SHARK® 200

UPGRADABLE FULLY FEATURED POWER & ENERGY METER

Revenue Grade with Advanced I/O and Power Quality

From Simple to Sophisticated

- Simple Multifunction Meter: V-Switch™ Key 1
- Historical Data-logging: V-Switch™ Key 2
- Advanced Power Quality Waveform Recorder: V-Switch™ Keys 5 or 6

Industry Leading Performance

- Highly Accurate Metering Technology
- Expandable I/O with 100BaseT Ethernet
- V-Switch™ Technology Upgrade
- Extensive Data Logging
- Power Quality Recording
- Up to 512 Samples/Cycle

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The Leader in Power Monitoring and Control
Electro Industries introduces a new standard in panel mounted power metering. The Shark® 200 metering system is an ultra-compact power metering device providing industry leading revenue metering functionality combined with advanced data-logging, power quality, communication and I/O traditionally found only in high performance and high cost systems. This product is designed to incorporate advanced features in a cost effective, small package for large scale, low cost deployment within an electrical distribution system.

**Basic Features Summary**
- 0.2% Class Revenue Certifiable Energy and Demand Metering
- Meets ANSI C12.20 and IEC 687 (0.2% Class)
- Multifunction Measurement
- 3 Line .56” LED display
- % of Load Bar for Analog Perception
- Standard RS485 (Modbus and DNP 3.0)
- IrDA Port for PDA Read
- Ultra-Compact
- Fits both ANSI and DIN Cutouts

**Advanced Features Summary**
- High Performance Waveform Recorder
- Up to 4 Megabytes Flash for Historical Data Logging & PQ Recording
- Extremely Configurable Field Upgradable I/O
- 100BaseT Ethernet – Rapid Response™ Technology
- V-Switch™ Technology

**ACCURACY**

<table>
<thead>
<tr>
<th>Measured Parameters</th>
<th>Accuracy %</th>
<th>Display Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage L-N</td>
<td>0.1%</td>
<td>0-9999 Scalable V or kV</td>
</tr>
<tr>
<td>Voltage L-L</td>
<td>0.2%</td>
<td>0-9999 V or kV Scalable</td>
</tr>
<tr>
<td>Current</td>
<td>0.1%</td>
<td>0-9999 Amps or kAmps</td>
</tr>
<tr>
<td>+/- Watts</td>
<td>0.2%</td>
<td>0-9999 Watts, kWatts</td>
</tr>
<tr>
<td>+/- Wh</td>
<td>0.2%</td>
<td>5 to 8 Digits Programmable</td>
</tr>
<tr>
<td>+/- VARs</td>
<td>0.2%</td>
<td>0-9999 VARs, kVARs, MVARs</td>
</tr>
<tr>
<td>+/- VARh</td>
<td>0.2%</td>
<td>5 to 8 Digits Programmable</td>
</tr>
<tr>
<td>VA</td>
<td>0.2%</td>
<td>0-9999 VA, kVA, MVA</td>
</tr>
<tr>
<td>VAh</td>
<td>0.2%</td>
<td>5 to 8 Digits Programmable</td>
</tr>
<tr>
<td>PF</td>
<td>0.2%</td>
<td>+/- 0.5 to 1.0</td>
</tr>
<tr>
<td>Frequency</td>
<td>+/- 0.03 Hz</td>
<td>45 to 65 Hz</td>
</tr>
<tr>
<td>%THD</td>
<td>+/- 2.0%</td>
<td>1 to 99.99%</td>
</tr>
<tr>
<td>% Load Bar</td>
<td>+/- 1 Segment</td>
<td>(0.005 to 6) A</td>
</tr>
</tbody>
</table>

**V-Switch™ Technology**
The Shark® 200 meter is equipped with EIG’s exclusive V-Switch™ technology. This technology allows users to upgrade and add features by using communication commands as needed, even after the meter is installed.

**V-Switches Include the Following Features:**
- Multifunction Measurement with I/O Expansion
- 2 Megabytes Data-Logging
- 3 Megabytes Data-Logging
- 4 Megabytes Data-Logging
- Harmonic Analysis
- Limit and Control Functions
- 64 Samples per Cycle Waveform Recorder
- 512 Samples per Cycle Waveform Recorder

**APPLICATIONS**
- Utility Metering
- Substations
- Power Generation
- Submetering
- Power Quality Studies
- Load Studies
- Commercial Metering
- Industrial Metering
- Campus Metering
- Analog Meter Replacement
- Disturbance Recording
- Voltage Recording

**HIGH PERFORMANCE WAVEFORM RECORDING**

The Shark® 200 meter is equipped with EIG’s exclusive V-Switch™ technology. This technology allows users to upgrade and add features by using communication commands as needed, even after the meter is installed.

**Traceable Watt-Hour Test Pulse for Accuracy Verification**
The Shark® 200 device is a traceable revenue meter. It contains a utility grade test pulse allowing power providers to verify and confirm that the meter is performing to its rated accuracy. This is an essential feature required of all billing grade meters.
- Utility Block and Rolling Average Demand
- Historical Load Profiling
The **Shark®200** meter offers the capability of having 2 Megabytes of data-logging to be used for historical trends, limit alarms, I/O changes and sequence of events. The unit has a real-time clock that allows for time stamping of all the data in the instrument when log events are created.

### Historical Logs
- 3 Assignable Historical Logs
- Independently Program Trending Profiles
- Up to 64 Parameters per Log

### System Events Log
To protect critical billing information, the meter records and logs the following with a time stamp:
- Demand Resets
- Password Requests
- System Startup
- Energy Resets
- Log Resets
- Log Reads
- Programmable Settings Changes

### I/O Change Log
- Provides a Time Stamped Log of any Relay Output
- Provides a Time Stamped Log of Input Status Changes
- 2048 Events Available

### Limit/Alarm Log
- Provides Magnitude and Duration of an Event
- Includes Time Stamps and Alarm Value
- 2048 Events Available

### Limits Alarms and Control Capability (V4 Option)
#### Limit Events
- Any measured parameter
- Up to 16 Limits
- Voltage Imbalance
- Current Imbalance
- Based on % of full scale settings

### Simultaneous Voltage and Current Waveform Recorder
The unit records up to 512 samples per cycle for a voltage sag or swell or a current fault event. The unit provides the following pre-event and post-event recording capability. Waveform records are programmable to the desired sampling rate. V5 provides up to 3 Megabytes storage and V6 provides a total of 4 Megabytes.

The meter’s advanced DSP design allows Power Quality triggers to be based on a 1 cycle updated RMS. Up to 170 events can be stored until the memory fills. The meter stores waveform data in a first-in/first-out circular buffer to insure data is always recording.

#### Optional Waveform Recorder

<table>
<thead>
<tr>
<th>Samples per Cycle</th>
<th>Pre Event Cycles</th>
<th>Post Event Cycles</th>
<th>Max Waveform per Event</th>
<th>Number of Stored</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>V5</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>32</td>
<td>96</td>
<td>256</td>
<td>85</td>
</tr>
<tr>
<td>32</td>
<td>16</td>
<td>48</td>
<td>128</td>
<td>85</td>
</tr>
<tr>
<td>64</td>
<td>8</td>
<td>24</td>
<td>64</td>
<td>85</td>
</tr>
<tr>
<td><strong>V6</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>128</td>
<td>4</td>
<td>12</td>
<td>32</td>
<td>170</td>
</tr>
<tr>
<td>256</td>
<td>2</td>
<td>6</td>
<td>16</td>
<td>170</td>
</tr>
<tr>
<td>512</td>
<td>1</td>
<td>3</td>
<td>8</td>
<td>170</td>
</tr>
</tbody>
</table>

**Note:** Sampling rate based on 60Hz. 50Hz systems, divide sample rate by 0.83.

### Independent CBEMA Log Plotting
The meter stores an independent CBEMA log for magnitude and duration of voltage events. This allows a user to quickly view total surges, total sags and duration without retrieving waveform data.

### Harmonic Recording to the 40th Order
The Shark® 200 meter provides advanced harmonic analysis to the 40th order for each voltage and current channel in real time. Using the stored waveforms, harmonic analysis is available to the 255th order.

### Waveform Scope
The unit uniquely offers a waveform scope to view the real time waveform for voltage and current. Waveform scope allows the meter to be used as a basic oscilloscope throughout a power system.
The Shark® 200 meter offers unequalled I/O expandability. Using the two universal option slots, the unit can easily be configured to accept new I/O cards even after installation. The unit auto-detects installed I/O option cards. Up to 2 cards of any type can be used per meter.

1. **INP100S: 100BaseT Ethernet Capability**
The meter can provide 100BaseT Ethernet functionality. Using this card, a user can connect to 12 simultaneous Modbus TCP/IP connections.

2. **1mAOS: Four Channel Bi-directional 0-1mA Outputs**
   - Assignable to any parameter
   - 0.1% of full scale
   - 0 to 10K Ohms, no accuracy losses
   - Range +/- 1.20mA

3. **20mAOS: Four Channel 4-20mA Outputs**
   - Assignable to any parameter
   - 0.1% of full scale
   - 0 – 500 Ohms, no accuracy losses
   - Loop Powered using up to 24 Volts DC

4. **RO1S: Two Relay Outputs / Two Status Inputs**
   - 250VAC/30VDC - 5A Relays, Form C
   - Trigger on user set alarms
   - Set delays and reset delays
   - Status Inputs – Wet / Dry Auto Detect (Up to 150 VDC)
   - Must be used with V4 or higher V-Switch™ option for limit based alarms and control

5. **PO1S: Four Pulse Outputs / Four Status Inputs**
   - Programmable to any energy parameter and pulse value
   - Form A: Normally open contacts
   - Also used for End of Interval pulse
   - Can function for manual relay control and limit based control (V4-V6 Options)
   - 120mA continuous load current
   - Status Inputs - Wet/Dry Auto Detect (Up to 150 VDC)

6. **FOVPS or FOSTS: Fiber Optic Card**
   - EIG’s exclusive Fiber Optic Daisy Chain switchable built-in logic mimics RS485 half duplex bus, allowing you to daisy chain meters for lower installation costs. Full duplex is also assignable.
   - ST Terminated Option (-FOST)
   - Versatile Link Terminated Option (-FOVP)
   - Modbus and DNP 3.0 protocols available

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**Front Mounted IrDA Communication**
Uniquely, the Shark® meter also has an optical IrDA port, allowing the unit to be set up and programmed using a PDA or remote laptop without need for a communication cable. Just point at the meter with an IrDA-equipped PC or PDA and configure it. COPilot EXT is a Windows CE software package that allows you to configure the meter and poll readings.

**Rear Mounted Serial Port with KYZ Pulse**
- RS485 - This port allows RS485 communication using Modbus or DNP 3.0 Protocols. Baud rates are from 9600 to 57.6k.
- KYZ Pulse - In addition to the RS485, the meter also includes Pulse Outputs mapped to absolute energy.

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**Field Expandable I/O and Communication Capabilities**

Field Expandable I/O Slots

**Note:** I/O cards can be ordered separately – see last page.
100BASE T ETHERNET (INP100S)

PC Software

Simultaneous Data Connections

SCADA

Meter Reading Software

Modbus TCP

Rapid Response™ 100BaseT Ethernet

Electro Industries Rapid Response™ Ethernet card allows for high speed Ethernet communication utilizing a 100BaseT protocol communicating with up to 12 connections with Modbus TCP. The card supports a static IP address and is treated like a node on the network. Using Rapid Response™ technology insures that the Shark® 200 meter provides fast and reliable updates to HMI packages, SCADA and COM EXT download software.

SHARK® 200 METER ANSI AND DIN MOUNTING

The unit mounts directly in an ANSI C39.1 (4” Round form) or an IEC 92 mm DIN square form. This is perfect for new installations and for existing panels. In new installations, simply use DIN or ANSI punches. For existing panels, pull out old analog meters and replace them with the Shark® 200 meter. The meter uses standard voltage and current inputs so that CT and PT wiring does not need to be replaced.

SHARK® 200T TRANSDECURER

This transducer version of the Shark® 200 meter does not include a display. The unit mounts directly to a DIN rail and provides an RS485 Modbus or DNP 3.0 output and the expandable I/O.
LOAD PROFILING

The Shark® 200 meter allows you to log substation data over time with regard to electrical usage, demand, voltage, current, PF and many other parameters. This enables a complete analysis of the power system over time.

- Provide revenue accurate load profiling
- Determine substation usage
- Analyze feeder capacity and utilization
- Provide time based load profile for planning one estimation
- Data trend PF distribution and imbalances for system efficiency analysis

LOW COST SUBSTATION TELEMETRY

The Shark® 200 meter’s advanced output capability brings back data using many different communication mediums such as RS485, Ethernet and analog outputs. This insures that one meter can be used for almost every substation application no matter what communication infrastructure is needed.

- Perfect for new or retrofit applications
- Multiple Com paths
- One meter provides outputs for every application
- Multiple systems and/or user accessing data simultaneously
Specifications

Voltage Inputs
- 20-576 Volts Line To Neutral, 0-721 Volts Line to Line
- Universal Voltage Input
- Input Withstand Capability – Meets IEEE C37.90.1 (Surge Withstand Capability)
- Programmable Voltage Range to Any PT ratio
- Supports: 3 Element WYE, 2.5 Element WYE, 2 Element Delta, 4 Wire Delta Systems
- Burden: Input Impedance 1 Meg Ohm, Burden 0.014AW at 120Volts
- Input wire gauge max (AWG 12 / 2.5mm²)

Current Inputs
- Class 10: (0.005 to 11) A, 5 Amp Nominal
- Class 2: (0.001 to 2) A, 1A Nominal Secondary
- Fault Current Withstand: 100 Amps for 10 Seconds, 300 Amps for 3 Seconds, 500 Amps for 1 Second
- Continuous current withstand: 20 Amps for Screw Terminated or Pass Through Connections

Environmental Rating
- Nominal Current Inputs
  - Input wire gauge max (AWG 12 / 2.5mm²)
- Temperature: 0°C to 70°C
- Humidity: 0-95% RH Non-Condensing
- Altitude: 0-2000m
- Mounting Gasket Included

Isolation
- All Inputs and Outputs are galvanically isolated to 2500 Volts
- Waveform up to 512 samples/cycle
- Harmonics resolution to 40th order
- Sensing Method
  - True RMS

Power Supply
- Option D2:
  - (90 to 265) Volts AC and (100 to 370) Volts DC, Universal AC/DC Supply
- Option D:
  - (19-60) Volts DC (4-48 VDC Systems)
- Burden: 10VA Max

Standard Communication Format
- 2 Com Ports (Back and Face Plate)
- RS485 Port (Through Back Plate)
-IrDA (Through Faceplate)
- Com Port Baud Rate: (9,600 - 57,600)
- Com Port Address: 1-247
- 8 Bit, No parity
- Modbus RTU, ASCII or DNP 3.0 Protocols

KYZ Pulse
- Type Form C Contact
- On Resistance: 35 Ohms Max
- Peak Voltage: 350 VDC
- Continuous Load Current: 120mA
- Peak Load Current: 350mA (10ms)
- Off State Leakage Current @ 350VDC: 1uA

Specifications

Ordering Information
All fields must be filled in to create a valid part number.

<table>
<thead>
<tr>
<th>Model</th>
<th>Frequency</th>
<th>Current Input</th>
<th>V-Switch Pack</th>
<th>Power Supply</th>
<th>I/O Slot 1*</th>
<th>I/O Slot 2*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example:</td>
<td></td>
<td>-60</td>
<td>-10</td>
<td>-V2</td>
<td>-D2</td>
<td>-INP100S</td>
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<tr>
<td>Shark200</td>
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<td></td>
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<tr>
<td>Shark200T</td>
<td>-50</td>
<td>-10</td>
<td>-2</td>
<td>-V3</td>
<td>-D2</td>
<td>-X</td>
</tr>
<tr>
<td>(Meter/Transducer)</td>
<td>50 Hz System</td>
<td>10 Amp Secondary</td>
<td>2 Amp Secondary</td>
<td>Multifunction Meter Only</td>
<td>90-265V AC/DC</td>
<td>None</td>
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<tr>
<td>Shark200T</td>
<td>-60</td>
<td></td>
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<tr>
<td>(Transducer Only)</td>
<td>60 Hz System</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Additional Accessories

Communication Converters
- 9PINC – RS232 Cable
- CAB6490 - USB to IrDA Adapter
- Unicorn 2500 – RS485 to RS232 Converter
- Unicorn 2500 – RS485 to RS232 to Fiber Optic Converter
- Modem Manager, Model #: MM1 – RS485 to RS232 Converter for Modern Communication
- IrDA232 - IrDA to RS232 Adapter for Remote Read

Compliance Documents
- Certificate of Calibration, Part #: CCal – This provides Certificate of Calibration with NIST traceable Test Data.
- Current Transformer Kits
- CT200K – 200/5 Ratio, .94” Window 3 CTs
- CT400K – 400/5 Ratio, 1.25” Window, 3 CTs
- CT800K – 800/5 Ratio, 2.06” Window, 3 CTs
- CT2000K – 2000/5 Ratio, 3.00” Window, 3 CTs

Dimensions and Shipping
- Weight: 2 lbs
- Basic Unit: H4.85 x W4.85 x L4.65
- Shark® 200 meter mounts in 92mm DIN & ANSI C39.1 Round Cut-outs
- Shark® 200T Transducer DIN rail mounted
- 2-Inch DIN Rail Included
- Shipping Container Dimensions: 6” cube

Meter Accuracy
- See page 3
- Note: Accuracy specs doubled for 2.5 Element connections (less accurate).

Compliance:
- IEC 667 (0.2% Accuracy)
- ANSI C12.20 (0.2% Accuracy)
- ANSI (IEEE) C37.90.1 Surge Withstand
- ANSI C62.41 (Burst)
- IEC1000-4-2 – ESD
- IEC1000-4-3 – Radiated Immunity
- IEC 1000-4-4 – Fast Transient
- IEC 1000-4-5 – Surge Immunity

Software
- Option Numbers
- COMEXT3 – CommunicatorEXT 3.0 for Windows®
  * Consult factory application engineer for additional transformer ratios, types or window sizes.
- Ethernet

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