# SHARK® 200

*Datalogging Power and Energy Meter*


**Shark® 200 Meter/Transducer**

**Shark® 200 Transducer Only**

## From Simple to Sophisticated

- V-Switch™ Technology Upgrade
- Simple Multifunction Meter: V-Switch™ Key 1
- Historical Datalogging: V-Switch™ Key 2
- Additional Memory for Extensive Datalogging: V-Switch™ Keys 5 and 6
- Advanced Power Quality Waveform Recorder: V-Switch™ Keys 5 and 6

## Industry-leading Performance

- Highly Accurate Metering Technology
- Power Quality Recording up to 512 Samples/Cycle
- Embedded Web Server - with Smartphone and Tablet Support
- Dual Ethernet Ports Compatible with Modbus, DNP3 over TCP/IP and IEC 61850 Protocols
- Supports Email on Alarm and Periodic Email Notification of Meter Status and Readings
- Ethernet Port Offers Data Push to Cloud Servers
- Enhanced Security with IP Whitelisting

Electro Industries/GaugeTech™
*Powered by Innovation™*

MV90 COMPATIBLE

www.electroind.com

# High Performance Waveform Recording

### Basic Features Summary

- 0.2% Class Revenue Certifiable Energy and Demand Metering
- Meets ANSI C12.20 0.2 CL and IEC 62053-22 0.2S Accuracy Standards
- Multifunction Measurement
- 3 Line .56" LED display with % of Load Bar for Analog Perception
- 0.007 Hz Frequency Measurement for Generating Stations
- Standard RS485 (Modbus and DNP3)
- IrDA Port Enables Laptop PC Reading and Programming
- Ultra Compact
- Fits both ANSI and DIN Cutouts

### Advanced Features Summary

- High Performance Waveform Recorder
- Up to 4 MB of Flash Memory for Historical Data Logging and PQ Recording
- Extremely Configurable, Field Upgradable I/O
- 100BaseT Ethernet – Rapid Response™ Technology
- V-Switch™ Technology
- High Precision Frequency Measurement for Frequency Control

### Applications

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

* New York State approved for residential submetering.

## Accuracy and Upgrade Switches

The Shark® 200 meter is an ultra compact power metering device that provides industry-leading revenue metering functionality combined with advanced datalogging, 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.

### V-Switch™ Technology

The Shark® 200 meter is equipped with EIG's exclusive V-Switch™ technology. This technology allows you to upgrade and add features to the meter without removing it from installation.

| Features | V1 | V2 | V3 | V4 | V5 | V6 |
|---|---|---|---|---|---|---|
| Multifunction Measurement with I/O Expansion | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 2 MB Datalogging | | ✓ | ✓ | ✓ | | |
| 3 MB Datalogging | | | | | ✓ | |
| 4 MB Datalogging | | | | | | ✓ |
| Harmonic Analysis | | | ✓ | ✓ | ✓ | ✓ |
| TLC and CT/PT Compensation | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Limit and Control Functions | | | | ✓ | ✓ | ✓ |
| 64 Samples per Cycle Waveform Recorder | | | | | ✓ | |
| 512 Samples per Cycle Waveform Recorder | | | | | | ✓ |

### Accuracy

| Measured Parameters | Accuracy % | Display Range |
|---|---|---|
| Voltage L-N | 0.1% | 0-9999 Scalable V or kV |
| Voltage L-L | 0.2% | 0-9999 V or kV Scalable |
| Current | 0.2% | 0-9999 Amps or kAmps |
| +/- Watts | 0.2% | 0-9999 Watts, kWatts, MWatts |
| +/-Wh | 0.2% | 5 to 8 Digits Programmable |
| +/-VARs | 0.2% | 0-9999 VARs, kVARs, MVARs |
| +/-VARh | 0.2% | 5 to 8 Digits Programmable |
| VA | 0.2% | 0-9999 VA, kVA, MVA |
| VAh | 0.2% | 5 to 8 Digits Programmable |
| PF | 0.2% | +/- 0.5 to 1.0 |
| Frequency | +/- 0.007 Hz | (45 to 65) Hz |
| THD | +/- 2.0% | 1 to 99.99% |
| % Load Bar | +/- 1 Segment | (0.005 to 6) A |

**Note:** Applies to 3 element WYE and 2 element Delta connections. See full accuracy specifications in the Shark® 200 Meter User Manual. Neutral current 2% accuracy.

### Advanced Revenue Energy Metering Capabilities

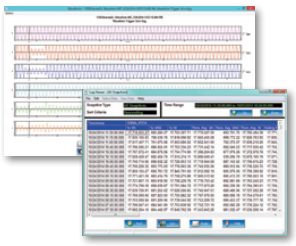
- Line Frequency Time Sync
- Traceable Watt-hour Test Pulse
- Utility Block and Rolling Average Demand
- Historical Load Profiling
- Transformer and Line Loss Compensation
- CT/PT Compensation

# Extensive Datalogging Capability (V2 and Higher)

At V2, the Shark® 200 meter has 2 MB of datalogging memory to be used for historical trends, limit alarms, I/O changes, and sequence of events (V5 and V6 offer even more memory). The unit has a real time clock that allows for timestamping of all the data in the instrument when log events are created.

### Historical Logs

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



**Historical Trending**

### I/O Change Log

- Provides a Timestamped Log of Any Relay Output
- Provides a Timestamped Log of Input Status Changes
- 2048 Events Available

### System Events Log

To protect critical billing information, the meter records and logs the following actions with a timestamp:

- Demand Resets
- Password Requests
- System Startup
- Energy Resets
- Log Resets
- Log Reads
- Programmable Settings Changes
- Critical Data Repairs

### Limit/Alarm Log

- Provides Magnitude and Duration of an Event
- Includes Timestamps and Alarm Value
- 2048 Events Available

### Limit Alarms and Control Capability (V4 and Higher)

- Up to 16 Limits
- Any Measured Parameter
- Voltage/Current Unbalance
- Based on % of Full Scale Settings

## High Performance Power Quality Analysis (V5 and V6)

### Simultaneous Voltage and Current Waveform Recorder

The meter records up to 512 samples per cycle for a voltage sag or swell or a current fault event. It provides the pre- and post-event recording capability shown in the table below. Waveform records are programmable to the desired sampling rate. V5 provides up to 3 MB of storage and V6 provides 4 MB.

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 is full. The meter stores waveform data in a first-in/first-out circular buffer to ensure data is always recording.

### Optional Waveform Recorder

| | Samples per Cycle | Pre Event Cycles | Post Event Cycles | Max Waveforms per Event | Number of Stored Events |
|---|---|---|---|---|---|
| V5 | 32 | 16 | 48 | 128 | 85 |
| | 64 | 8 | 24 | 64 | 85 |
| V6 | 128 | 4 | 12 | 32 | 170 |
| | 256 | 2 | 6 | 16 | 170 |
| | 512 | 1 | 3 | 8 | 170 |

**Note:** Sampling rate based on 60 Hz systems. For 50 Hz systems, multiply by 1.2.

### Waveform Scope

The unit uniquely offers a waveform scope that lets you view the real time waveform for voltage and current. With the waveform scope, the meter can be used as a basic oscilloscope throughout a power system.

### Independent CBEMA (or SEMI F47) Log Plotting

The meter stores an independent CBEMA or SEMI F47 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. The meter also fully supports MV90. Timestamps are stored with millisecond accuracy.

### 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.

# Standard Communication Capability

The Shark® 200 meter provides two independent communication ports with advanced features.

### Rear Mounted Serial Port with KYZ Pulse

- **RS485** - This port allows RS485 communication using Modbus or DNP3 protocols. Baud rates are from 1200 to 57600.
- **KYZ Pulse** - In addition to the RS485 port, the meter also includes Pulse Outputs mapped to absolute energy.

### Front Mounted IrDA Communication

Uniquely, the Shark® 200 meter also has an optical IrDA port, allowing you to program it with an IrDA-enabled laptop.

## Field Communication Capability

**The Shark® 200 meter offers unequaled I/O expandability.** Using the two universal option slots, the unit can be easily 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 in the meter.

### INP100S: 100BaseT Ethernet Capability

- NTP time server for high accuracy network time synchronization.
- 12 simultaneous Modbus TCP/IP connections; 5 simultaneous DNP3 over TCP/IP connections.
- Supports data push to Cloud servers.

### INP300S: IEC 61850 Protocol Ethernet Card

- Simultaneous communication of IEC 61850 and Modbus TCP/IP.
- 5 simultaneous MMS clients.
- Multiple logical nodes; configurable .CID file.

### 1mAOS: Four Channel Bi-directional 0-1 mA Outputs

- Assignable to any parameter.
- 0.1% of full scale.
- Max. load impedance 10 kΩ.

### 20mAOS: Four Channel 4-20 mA Outputs

- Assignable to any parameter.
- 0.1% of full scale.
- 850 Ω at 24 V DC.
- Loop powered using up to 24 V DC.

### PO1S: Four Pulse Outputs / Four Status Inputs

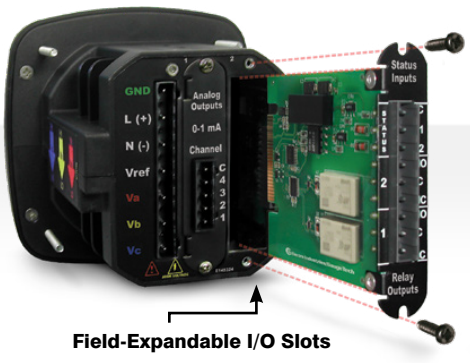
- Programmable to any energy parameter and pulse value.
- Form A: Normally open contacts.
- Also used for end of interval pulse.

### RO1S: Two Relay Outputs / Two Status Inputs*

- 250 V AC / 30 V DC - 0.25 A relays, Form C.
- Trigger on user set alarms.
- Set delays and reset delays.

### FOVPS or FOSTS: Fiber Optic Card

- EIG's exclusive fiber optic daisy chain switchable built-in logic mimics RS485 half duplex bus, so you can daisy chain meters for lower installation costs. Full duplex is also assignable.
- ST Terminated Option (-FOSTS).
- Versatile Link Terminated Option (-FOVPS).
- Modbus and DNP3 protocols available.




Meter Auto Detects I/O Card Type

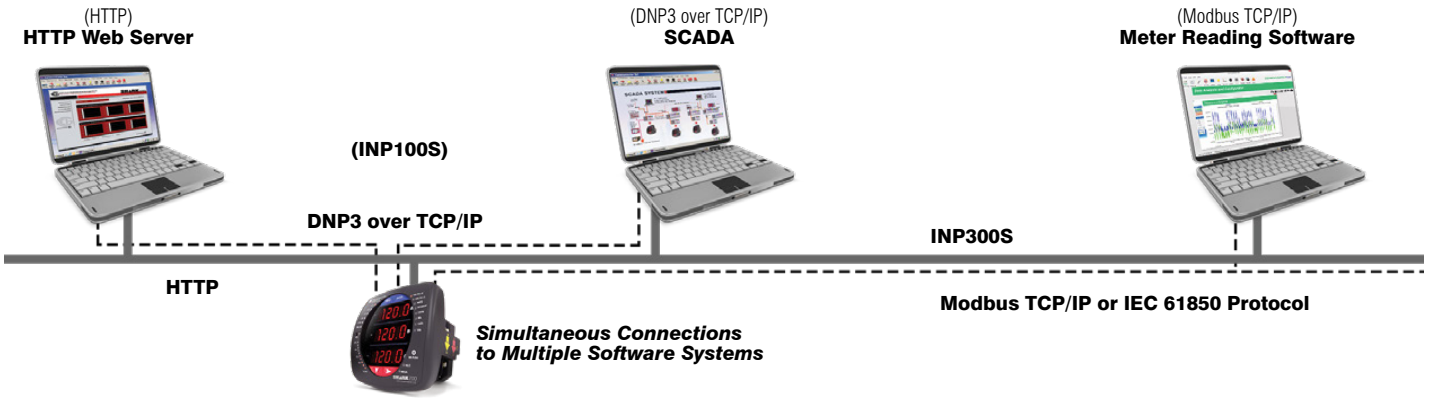
**Simple Field Upgrade**

**Note:** I/O cards can be ordered separately - see last page.

*The meter must be at V-Switch™ key 4 or higher to use the relay features.

# 100BaseT Ethernet (INP100S or INP300S)

## Simultaneous Data Connections




## INP100S - Web Server, Modbus, DNP, and Email

- Web Server with Configurable HMI
- Smartphone Compatible
- 12 Connections Modbus TCP/IP
- 5 Connections DNP3 over TCP/IP
- Data Push of Meter Readings to Cloud Servers
- Send Email on Alarm or Periodic Email Notification of Meter Status and Readings

## INP300S - Web Server, Modbus, DNP3, and IEC 61850

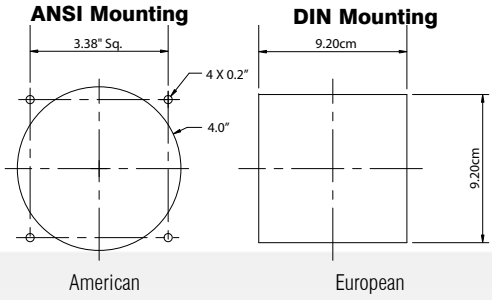
- IEC 61850 Protocol
- 5 Modbus Connections
- 5 MMS Clients
- Web Server for Status and Configuration
- Dual Ethernet Port Capable
- Simultaneous Modbus, DNP3 over Ethernet, and IEC 61850

Both INP100S and INP300S offer enhanced security through the Exclusive Client feature, which provides secure communication for a whitelisted IP/MAC address, to protect from unauthorized programming.

Embedded Web Server with Smartphone Support

## Shark® 200 Meter ANSI and DIN Mounting

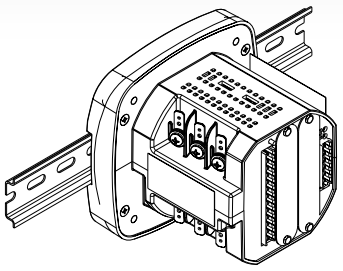
The unit mounts directly in an ANSI C39.1 (4" round form) or an IEC 92 mm DIN square form. This is perfect for new installations and for existing panels. In new installations, simply use DIN or ANSI punches. For existing panels, pull out old analog meters and replace them with the Shark® 200 meter. The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




**(One meter fits both standards)**

## Shark® 200T Transducer

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 DNP3 output and the expandable I/O.

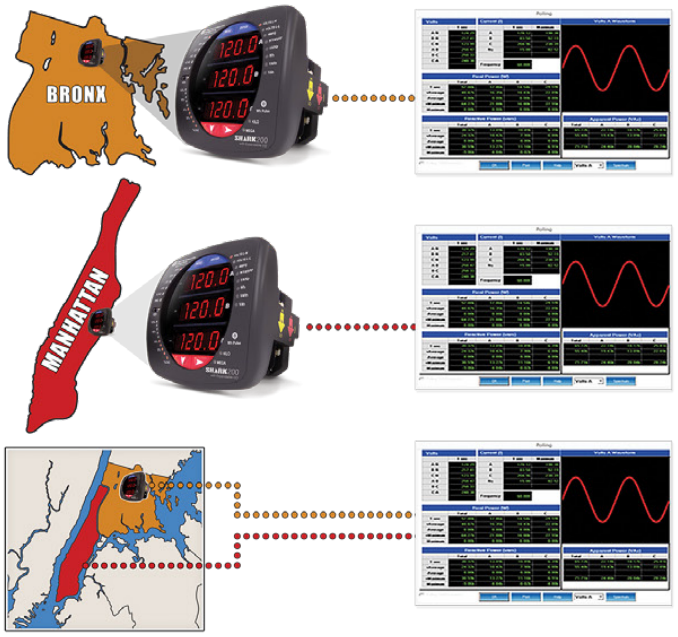


**Easy DIN Rail Mounting**

# Typical Substation Solutions

## Substation Voltage and Frequency Recording

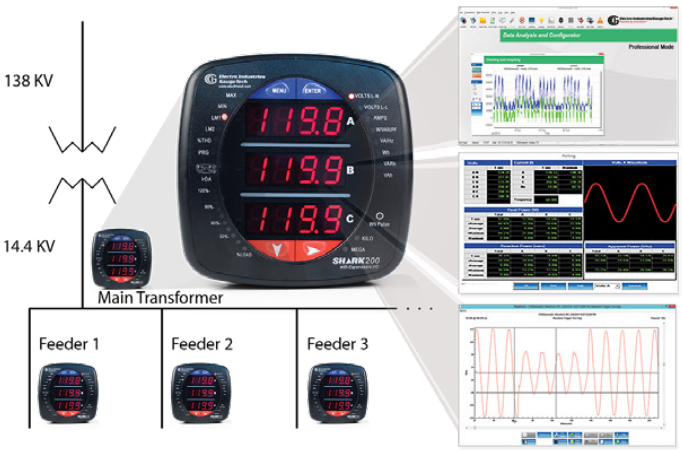
Traditionally, voltage recording meters were relegated to high cost metering or monitoring solutions. The Shark® 200 meter can be placed throughout an electrical distribution network. The meter provides one of the industry's lowest cost methods of collecting voltage information within a utility power distribution grid.




- Perform voltage reliability analysis to ensure proper voltage to customers.
- Compare voltage reliability throughout transmission or distribution networks.
- Monitor the output of substation transformers or line regulators.
- Initiate conservation voltage reduction, reducing system demand.
- Monitor highly accurate frequency to regulate frequency stability.
- Replace costly frequency transducers.

## Interval Load Profiling

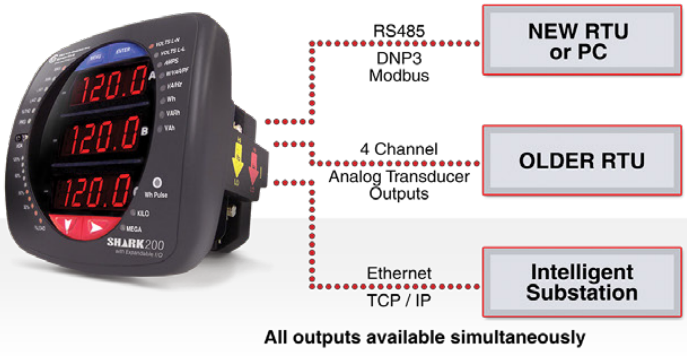
The Shark® 200 meter allows you to log substation data over time for electrical usage, demand, voltage, current, PF, and many other parameters. This enables a complete analysis of the power system over time.




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

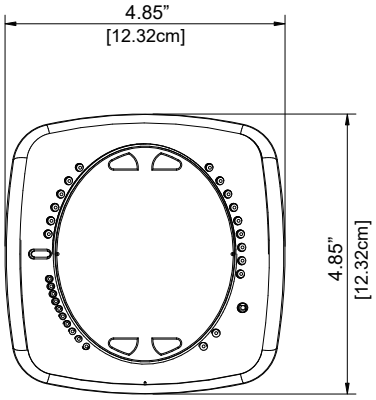
## Low Cost Substation Telemetry

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

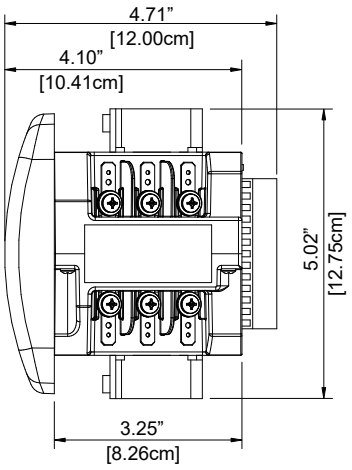



- Perfect for new or retrofit applications.
- Multiple communication paths.
- One meter provides outputs for every application.
- Multiple systems and/or users can access data simultaneously.

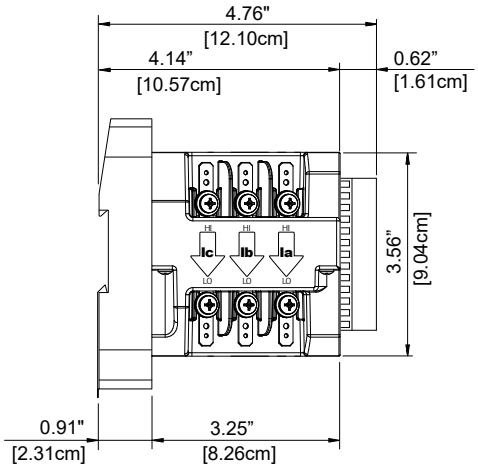
# Dimensional Drawings




**Shark® 200 Meter**
**Front Dimensions**

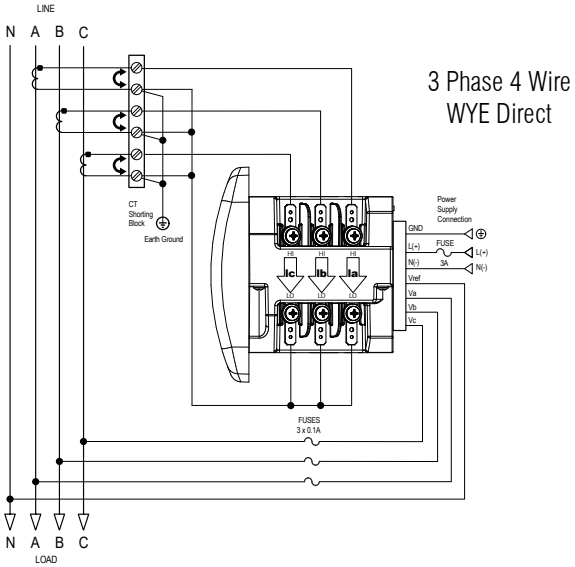


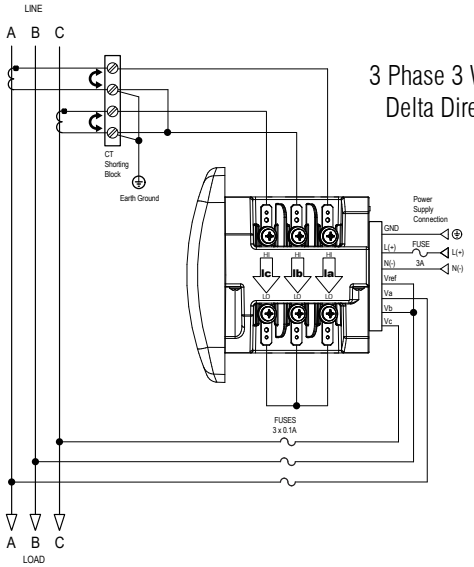

**Shark® 200 Meter**
**Side Dimensions**

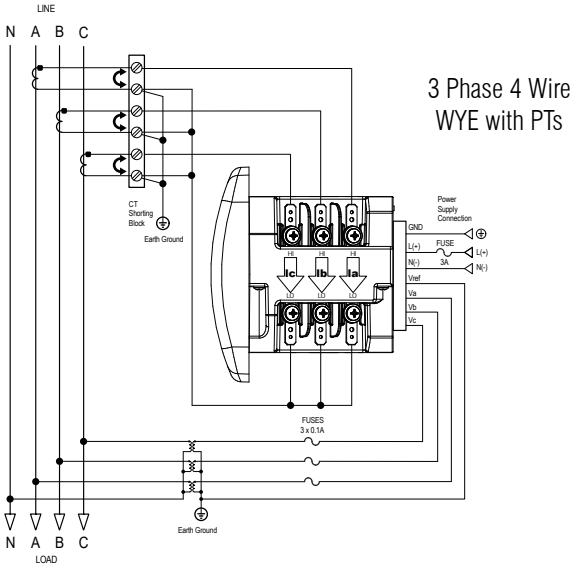


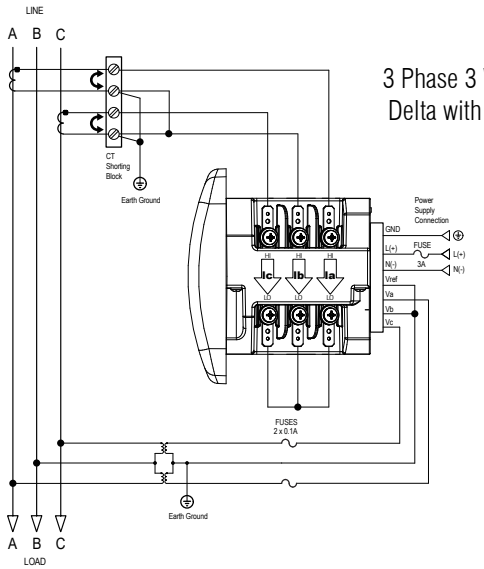

**Shark® 200T**
**Side Dimensions**

# Wiring Diagrams



# Specifications

**Voltage Inputs:**

- Absolute Range: (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
- Input Impedance 1 MΩ/Phase
- Burden: 0.36 VA/Phase at 600V; 0.014 VA at 120 Volts
- Input Wire Gauge: AWG#12 -26/(0.129 -3.31) $mm^2$

**Current Inputs:**

- Class 10: (0.005 to 10) A, 5 A Nominal CT Secondary
- Class 2: (0.001 to 2) A, 1 A Nominal CT Secondary
- Fault Current Withstand (at 23 °C): 100 A for 10 Seconds, 300 A for 3 Seconds, 500 A for 1 Second
- Continuous Current Withstand: 20 A for Screw Terminated or Pass Through Connections
- Programmable Current to Any CT Ratio
- Burden 0.005 VA per Phase Max at 11 A
- Pickup Current: 0.1% of Nominal (Class 10: 5 mA; Class 2: 1 mA)
- Pass Through Wire Diameter: 0.177" / 4.5 mm

**Isolation:**

- All Inputs and Outputs are Galvanically Isolated to 2500 Volts

**Environmental Rating:**

- Storage: (-20 to +70) °C
- Operating: (-20 to +70) °C
- Humidity: to 95% RH Non-Condensing
- Faceplate Rating: NEMA 12
- Mounting Gasket Included
- Protection: IP30 - Meter Front/Back, Optional DIN Rail Mounting, Optional Plug-in I/O Modules

**Sensing Method:**

- True RMS
- Sampling at over 400 Samples/Cycle on all Channels of Measured Readings Simultaneously
- Harmonics Resolution to 40th Order
- Waveform up to 512 Samples/Cycle

**Update Rate:**

- Watts, VARs, and VA - Every 6 Cycles
- All Other Parameters - Every 60 Cycles

**Power Supply:**

- Option D2: (90-265) V AC @ 50/60 Hz or (100-370) V DC/ 10 VA Max
- Option D: (18-60) V DC (24 to 48 VDC Systems) / 7W Max

**Standard Communication Format:**

- 2 Com Ports (Back and Faceplate)
  - RS485 Port through Backplate
  - IrDA through Faceplate
- Com Port Baud Rate: (1200 - 57600)
- Com Port Address: 1-247
- 8-Bit, Parity Setting: Odd, Even, None
- Modbus RTU, ASCII, or DNP3 Protocols

**KYZ Pulse:**

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

**Dimensions and Shipping:**

- Weight: 2 lbs /.91 kg
- Basic Unit: H4.85" x W4.85" x L4.25"
- Shark® 200 Meter Mounts in 92 mm DIN & ANSI C39.1 4" Round Cutouts
- Shark® 200T Transducer: DIN Rail Mounted Using Attached DIN Rail Clips
- Shipping Container Dimensions: 6" Cube

**Meter Accuracy:**

- See Page 2
- ***Note:*** *For 2.5 element programmed units, degrade accuracy by an additional 0.5% of reading.*
- ***Note:*** *For 1A (Class 2) Nominal, degrade accuracy to 0.5% of reading for watts and energy; all other values 2 times rated accuracy.*

**Compliance:**

- ANSI C12.20-2015, 0.2 Accuracy Class and C12.1 (MET Labs Certified)*
- ANSI C62.41 (Burst)*
- FCC, Part 15, Subpart B, Class A (Radiated and Conducted Emissions)*
- IEC 62053-22 Accuracy, 0.2S (KEMA Laboratories Certified) *
- IEC 62053-23 Edition 1, Class 2
- EN 61000-6-2 – Immunity for Industrial Environments: 2005
- EN 61000-6-4 – Emission Standards for Industrial Environments: 2007
- CE (EN 61326-1*, EN 61000-6-2, EN 61000-6-4)
  - EN 61000-3-2, Class A (Harmonic Current)*
  - EN 61000-3-3 (Voltage Fluctuation and Flicker)*
  - IEC 61000-4-2, Ed.1.2, Class A (Electrostatic Discharge)*
  - IEC 61000-4-3, Class A (Radiated EM Immunity)*
  - IEC 61000-4-4, Second Ed., Class A (EFT)*
  - IEC 61000-4-5, Ed. 1.1, Class A (Surge Immunity)*
  - IEC 61000-4-6 (Conducted Immunity)*
  - IEC 61000-4-8, Class A (Magnetic Immunity)*
  - IEC 61000-4-11, Class A (Voltage Variations Immunity)*
  - IEC/CISPR11, Ed.4.1 (Radiated Emissions)*
  - CISPR22, Class A, Fifth Ed.*
- IEC 61850 (KEMA Laboratories Certified)*
- IEEE C37.90.1 (Surge Withstand Capability)
- Certified to UL/IEC 61010-1 and CSAC22.2 No. 61010-1, UL File: E250818
- REACH/RoHS 2011/65/EU
- New York State approved for residential metering

*Third party lab certified

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

| | Model | | Frequency Range | | Current Input | | V-Switch™ Pack | | Power Supply | | I/O Slot 1* | | I/O Slot 2* | | Mounting (Shark® 200 Meter) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Option Numbers:** | | - | | - | | - | | - | | - | | - | | - | |
| **Example:** | **Shark200** | - | **60** | - | **10** | - | **V2** | - | **D2** | - | **INP100S** | - | **X** | - | **X** |
| | **Shark200** (Meter/Transducer) | | **60** 60 Hz System | | **10** 5 A Nominal CT Secondary | | **V1** Multifunction Meter Only | | **D2** (90-265) V AC/ DC | | **X** None | | **X** None | | **X** ANSI Mounting |
| | **Shark200T** (Transducer Only) | | **50** 50 Hz System | | **2** 1 A Nominal CT Secondary | | **V2** Standard Data Logging Memory | | **D** (18-60) V DC | | **RO1S**** 2 Relays/2 Status | | **RO1S**** 2 Relays/2 Status | | **DIN** DIN Mounting Brackets |
| | | | | | | | **V3** Power Quality Harmonic | | | | **PO1S** 4 Pulses/4 Status | | **PO1S** 4 Pulses/4 Status | | |
| | | | | | | | **V4** Limits & Control | | | | **1mAOS** 4 Channel Analog Output 0-1 mA (bidirectional) | | **1mAOS** 4 Channel Analog Output 0-1 mA (bidirectional) | | |
| | | | | | | | **V5** 64 Samples/Cycle Waveform Recording | | | | **20mAOS** 4 Channel Analog Output 4-20 mA | | **20mAOS** 4 Channel Analog Output 4-20 mA | | |
| | | | | | | | **V6** 512 Samples/Cycle Waveform Recording | | | | **FOSTS** Fiber Optic Output ST terminated | | **FOSTS** Fiber Optic Output ST terminated | | |
| | | | | | | | | | | | **FOVPS** Fiber Optic Output VPIN terminated | | **FOVPS** Fiber Optic Output VPIN terminated | | |
| | | | | | | | | | | | **INP100S** 100BaseT Ethernet | | **INP100S** 100BaseT Ethernet | | |
| | | | | | | | | | | | **INP300S** IEC 61850 Protocol Ethernet | | **INP300S** IEC 61850 Protocol Ethernet | | |

### Accessories

**Communication Converters**

| | |
|---|---|
| **9PINC** | RS485 to USB Adapter |
| **CAB6490** | USB to IrDA Adapter |
| **Unicom 2500** | RS485 to RS232 Converter |
| **Unicom 2500-F** | RS485 to RS232 to Fiber Optic Converter |

**Compliance Documents**

| | |
|---|---|
| **Certificate of Calibration, Part#: CCal** | This provides Certificate of Calibration with NIST traceable Test Data. |

**Software**

| | |
|---|---|
| **COMPQA5P1Y** | CommunicatorPQA® 5.0 Software for Windows Single-Computer License (One Year) |
| **ENERGYPQA-1Year** | Cloud-based Energy Management Solution |

**Current Transformer Kits**

| | |
|---|---|
| **CT200K** | 200/5 Ratio, 1.00" Window, 3 CTs |
| **CT400K** | 400/5 Ratio, 1.25" Window, 3 CTs |
| **CT800K** | 800/5 Ratio, 2.5" Window, 3 CTs |
| **CT2000K** | 2000/5 Ratio, 3.00" Window, 3 CTs |

**CT Specifications**

| | |
|---|---|
| **Frequency** | (50 to 400) Hz; Insulation: 600 Volts, 10 kV BIL |
| **Flexible Leads** | UL 1015, 105 °C, CSA Approved, 24" Long, AWG#16 |

* Consult factory application engineer for additional transformer ratios, types, or window sizes.

** I/O cards can be ordered separately using the part numbers shown in the ordering information.*

*** The meter must be at V-Switch™ key 4 or higher to use the relay features.*

**Shark® 200 web page**

Electro Industries/GaugeTech™
Powered by Innovation™

1800 Shames Drive, Westbury, NY 11590 **1-877-EIMETER**
(1-877-346-3837) **Tel:** 516-334-0870 **Fax:** 516-338-4741
**Email:** sales@electroind.com **www.electroind.com**

E149702 031221 V.1.32