Power Monitoring & Analysis
- True RMS Voltage, Current, Power & Energy
- Max & Min Demand
- Harmonic Analysis
- Waveform Scope

On-Board Data Logging & Storage
- On-Board Historical Trending
- On-Board Event Recording
- On-Board Waveform Recording
- Power Quality with Voltage Stability & Reliability Recording
- Current Fault Recording

Advanced Communication Capabilities
- Dual Digital Com Ports
- Modbus & DNP 3.0
- 10 Channel Analog Retransmits (0-1 or 4-20mA)
- Up to 4 Remote Displays

Utility Grade Design
- Optically Isolated SensingVoltages
- Universal AC/DC Power Supply
- Meets ANSI C62.41 (6 KV Voltage Burst), IEEE SWC C.37.90.1 (Surge Withstand)
- Reliable in Harsh Conditions

Description
The Futura+ Series, CPU 1000, is an advanced, easy-to-use multi-function electrical power monitor/transducer that measures every aspect of power including Voltage, Current, Watts, VARs, VA, PF, Freq. and Energy.

From basic energy metering to advanced power quality analysis, the CPU 1000 arms you with sophisticated monitoring capabilities. The unit’s comprehensive on-board memory provides immediate access to historical, I/O and waveform recording. With the M200 memory option, the unit records up to 3 months of historical data and 100 waveform records. This makes the CPU 1000 one of the most prolific analysis devices at its pricing point.

The unit provides multiple paths of communication providing open protocol solutions. Built-in analog retransmits retrofit into existing analog milliamp input based data collection.

Comprehensive Measurements
- Three Phase Voltage (L-N)
- Three Phase Voltage (L-L)
- Three Phase Amps
- Neutral Current (Calculated)
- Bidirectional kW (Three Phase & Total)
- Bidirectional kVAR (Three Phase & Total)
- Bidirectional kVA (Three Phase & Total)
- PF (Three Phase & Total)
- Frequency
- Bidirectional kWh
- Bidirectional kVARh
- Bidirectional kVAh
- %THD
- Harmonics to the 31st Order

Advanced Measurements
- Voltage Max/Min
- Amps Demand Max/Min
- KW Max/Min
- kVAR Max/Min
- kVA Max/Min
- PF Max/Min
- Frequency Max/Min
- %THD Max

User Alarm Set Points
- Over/Under Voltage
- Over/Under Current
- Over/Under kVA
- Over/Under kW
- Over/Under kVAR
- Over/Under PF
- Over/Under Frequency
- Over %THD
- Phase Reversal
- Reverse Power
- Logic & Hysteresis
- Relay Output Control

Electro Industries/GaugeTech
The Leader in Web Accessed Power Monitoring
Power Quality/Harmonic Analysis

The CPU 1000 conducts an extensive harmonic and power quality analysis. The unit measures and calculates harmonic distortion to the 31st order for each voltage and current channel. Using the M150 and M200 memory modules, the unit will record voltage disturbances such as surges, sags and transients.

Waveform Scope

The unit also provides data to build a graphical, real time depiction of each waveform channel. This allows the user to view actual waveforms for each voltage and current channel using PC software.

Extensive On Board Memory

The CPU 1000 is available with several different on-board memory options allowing you to choose the memory option that is necessary for your specific power monitoring application needs.

M100 Memory Module – Historical & Event Memory

This module stores up to 110,000 snapshots of information per value in non-volatile mass memory. The storage interval is programmable from 1 second to 180 minutes. The default storage interval is 15 minutes. Using this module, you can trend any parameter such as kW usage, Voltage, Watt/VAR distribution and any other desired parameter.

The event portion of the memory, when used with the L200 I/O module, records when a status input or a relay output changes state.

M150 Memory Module — Historical, Event & Waveform Storage

This module provides historical, event and waveform recording. The M150 offers 55,000 historical points and full event recording. All memory is stored in a FIFO buffer.

Additionally, the module records waveforms based on RMS triggers. Set the meter to trigger on above/below voltage and above current. When the unit triggers a waveform recording, it records 10 cycles prior and 50 cycles past the event. All 6 channels are recorded simultaneously. This module provides 25 captured waveform events and is a good economical choice for an advanced metering solution.

M200 Memory Module – Advanced Memory

The M200 module is the advanced memory module offered in the CPU 1000 power monitor. This module provides significantly more memory capability. Using this memory module, you are assured that your monitor is always recording and providing you with a comprehensive analysis of any occurrences in the power distribution system.

The M200 provides 110,000 snapshots of historical data, full I/O event recording and 100 waveform events consisting of 60 cycles of recording for each event. This is a significant amount of waveform recording capability.

In addition, unique to this design, the memory can be configured to store any desired amount of waveforms (in intervals of 60) when an event occurs. You can program the unit to record for long duration event or short duration events depending on the application. This is the memory of choice for users who want to capitalize on their investment. This memory is stored is a FIFO buffer.

Storage Capabilities

<table>
<thead>
<tr>
<th>Memory Modules</th>
<th>Historical Snapshots</th>
<th>Recording*</th>
<th>I/O Event Stamping</th>
<th>Waveform Recording**</th>
</tr>
</thead>
<tbody>
<tr>
<td>M100</td>
<td>110,000</td>
<td>90 Days</td>
<td>255 for Relay and Input Status Contacts 3</td>
<td>N/A</td>
</tr>
<tr>
<td>M150</td>
<td>55,000</td>
<td>45 Days</td>
<td>255 for Relay and Input Status Contacts 3</td>
<td>25 Waveform Records</td>
</tr>
<tr>
<td>M200</td>
<td>110,000</td>
<td>90 Days</td>
<td>255 for Relay and Input Status Contacts 3</td>
<td>100 Waveform Records</td>
</tr>
</tbody>
</table>

* Recording Time is Based on 10 Values Logged at 15 Minute Intervals.
** Each Record is 10 Cycles Prior 50 Cycles Post Event. All 6 Channels Simultaneously.
① Snapshots Can Be Configured to any Desired Time Interval from 1 Second to 2.5 Hours.
② Both Instantaneous and Average Readings Stored.
③ Must Be Used with L200 I/O Module

Display Modules

P11
A Single Function Digital Display Module Available for Every Function.

P14/15
P14: Displays Instantaneous Real Power (W), Total Kilowatt Hour (Wh) and Watt Demand (kW).
P15: VAR/VARh/VARD. 6 1/2 Digit Resolution.

P31
Amps Module Displaying Phases A-B-C and N. Also Displays % THD for Each Reading.
Advanced Communication Capabilities

Dual Digital Communication Ports
Dual digital communication ports allow communication with RTUs, SCADA, PLCs, or remote monitoring software using Modbus or DNP 3.0 protocol. The first serial port allows for real time polling and data downloads using EI protocol. The second port provides a Modbus RTU, Modbus ASCII or DNP 3.0 output.

Using dual ports allows the unit to communicate to RTUs and other data collection systems in real time while having an additional serial port available for data downloads and remote interrogation. In this manner, you are assured that the monitor is always available for data collection even while communicating in real-time to a third party system.

Built-In Analog Transducer Outputs
The CPU 1000 features 10 channels of analog transducer outputs replacing all existing transducers (0-1mA or 4-20mA.) Bidirectional as well as unidirectional outputs are available. The analog transducer signals are custom scalable and allow you to wire the meter to communicate to any pre-existing data collection system. This is invaluable in retrofit applications. Communicate analog now and upgrade to digital later. With the CPU 1000 meter, you have the best of both worlds.

Multiple Remote Displays
Choice of Display Modules
The CPU 1000 Series provides a multitude of different display choices. Just select the applicable display or combination of displays that meet your individual application needs. Up to 4 displays can be powered directly from the CPU 1000’s power supply. The displays can be mounted both locally and remotely (up to 4,000 feet from CPU 1000.) All displays are LED based to ensure durability in harsh conditions.

Physical Construction

Voltage Optical Isolation
The voltage inputs are optically isolated. Issues such as noisy grounds, switching noise, SWC or any other such problems pose no threat to the CPU 1000 meter. The input structure is one of the safest and most durable designs available.

Case Construction
Designed for harsh environments, the unit is mounted in a shielded metal case. It offers no visible openings and is resistant to contamination from harmful dust, sand or other matter. All screws and hardware are non-corrosive stainless steel.

Power Supply
The power supply offers both primary MOV protection and active line filtering to reduce any damaging occurrences to the supply. This design meets ANSI C42.21 (Surge Test 6.0KV) and ANSI C37.90.1 (Surge Withstand Capability).

Communication Ports
All communication ports are isolated from the main unit and additionally isolated from each other. This design avoids dangerous ground loops.
**Specifications**

**INPUT VOLTAGE RANGE**
- 100% of Neutral Standard**
- 300V Phase to Neutral (OPTION 0)
- 100% Phase to Phase Standard (OPTION 2)

**1/0 ISOLATION**
- 2500V AC 60 Hz

**CONTROL POWER REQUIREMENTS**
- 115V = 20%, 12VA (OPTION 115A)
- 230V = 20%, 12VA (OPTION 230A)
- 24-48V DC = 20%, 12VA (OPTION D)

**INPUT CURRENT RANGE**
- 15A maximum (programmable to any CT ratio)

**HARMONIC RANGE**
- 3 Channels to Neutral**
- 3 Channels A, B and C Current**

**SENSING METHOD**
- Two RMS

**INPUT WITHSTAND CAPABILITIES**
- Voltage & Current Continuous 200% Rated, Surge 10x
  - Per 3 Seconds
- Surge Withstand: per IEEE C37.90.1

**COMMUNICATION FORMAT**
- Protocols: DMF 3.0, Modbus RTU/ASCII, E Bus
- 1 Start Bit, 8 Data Bits, 1 Stop Bit. Programmable up to 9600 Baud on Real Time Port, 38 400 based on Download Port

**FREQUENCY RANGE**
- Fundamental 45-75 Hz

**AMBIENT TEMPERATURE**
- Operating: -20ºC to +70ºC
- Waveform: Capable of viewing 5 Times Full Scale
- One Second Update

**BURDEN**
- Per Element

**WAVEFORM RECORDING**
- Digital Analog Processing
- One Second Update

**DISPLAY UPDATE TIME**
- 1 Second

**TIME CLOCK**
- On-Board Time/Date Clock – Non Volatile

**SHIPPING**
- 4 lbs.

**COMPLIANCE**
- ANSI/IEEE C37.901 Surge Withstand
- ANSI CE21 Surge Immunity (6 KV)
- ANSI C13 Revenue Accuracy
- IEC 607 Revenue Accuracy

**Accuracy**

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Accuracy*</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volts &amp; Current</td>
<td>0.15%</td>
<td>0-2000</td>
</tr>
<tr>
<td>Watts &amp; Energy</td>
<td>0.2%</td>
<td>0-2000 / 5VA</td>
</tr>
<tr>
<td>VA &amp; VARs</td>
<td>0.3%</td>
<td>0-2000 / 5VA</td>
</tr>
<tr>
<td>VArh &amp; VARh</td>
<td>Digit Counter</td>
<td>Digit Counter</td>
</tr>
<tr>
<td>PF</td>
<td>0.50 %</td>
<td>1.0 TO ±0.5</td>
</tr>
<tr>
<td>Frequency</td>
<td>0.01 Hz</td>
<td>47-75 Hz</td>
</tr>
<tr>
<td>Harmonic</td>
<td>0.50%</td>
<td>0-100%</td>
</tr>
<tr>
<td>Current Neutral</td>
<td>2%</td>
<td>0-2000</td>
</tr>
</tbody>
</table>

* Accuracy in % of Full Scale

**Note:** Complete Mounting and Wiring Diagrams can be downloaded directly from www.electroind.com

**Ordering Information**

Specify a unit by writing its option numbers below. See sample. Specify your CT and PT ratio, Delta or Wye System. If a specification is given, it will be preprogrammed in the factory.

<table>
<thead>
<tr>
<th>Model</th>
<th>Connection</th>
<th>Volts</th>
<th>Amps</th>
<th>Power</th>
<th>Operating Voltage</th>
<th>Control Power</th>
<th>Com Port</th>
<th>Memory</th>
<th>I/O</th>
<th>Analog Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU 1000</td>
<td>3E</td>
<td>V</td>
<td>A</td>
<td>KW</td>
<td>120</td>
<td>115A</td>
<td>X</td>
<td>None</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>2.5E</td>
<td>KV</td>
<td>KA</td>
<td>MW</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2E</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Hardware Options**

<table>
<thead>
<tr>
<th>M100</th>
<th>M150</th>
<th>M200</th>
<th>L200</th>
<th>L200KYZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>512k Mass Memory</td>
<td>Historical Data Logging</td>
<td>1024k Mass Memory</td>
<td>10/32 Relays Outputs</td>
<td>3 Relay Pulses and 4 Status Inputs</td>
</tr>
<tr>
<td>512k Mass Memory</td>
<td>Historical Data Logging</td>
<td>and 25 Captured Event Waveforms</td>
<td>for Historical Data Logging and 100 Captured Event Waveforms</td>
<td></td>
</tr>
</tbody>
</table>

**Display Options**

Up to 4 displays with a CPU 1000 power supply. All displays include 6 feet of cable. If additional Length is desired, please specify. Look up display descriptions on previous pages.

- **P1** Single Function
- **P14/15** Energy
- **P31** Amps
- **P32** Volts
- **P33** Power
- **P34** Multifunction
- **ISO485** Isolation Module (for long distance display applications)