- Records THD to the 255th order peak. Real-time harmonic magnitudes analysis to the 128th order for every channel. This advanced harmonic recording capability has been traditionally available only in high-end power quality recorders
- Real time phasor analyzer monitors phase angles between the voltage and the currents
- Communication option of 10/100 BaseT ethernet with Modbus/TCP
- Expandable output modules

APPLICATIONS

- Revenue class metering and load aggregation for energy management
- Transformer loss compensation
- High-performance power quality monitoring of critical loads

FEATURES

Protection and Control

- Fully programmable set-points for alarms and 90 millisec relay activation for high-speed updates and control
- Expandable external outputs for control

Monitoring and Metering

- Current, voltage, real and reactive power, energy use, cost of power, power factor and frequency
- Laboratory grade 0.04% Watt-Hour accuracy
- Flicker and waveform recording
- Real-time PQ monitoring and harmonic magnitude analysis to 255th order

Communications

- On-board ethernet and Modbus/TCP capability
- High-speed RS-485 and RS-232 Com Ports
- Multiple protocols including Modbus and DNP 3.0 level 2
- Built-in modem with dial-out capability
- 8 built-in High-Speed Digital Inputs
- Multiple analog, digital, and relay outputs
- Web Server & Gateway

Standard Features

Perfect for industrial, commercial and utility applications, the performance enhanced EPM 9000, includes all the attributes required for the highest level of PQ analysis and communications. From today's utility giants to Fortune 100 companies to local electrical municipals, an effective energy management and power-monitoring program is critical for success. The EPM 9000 is an advanced monitoring product, providing the total picture of power usage and power quality for any metered point within a power distribution network allowing users to make power related decisions quickly and effectively.

Robust Communication

Four Isolated High-speed Communication Ports: EPM 9000 offers four built-in communication ports. Each port can communicate independently using supported protocols. Standard protocols include Modbus RTU/ASCII and DNP 3.0. Logs and waveform events are available in Modbus format. Port 3 and Port 4 can be used as a Modbus slave for external output modules.

8 Built-in Digital High Speed Status Inputs: These inputs automatically sense whether the circuit is externally wetted. If externally wetted, the input will accept up to 400VDC. If internally wetted, the unit supplies the needed voltage for the desired control application.

High Speed-Transducer Outputs for Control Purposes: EPM 9000 offers 50 millisec updates for all instantaneous readings. The unit can be a high-speed control transducer for power generation, transmission line synchronization and other control schemes.

Precision Power Quality Measurement

16-bit Waveform and Fault Recorder: EPM 9000 captures up to 512 samples per cycle for an event. Voltage and current are recorded with pre-and-post-event analysis. Hardware and software triggers are available to activate a waveform reading, which can be used for power quality surveys, fault analysis, breaker timing, motor start-up, etc.

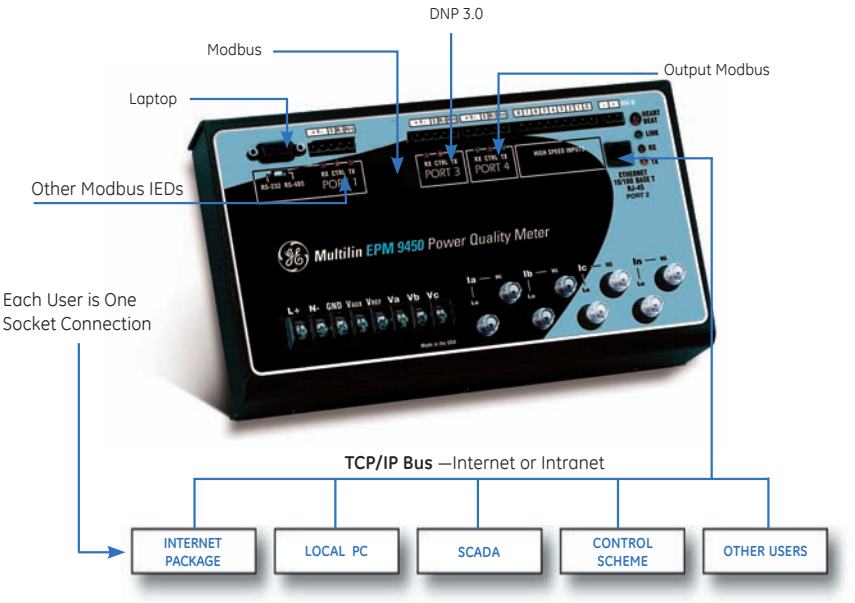
Measure and Record Harmonics Magnitude to the 255th Order: Measure harmonics magnitude up to the 255th order for each voltage and current channel. Real-time harmonics magnitude are resolved to the 128th order. Percent THD and K-factor are also calculated. Harmonic magnitude analysis allows users to conduct power quality analysis at the high end of the harmonic spectrum.

Sub-Cycle Transient Recorder: The unit records sub-cycle transients on voltage and current readings. It monitors switching noise from capacitors, static transfer switches, SCRs and many other "power quality harmful" devices. Transients are often the cause of intermittent and expensive downtime, and may cause damage to electrical equipment.

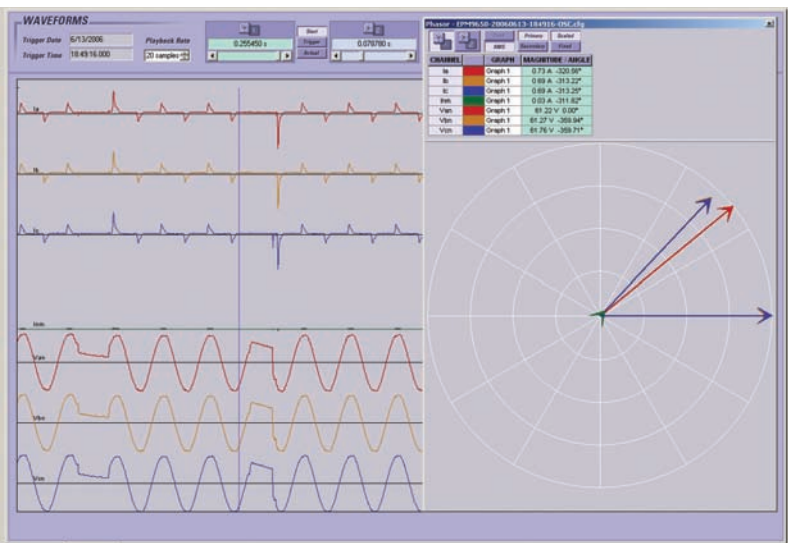
Phasor Analysis: The monitor reads a phase angle analysis between the voltage and current channels, allowing for efficiency and system-integrity analysis.

Inter-harmonics Analysis: The EPM 9000 provides users with the ability to view inter-harmonics, the discrete frequencies that lie between the harmonics of the power frequency voltage and current.

Multiple Communication Paths



Multiple socket Internet or Intranet meter access up to 12 sockets simultaneously



EnerVista Viewpoint Monitoring waveform viewer for analyzing fault data

Frequencies can now be observed which are not an integer multiple of the fundamental.

Revenue Metering

Accuracy in Billing Measurements: Dual 16 Bit A/D converters provide supreme sampling accuracy and resolution. The unit far exceeds ANSI C-12 and IEC 687 accuracy standards offering 0.04% watt-hour accuracy.

To ensure optimum accuracy the unit auto-adjusts to dual internal references accurate to 1 part per million. In addition, the EPM 9000 uses an auto-calibration technique that recalibrates the unit on the fly when the temperature changes more than 5 degrees Celsius for improved accuracy over the full temperature range.

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 9000 offers comprehensive time of use capability. Standard features include:

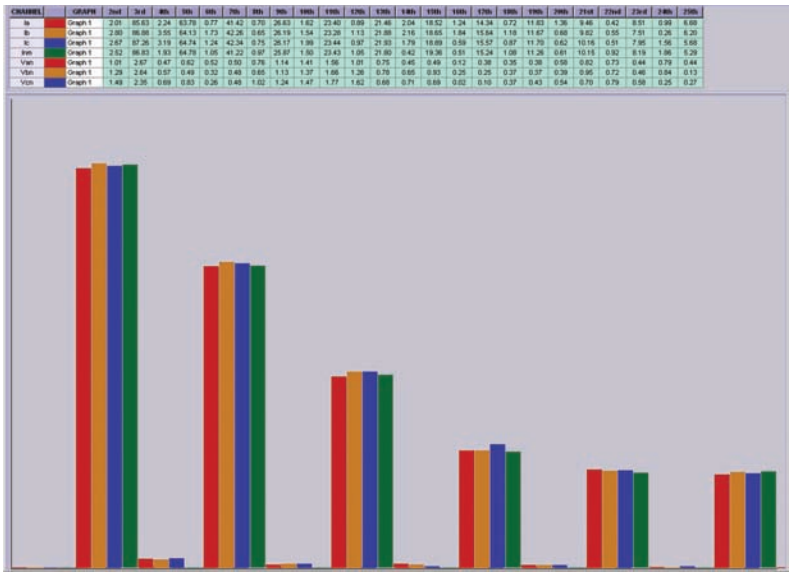
- Bi-directional consumption and demand quantities
- 20-year calendar - 4 seasons/yr, 12 holidays/yr
- 4 TOU schedules/seasons
- Prior month, prior season storage
- Present month, present season storage

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 9000 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

The EPM 9000 Series meters utilize two separate logs of historical information.



EnerVista Viewpoint Monitoring harmonic spectrum graph to quantify power quality

History can be used for trending and conducting preventive maintenance... Conduct preventative maintenance on critical equipment as well as power analysis.

Primary Historical Tending Log File - Log 1

Log any measured parameter from either the main unit or any of the option modules. Either 8, 16, 32 or 64 values can be logged per programmable interval.

Secondary Historical Tending Log File - Log 2

This log can be set up as an additional historical interval log or as an exclusive energy log. Either 8, 16, 32 or 64 values can be logged per interval.

Out Of Limit Log

The units offer 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 1 millisec clock resolution, the logs can be combined with different metered points through a distribution system to provide an accurate system-wide depiction of a power disturbance.

Event-Triggered Waveform Recording Log

EPM 9000 records waveforms with a resolution of up to 512 samples per 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 1 millisec. The 8 on-board high-speed inputs can be tied to the waveform recording. Record when the breaker tripped as compared to when the relay activated. This is very useful for 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.

Optional Features

Flicker (EPM 9650 only)

EN50160 Flicker and Compliance Monitoring: Flicker consists of low frequency (less than 24 Hz) to intermittent line disturbances on the power line. Flicker can affect equipment. The EPM 9650 complies with the Flicker requirements of EN50160 that includes harmonics.

Modem

Dial-Out on Alarm: With the built-in optional modem, the meter provides dial-out capabilities that can detect an alarm occurrence and dials out to provide notification.

Dial-Out for other Events

The meter can dial-out for the following circumstances:

- Limit status change
- High-speed input change
- Waveform record capture
- CBEMA power quality event
- Control output change
- Filling of meter memory
- Cycling of control power
- Password failure on a call coming into the modem
- Meter communication failure

Dial-In Server Capabilities

The dial-in server will record all notifications and accept downloads from the meter.

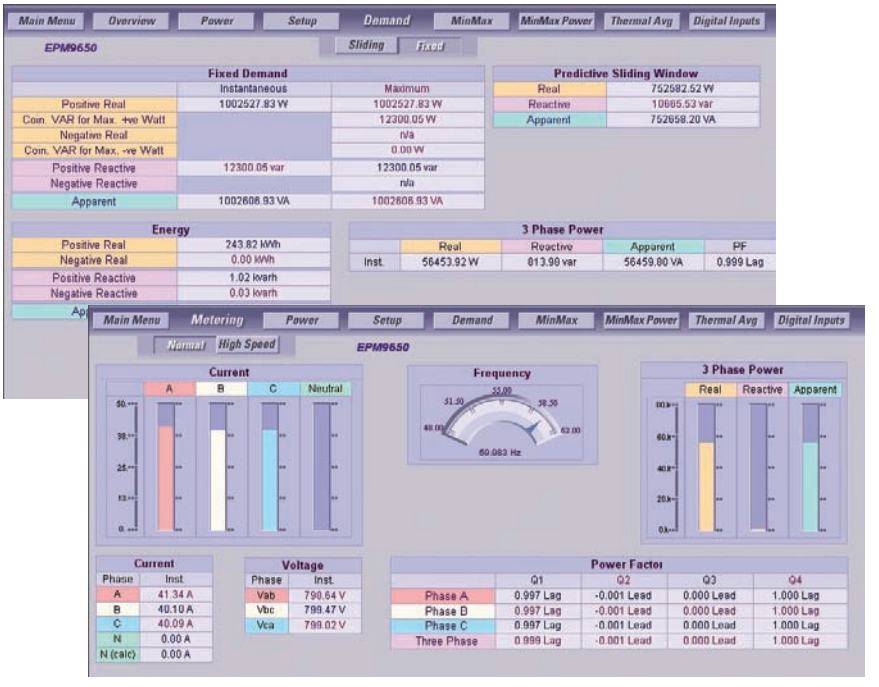
Ethernet Capability

The EPM 9000 series meter has an optional Ethernet that supports Modbus/TCP.

Output Modules

GE Multilin offers multiple analog and digital output modules that mount externally to the EPM 9000. The unit supports up to 4 output modules using internal power. An additional power supply extends output capability. The unit can poll different output devices, log data, and send data to a master station via Modbus or DNP 3.0 protocol.

The EPM 9000 power monitor provides advanced logic and control on programmable limit settings.



EnerVista Viewpoint Monitoring - Access real-time system values and track energy consumption

EnerVista™ Software

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. 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 simple to enter setpoints, read metered values, monitor status and evaluate power quality. Powerful troubleshooting features make it easy to retrieve and view voltage & current waveshapes and harmonic analysis. This vital information can help provide early warning of problems and prevent equipment damage or nuisance breaker tripping.

Included in 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 nates, specifications, and service bulletins.

Viewpoint Monitoring

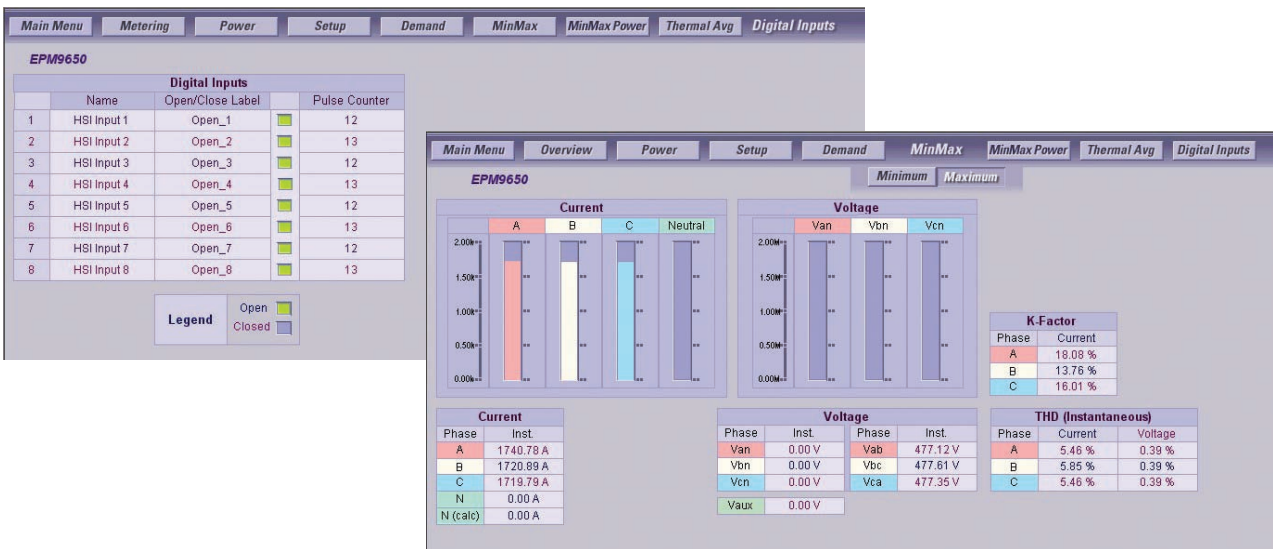
Viewpoint monitoring is a simple-to-use, full-featured monitoring and data recording software package for small systems. Viewpoint Monitoring provides a complete HMI package that instantly puts critical real-time device data on your PC through pre-configured graphical screens with the following functionality:

- Plug-&-Play Device Monitoring
- System Single-Line Monitoring & Control
- Annunciator Alarm Screens
- Trending Reports
- Automatic Event Retrieval
- Automatic Waveform Retrieval

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 EnverVista Integrator is:

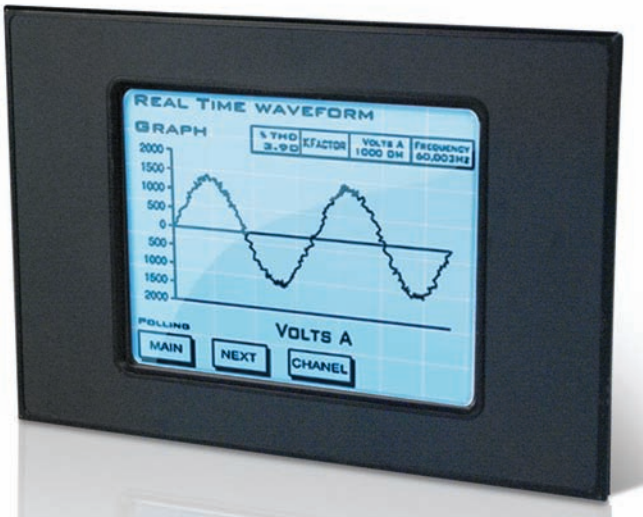
- OPC/DDE Server
- GE Multilin Drivers
- Automatic Event Retrieval
- Automatic Waveform Retrieval



EnerVista Viewpoint Monitoring - Monitor the status of digital inputs and review the magnitude of system highs and lows

External Output Modules

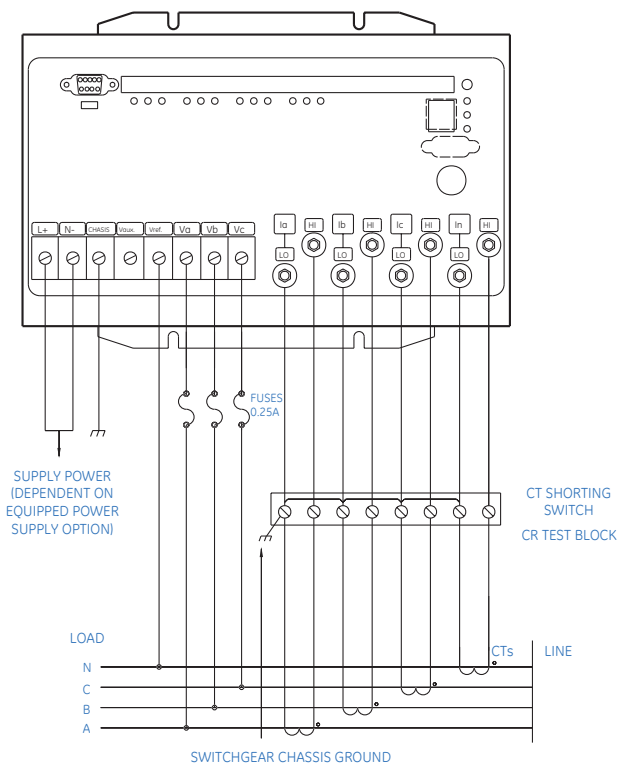
Multifunction LED Display



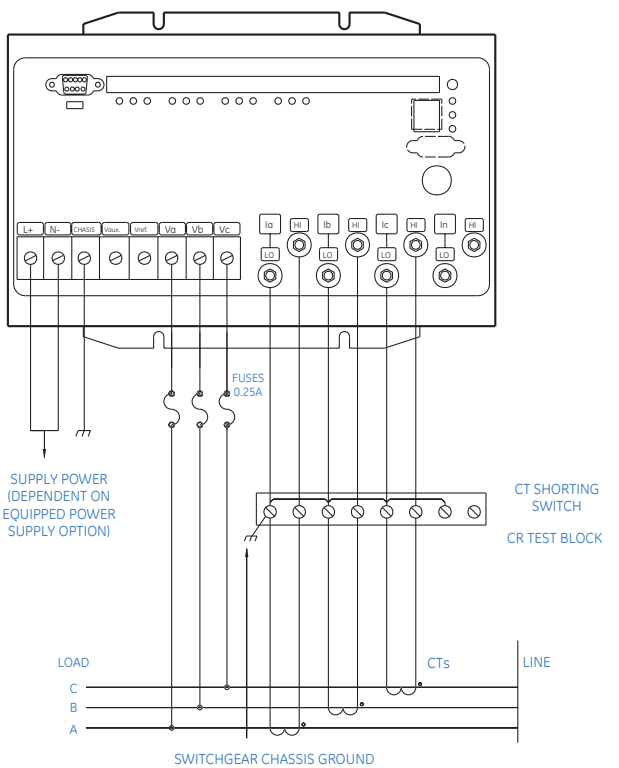
Touch screen LCD display

Typical Wiring

4 Wire Wye: 3 Element Direct Voltage



3 Wire: 3 Element Direct Delta



Technical Specifications

DEMAND MONITORING

Measured values: Phase A/B/C/N current (A)
3 phase real power (kW)
3 phase reactive power (kvar)
3 phase apparent power (kVA)

Measurement type:
Thermal exponential
1 – 9999 sec, steps of 1 sec
Block interval/rolling demand time in interval (programmable):
1 – 9999 sec, steps of 1 sec

POWER SUPPLY

CONTROL POWER

Input options: 90–276 Volts AC/DC
18–60 Volts DC
Frequency: 20–400Hz
Burden: 20 VA max

METERING

MEASURED VALUES

MEASUREMENTS	200 Millisec*	1 Sec	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	0.01 Hz	00.001 Hz
KW @ Unity PF	0.10%	0.06%	5 Digit
KW @ .5 PF	0.10%	0.1%	5 Digit
KVA	0.40%	0.08%	5 Digit
VAR	0.10%	0.0%	5 Digit
PF	0.10%	0.08%	3 Digit
Harmonics	N/A	0.2%	3 Digit
KW/Hours	N/A	0.04%	16 Digit
KVA/Hours	N/A	0.08%	16 Digit
KVAR/Hours	N/A	0.08%	16 Digit

Note: Readings are in percent of reading where applicable (more accurate standard), not in percent of full scale (less accurate standard).

ACCURACY: ANSI C12.20 Class 0.2 and IEC687
HARMONICS: Measures harmonic magnitudes to the 255th order for each voltage and current channel
Real-time harmonics resolved to the 128th order

WAVEFORM

Samples per Cycle	No of Cycles Record per Screen*	**Max. No of Cycles Record per Event	No of Channels
16	8 Pre / 56	6080	7
32	4 Pre / 28	3040	7
64	4 Pre / 12	1520	7
128	1 Pre / 7	760	7
256	1 Pre / 3	760	3
512	1 Pre / 3	760	1

* Post Event Screen (Calculations at 60Hz.)

DATA LOGGING

EPM 9450

Log Storage Options	512K RAM	512K Record Size
Historical Log 1	176K	58 Days
Historical Log 2	256K	42 Days
Out of Limit	48K	512
CBEMA Log	16K	256
Relay Output Log	N/A	N/A
Input Status Log	N/A	N/A
Waveform Recording Number of Events	N/A	8

EPM 9650

Log Storage Options	2 Meg RAM	2 Meg Record Size	4 Meg RAM	4 Meg Record Size
Historical Log 1	176K	58 Days	1808K	602 Days
Historical Log 2	256K	42 Days	400K	66 Days
Out of Limit	48K	512	96K	1024
CBEMA Log	16K	256	64K	1024
Relay Output Log	N/A	N/A	32K	512
Input Status Log	N/A	N/A	32K	512
Waveform Recording Number of Events	N/A	8	1568K	96

INPUTS

INPUT VOLTAGE RANGE
150V phase to neutral, 300V phase to phase*
300V phase to neutral, 600V phase to phase
*To be used also with PTs for extended input voltage.

INPUT CURRENT RANGE
5 amp inputs 2x continuous programmable to any CT range
Fault current recording to 60 amps peak secondary based on 5 amp full scale
Note: 1 amp and 0.25 amp current inputs available as special order

ISOLATION
All inputs and outputs are isolated to 2500 Volts

FREQUENCY RANGE
Fundamental 45-75 Hz

BURDEN
Voltage inputs: 0.05VA Max
Current inputs: 0.005VA Max

SENSING METHOD
Up to 512 samples per cycle (programmable)
16 Bit A/D resolution – dual converters
True RMS

UPDATE TIME
200 millesec — high speed instant readings
1 second — Revenue accurate

COMMUNICATIONS

Format: Programmable parity and stop bits
Ports: 4 Communication ports
2 slave ports
Port 1: RS-232 or RS-485 selectable
Protocol: Modbus®
Modbus ASCII/RTU and DNP 3.0
Media: All ports use 2-wire RS-485 communication
Baud rate: 56K bps
Modem: 56K Modem with dial-out capability
Ethernet: 10/100 base T with Modbus/TCP Protocol
Functions: Read/write setpoints
Read actual values
Isolation: All Com Ports are additionally isolated from each other

ENVIRONMENTAL

Humidity: Up to 95% non-condensing
Temperature: -40° C to +80° C ambient

CONSTRUCTION

Constructed in a metal case. All hardware is stainless steel.

PACKAGING

Shipping box: 16" x13" x11"
(40.64cm x 33.02cm x 27.94cm)
Ship weight: approx. 12 lbs (5.4 kgs)

OUTPUT MODULES

ANALOG TRANSDUCER SIGNAL OUTPUT

4 Analog Outputs, 0–1mA, self-powered, scalable, bi-directional
8 Analog Outputs, 0–1mA, self-powered, scalable, bi-directional
4 Analog Outputs, 4–20mA, self-powered, scalable
8 Analog Outputs, 4–20mA, self-powered, scalable

Wiring: Common Mode
Accuracy: 0.1% of Full Scale
Calibration: Self-Calibrating
Scaling: Programmable
Ordering Specifics:
Up to 4 Analog Output modules can be used with each unit

DIGITAL DRY CONTACT RELAY OUTPUTS

4 Relay Outputs, 5 amps, 125, AC/DC, Form C

Ordering Specifics: Multiple modules can be used

DIGITAL SOLID STATE PULSE OUTPUTS

4 Solid State Pulse, Outputs, Form A or C KYZ Pulses

Maximum Pulse Speed: 20 pulses per second
Ordering Specifics: Up to 4 modules can be used

BUILT-IN DIGITAL INPUTS

8 Digital Status Inputs Wet/Dry Auto-Detect Up to 300 Volts DC

DISPLAY

TOUCH SCREEN LCD DISPLAY

Touch screen graphical display
320 x 240 pixels CCFL backlit
Displays data from up to 8 meters
4.7" x 3.5" aperture (12.1cm x 9.1cm)

LED DISPLAY

3-line multi-function LEDs
RS-485 master
Displays data from a single meter

TYPE TESTS

Type tests as per UL® & CE®
Emissions: EN55011
Immunity: EN50082
Accuracy Communication :
ANSI C12.20 Class 0.2 and IEC687
Isolation: 2500 volts AC 60 Hz
Voltage Input withstand:
Optically isolated to 2500VDC
Current Input withstand:
100 amps for 10 Seconds
300 amps for 1 Second
Surge withstand: ANSI/IEEE C37.90.1
Surge: ANSI C62.41
ESD: IEC 1000-4-2
Radiated Immunity: IEC 1000-4-3
Fast Transient: IEC 1000-4-4
Surge Immunity: IEC 1000-4-5
Flicker Meter: IEC 868
Flicker Meter: IEC 61000-4-15

APPROVALS

ISO: Manufactured to an ISO9001 registered program
UL & cUL: Recognized under e200431
CE: Conforms to EN 55011/ EN 50082
Industry Canada
Revenue Metering: Approval:#AE-1069

Note: Historical Log 1 is calculated recording 8 values every 15 minutes. Historical Log 2 is calculated storing all integrated hour readings every 15 minutes. Every reading for every log is recorded with the appropriate time stamps.

**Specifications subject to change without notice.*

Visit www.GEMultilin.com/EPM9000 to:

- View Guideform Specifications
- Download the instruction manual
- Review applications notes and support documents
- Buy an EPM 9000 online

Ordering

Meters

EPM 9450 - High performance power meter & data acquisition node

PL9450	*	*	*	A	*	0	0	0	0	Description
Frequency	0									60 Hz
	1									50 Hz
System Voltage		A								120/208 volts connection
		B								277/480 volts connection
Control Power			0							90-276 volts AC/DC power supply
			1							18-60 volts DC power supply
Features Options				A						Basic unit with 512 K memory, 8 digital inputs, 8 cycle of waveform (up to 512 samples/cycle), 100 days data log.
Communications					0					4 communication port User-selectable RS 485 Modbus and DNP - no modem or Ethernet connection
					1					10/100 BaseT Ethernet, web server and gateway capability
					2					Internal 56k modem connection with pass-through port

EPM 9650 - High performance power meter & data acquisition node with memory

PL9650	*	*	*	A	*	0	0	0	0	Description
Frequency	0									60 Hz
	1									50 Hz
System Voltage		A								120/208 volts connection
		B								277/480 volts connection
Control Power			0							90-276 volts AC/DC power supply
			1							18-60 volts DC power supply
Features Options				A						Advance unit includes basic unit, with 2 Meg memory, Up to 96 days of data logging, up to 64 cycles of waveform recording
				B						Flicker includes advance unit plus Flicker with 4 Meg memory, 602 days of data logging
Communications					0					4 Communication ports User-selectable RS 485 Modbus and DNP - no modem or Ethernet connection
					1					10/100 BaseT Ethernet, web server and gateway capability
					2					Internal 56k modem connection with pass-through port

Accessories

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	*	*	*	*	0	0	0	0	0	**Digital Input Modules**
	8	D	I	1	0	0	0	0	0	8 Channel Digital Status Inputs
PL9000	M	B	I	O	0	0	0	0	0	**Auxiliary Mounting Bracket (One set per module group)**
PL9000	P	S	I	O	0	0	0	0	0	**Auxiliary Power Supply (For more than 4 modules)**
PL9000	*	*	*	*	*	*	*	*	*	**9000 Series Meter Display Module**
	P	4	0	N	P	L	U	S	0	Three line LED Display
	P	6	0	N	0	0	0	0	0	Touch-Screen LCD Display with 6-ft cable
	P	6	0	N	1	0	0	0	0	Touch-Screen LCD Display with 15-ft cable
PL9000	*	*	*	*	0	0	0	0	0	**9000 Series Meter Software**
	N	C	M	1						Communicator Software, Single User License
	N	C	M	5						Communicator Software, Five User License
	N	C	M	S						Communicator Software, Multiple User, Single Site License