

SHARK 200 Upgradable fully featured power & energy meter

SHARK 200



SHARK 200

- V-Switch Technology Upgrade
- Simple multifunction Meter
 - Historical Data Loggin
- Additional Memory for Extensive Data Loggin
- Advanced Power Quality Waveform Recorder

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HIGH PERFORMANCE WAVEFORM RECORDING

Basic Features Summary

- 2% Class Revenue Certifiable Energy and Demand Metering
- Meets ANSI C12.20 and IEC 62053-22 (0.2% Class)
- Multifunction Measurement
- 3 Line .56" LED display and % of Load Bar for Analog Perception
- 0.007 Hz Frequency Measurement for Generating Stations
- Standard RS485 (Modbus and DNP 3.0)
- 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 Megabytes Flash for Historical Data Logging & 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
- Substations
- Industrial Metering
- Power Generation
- Campus Metering
- Submetering
- Analog Meter Replacement
- Power Quality Studies
- Disturbance Recording
- Load Studies
- Voltage Recording

ACCURACY AND UPGRADE SWITCHES

Amperis 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.

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 to the meter without removing it from installation. V-Switches include the following Features:

Feature	V1	V2	V3	V4	V5	V6
Multifunction Measurement with I/O Expansion	*	*	*	*	*	*
2 Megabytes Data Loggin		*	*	*		
3 Megabytes Data Loggin					*	
4 Megabytes Data Loggin						*
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-N	0.1%	0-9999 V or Kv Scalable
Current	0.1%	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	+/- Segment	(0.005 to 6) A

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 DATA LOGGING CAPABILITY (V2 AND HIGHER)

At V2, the Shark® 200 meter has 2 Megabytes of data logging 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 time stamping of all the data in the instrument when log events are created.

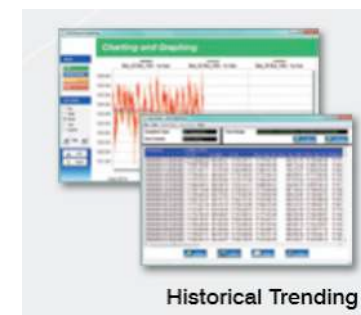
Historical Logs

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

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
- Critical Data Repairs
- 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

Limit 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



EXTENSIVE DATA LOGGING CAPABILITY (V2 AND HIGHER)

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 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 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.

	Samples per cycle	Pre Event Cycles	Post Event Cycles	Max Waveform per Event	Number of Stored Events
V5	16	32	96	256	85
	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

Waveform Scope

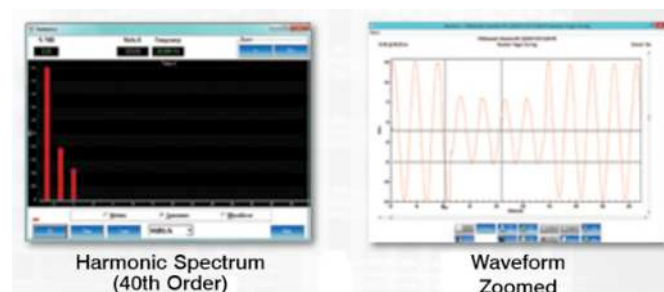
The unit uniquely offers a waveform scope to view the real time waveform for voltage and current. The waveform scope allows the meter to be used as a basic oscilloscope throughout a power system.

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.



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 DNP 3.0 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.

FIELD EXPANDABLE I/O AND COMMUNICATION CAPABILITIES

The Shark® 200 meter offers unequalled 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 per meter.

INP100S: 100BaseT Ethernet Capability

The meter can provide 100BaseT Ethernet functionality.

- Embedded web server, Smartphone compatible
- Network Time Protocol (NTP) support (Network Clock Sync)
- 12 simultaneous Modbus TCP/IP connections
- 5 simultaneous DNP over TCP/IP connections
- Dual Ethernet Ports available
- Supports alarm emails and periodic email notification of meterstatus/reading data

INP300S: IEC 61850 Protocol Ethernet Card

- Simultaneous Modbus and IEC 61850
- 5 Simultaneous MMS Clients
- Multiple Logical Nodes
- Polled Operation Mode (Queried Reports)
- Buffered and Unbuffered Reports
- Configurable .CID file

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

- Assignable to any parameter
- 0.1% of full scale
- 0 to 10K Ohms
- Range +/- 1.20mA
- Designed for RTUs and generating stations

20mAOS: Four Channel 4-20mA Outputs

- Assignable to any parameter
- 0.1% of full scale
- 0 to 850 Ohms at 24VDC
- Loop Powered using up to 24 Volts DC
- Ideal for any Process Control application

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)
- Allows for control, alarm and status (must be at V4 or higher for limit alarms and control)

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
- 120mA continuous load current
- Status Inputs - Wet / Dry Auto Detect (Up to 150 VDC)
- Provides KYZ outputs and pulse input counting

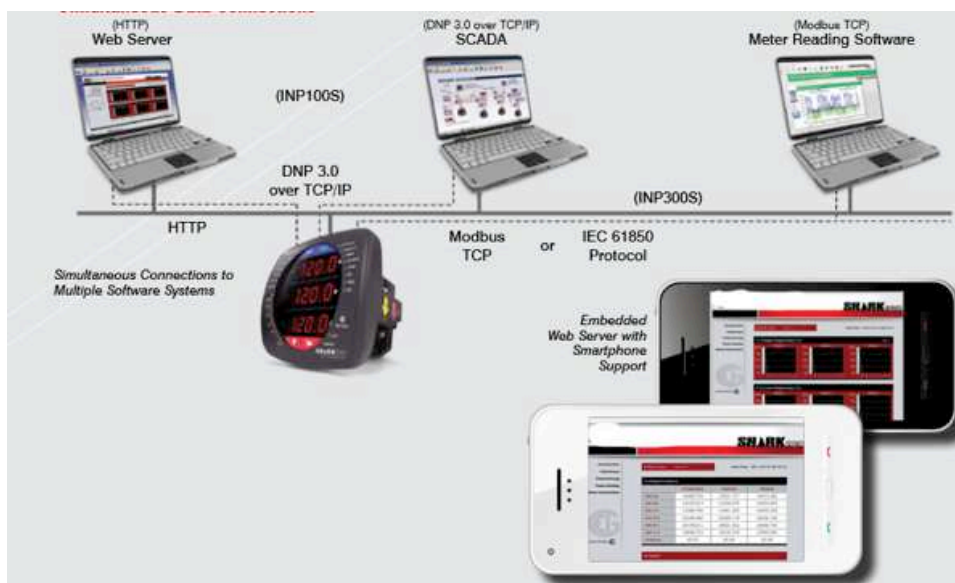
FOVPS or FOSTS: Fiber Optic Card

- 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 DNP 3.0 protocols available
- The preferred communication method for intrinsic safety and high reliability



100BASET ETHERNET (INP100S or INP300S)

Simultaneous Data Connections



INP100S - WEB SERVER, MODBUS, DNP AND EMAIL

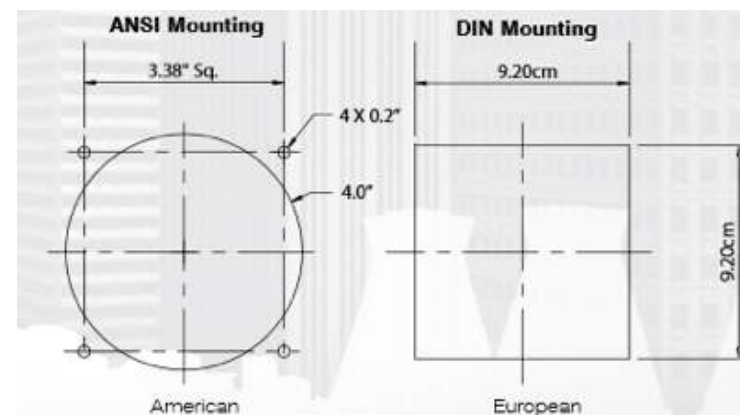
- Web Server with Configurable HMI • Smartphone Compatible
- 12 Connections Modbus TCP HMI
- 5 Connections DNP over TCP/IP
- Smartphone Compatible
- Sends Emails on Alarm or Meter Status & Reading Data

INP300S - WEB SERVER, MODBUS, IEC 61850

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

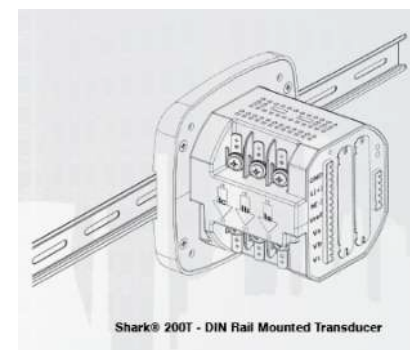
SHARK 200 METER ANSI AND DIN MOUNTING

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 TRANSDUCE

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

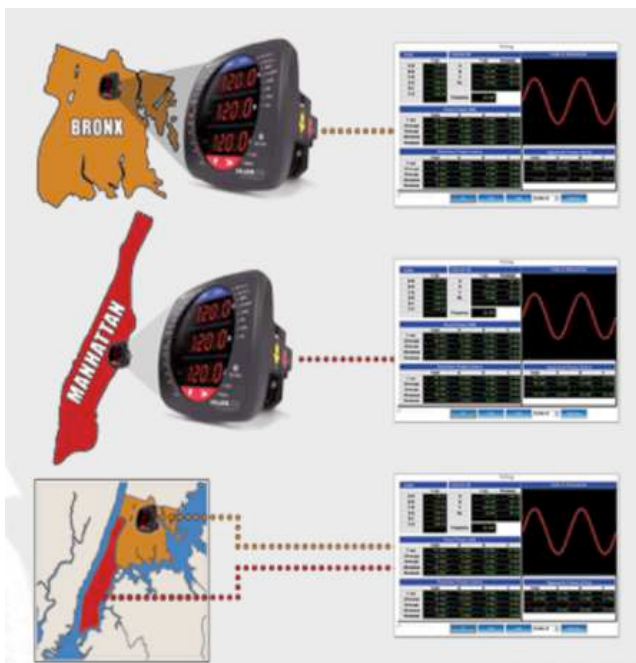


TYPICAL SUBSTATION SOLUTIONS

SHARK 200 METER ANSI AND DIN MOUNTING

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 insuring 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 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 and estimation.
- Data trend PF distribution and imbalances for system efficiency analysis

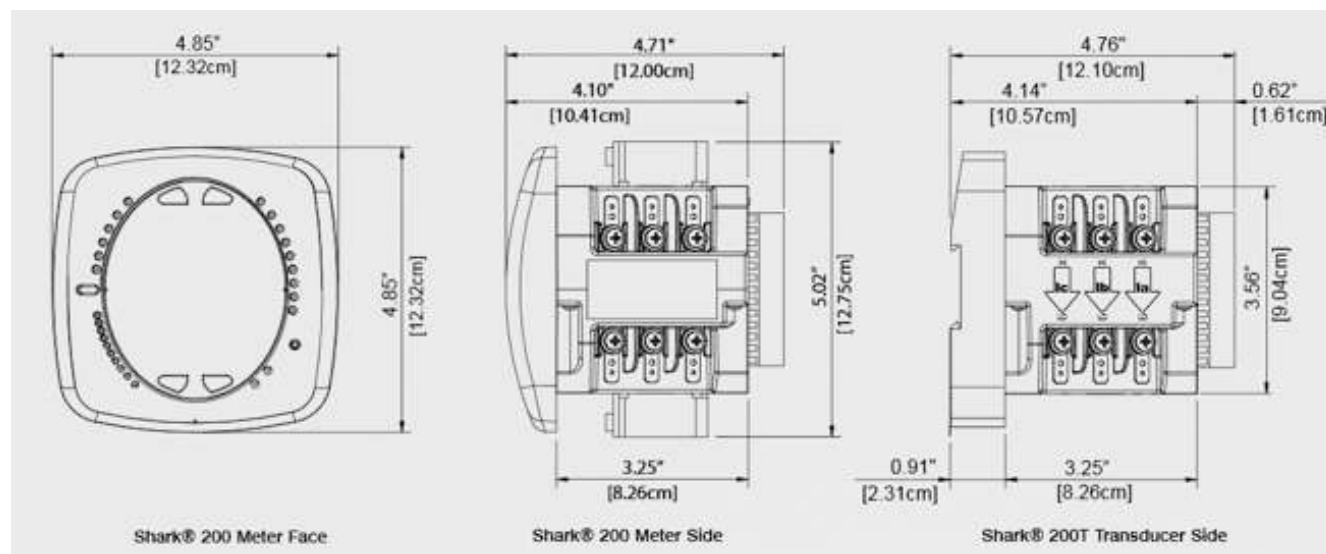
LOW COST SUBSTATION TELEMETRY

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

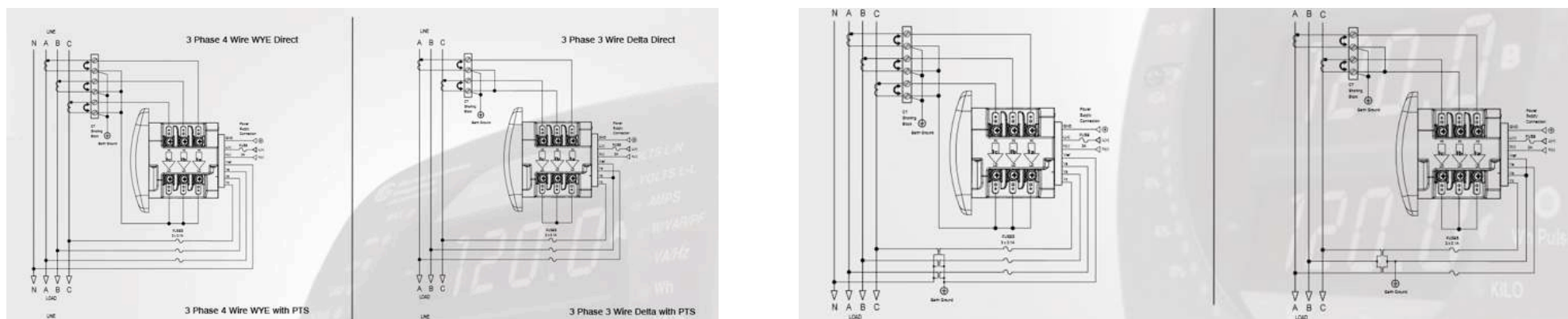
- Perfect for new or retrofit applications.
- Multiple Com paths.
- One meter provides outputs for every application.
- Multiple systems and/or users accessing data simultaneously.



DIMENSIONAL DRAWINGS



WIRING DIAGRAMS



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, •Element WYE, 2 Element Delta, 4 Wire Delta Systems •Burden: Input Impedance 1 Mega Ohm. Burden 0.014 W at 120 Volts •Input Wire Gauge: AWG#12 -26/(0.129 -3.31) mm2	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
CURRENT INPUTS	•Class 10: (0.005 to 11)A, 5 A Nominal •Class 2: (0.001 to 2)A, 1 A Nominal Secondary •Fault Current Withstand (at 23°C): 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 •Programmable Current to Any CT Ratio •Burden 0.005 VA per Phase Max at 11 Amps •Pickup Current: 0.1% of Nominal Class 10: 5 mAClass 2: 1 mA •Pass Through Wire Diameter: 0.177" / 4.5 mm	UPDATE RATE	•Watts, VAR and VA - Every 6 Cycles •All Other Parameters - Every 60 Cycles
ISOLATION	All inputs and Outputs are Galvanically Isolated to 2500 Volts	POWER SUPPLY	Option D2: •(90 to 265) Volts AC and (100 to 370) Volts DC. Universal AC/DC Supply Option D: •18-60VDC Burden: 10VA max.
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	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 DNP 3.0 Protocols
DIMENSIONS & SHIPPING	•Weight: 2 lbs /0.91 Kg •Basic Unit: H4.85" x W4.85" x L4.25"	KYZ PULSE	•Type Form C Contact •On Resistance: 35 Ohms Max •Peak Voltage: 350 VDC •Continuous Load Current: 120 mA •Peak Load Current: 350 mA (10 ms) •Off State Leakage Current@ 350 VDC: 1uA

ORDERING INFORMATION

	Model	Frequency	Current Input	V-Switch™ Pack	Power Supply	I/O Slot 1*	I/O Slot 2*	Mounting (Shark® Meter 200)
Option Numbers:	-	-	-	-	-	-	-	-
Example:	Shark200	60	10	V2	D2	INP100S	X	X
	Shark200 (Meter/Transducer)	50 50 Hz System	10 10 Amp Secondary	V1 Multifunction Meter Only	D2 90-265 V AC/DC	X None	X None	X ANSI Mounting
	Shark200T (Transducer Only)	60 60 Hz System	2 2 Amp 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
Additional Accessories				V3 Power Quality Harmonics		PO1S 4 Pulses / 4 Status	PO1S 4 Pulses / 4 Status	
Communication Converters				V4 Limits & Control		1mAOS 4 Channel Analog Output 0-1 mA (bidirectional)	1mAOS 4 Channel Analog Output 0-1 mA (bidirectional)	
9PINC - RS232 Cable				V5 64 Samples/Cycle Waveform Recording		20mAOS 4 Channel Analog Output 4-20 mA	20mAOS 4 Channel Analog Output 4-20 mA	
CAB6490 - USB to IrDA Adapter				V6 512 Samples/Cycle Waveform Recording		FOSTS Fiber Optic Output ST Terminated	FOSTS Fiber Optic Output ST Terminated	
Unicom 2500 - RS485 to RS232 Converter						FOVPS Fiber Optic Output VPIN Terminated	FOVPS Fiber Optic Output VPIN Terminated	
Unicom 2500-F - RS485 to RS232 to Fiber Optic Converter						INP100S 100BaseT Ethernet	INP100S 100BaseT Ethernet	
Modem Manager, Model #, MM1 - RS485 to RS232 Converter for Modem Communication						INP300S IEC 61850 Protocol Ethernet	INP300S IEC 61850 Protocol Ethernet	
Compliance Documents				Current Transformer Kits				
Certificate of Calibration, Part #: CCal - This provides Certificate of Calibration with NIST traceable Test Data.				CT200K - 200/5 Ratio, 1.00" 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				
Software				CT Specifications:				
COMEXT4P - Communicator EXT™ 4.0 Software, Single License				Frequency: 50 to 400Hz; Insulation: 600 Volts, 10kV BIL				
* Consult factory application engineer for additional transformer ratios, types or window sizes.				Flexible Leads: UL 1015 105°C, CSA Approved, 24" Long, #16AWG				

* I/O cards can be ordered separately using the above part numbers.