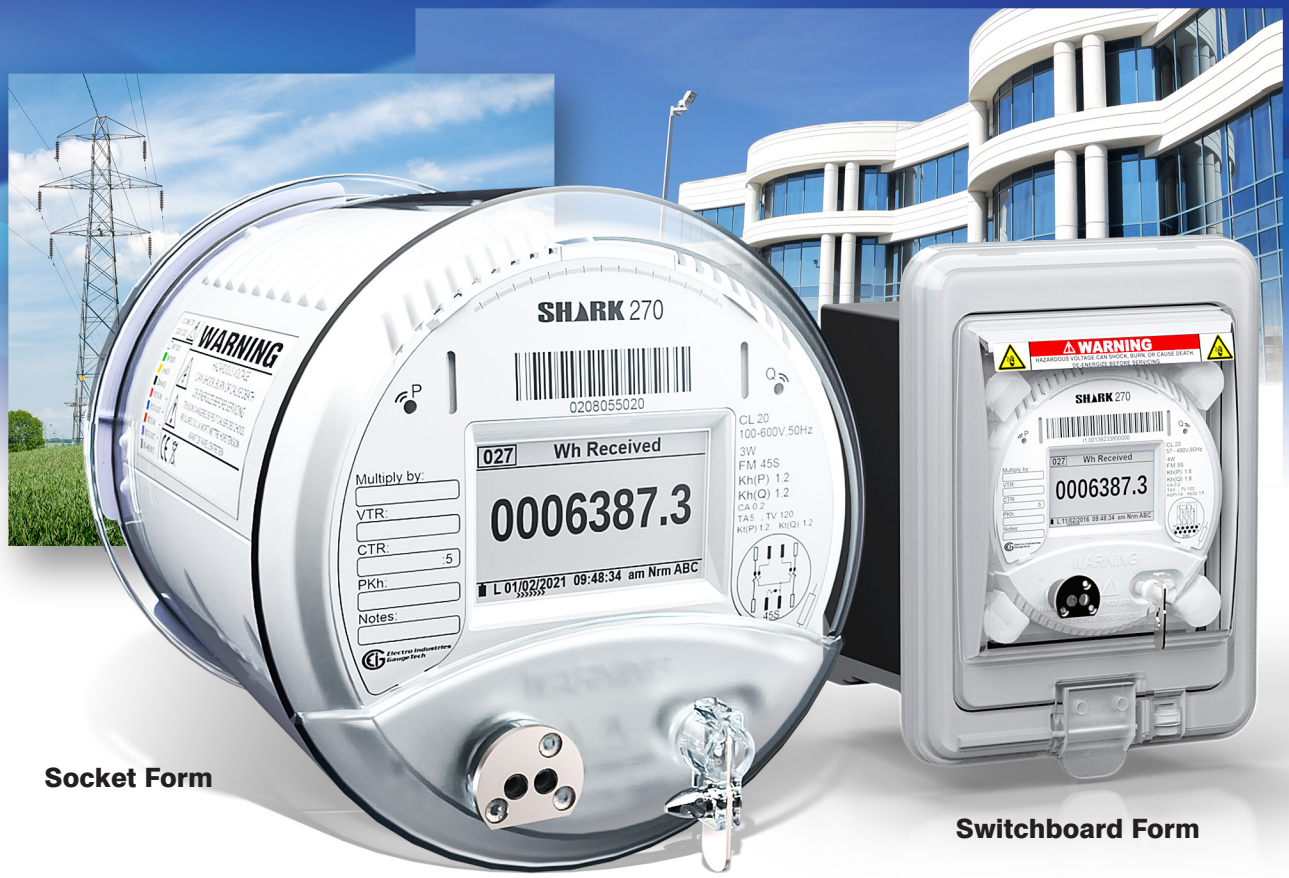
SHARK® 270

Socket and Switchboard Form Revenue Meter



Revenue Metering

- Certified to ANSI C12.20 0.1 Accuracy Class
- Time of Use, Transformer/Line Loss Compensation, and Test Mode
- Rugged Design with Primary Surge Suppression
- Draw Out Switchboard Case Form
- WYSIWYG Screen Designer for Creating Customized Display Screens for Any Metering Application
- Enhanced, Role-based Cyber Security with IP Whitelisting and Encryption

Power Quality Metering

- Power Quality Analyzer with Limits, THD Monitoring, and Harmonics Recording
- 512 Samples/Cycle Waveform Recorder on Surge and Sag Events
- Extensive Logging for Analysis, Reporting, and Viewing over the Cloud
- Email Power Quality Events on Alarm

Communication and I/O

- Real Time SCADA Communication Capability: Modbus RTU/ASCII, Modbus TCP/IP, DNP3, and IEC 61850
- Multiple Communication Ports, Including RS485, RS232, ANSI Type 2 Optical Port, and Ethernet
- 4G LTE™ and 4G GSM (Coming Soon) Underglass Wireless Cellular Card
- Built-in I/O Instead of Expansion Modules
- Superior Keystone Connectors for I/O

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MV90 COMPATIBLE KEMA MET

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Introduction

The Shark® 270 meter is a SCADA ready revenue meter for utility customer metering and distributed generation. It has 0.1% energy accuracy with certification to the ANSI C12.20 0.1 Accuracy Class. The meter offers advanced revenue metering capability, including extensive load profiling, transformer line loss, and CT/PT compensation. It also offers power quality monitoring with up to 512 samples/cycle waveform recording. The Shark® 270 meter's SCADA capability consists of multiple serial and Ethernet communication ports and multiple protocols, including Modbus, DNP3, IEC 61850, and MV90. Additional features of the meter include:

- Internal 4G LTE™ and 4G GSM (coming soon) wireless two-way communication.
- Role-based encrypted cyber security for NERC CIP compliance.
- Rugged design with primary surge suppression to ensure long life operation.
- Superior Keystone connectors for I/O.
- Built-in I/O as opposed to expansion modules.
- Unique screen designer to create customized display screens for any metering application.
- Newly redesigned switchboard model with draw out cradle to facilitate testing and replacement and easy-remove hinged paddle to make installation easier.
- Compatible with EnergyPQA.com™ cloud-based energy management system.

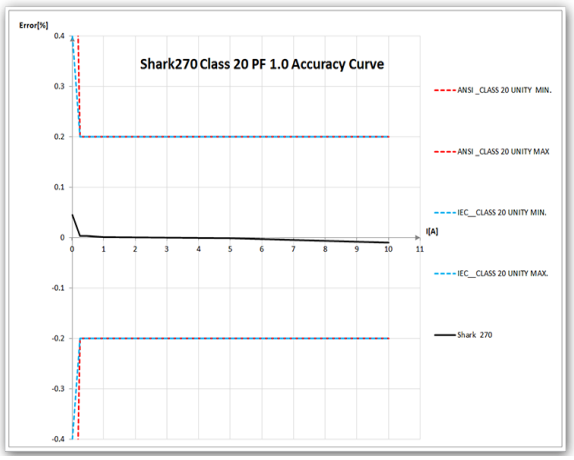
Applications

- Primary revenue metering.
- Advanced metering infrastructure.
- Customer power quality.
- Grid monitoring and substation metering.
- Distribution energy.
- Industrial and commercial metering and sub-metering.

Primary Revenue Metering

Energy Metrology - 0.1% Class Certified

Utilities today face many challenges when metering customers. Installed meters need to be highly accurate and verifiable. Due to reductions in labor force, modern meters need to be both reliable and designed for a long operation life. The Shark® 270 meter meets these requirements with advanced metering technology and superior engineering to improve reliability.



Highly Accurate Measurements for Grid Metering and Power Generation

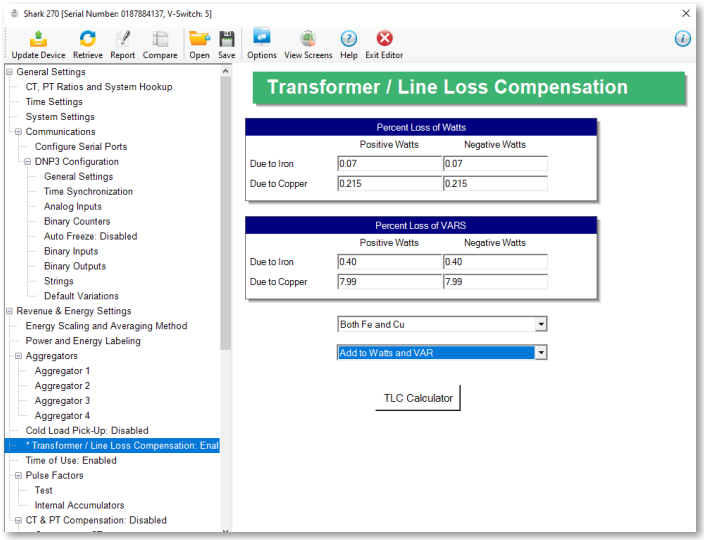
The Shark® 270 meter is designed with the latest DSP technology. It offers highly accurate measurements, providing reliable data for inter-tie billing, power generators, and alternative energy solutions. It provides a versatile, reliable solution for measuring energy and performing accurate cost analysis and allocation.

Parameters	Accuracy
Voltage L-N [V]	0.1% of reading
Voltage L-L [V]	0.2% of reading
Current Phase [A]	0.1% of reading
Current Neutral (calculated) [A]	2% of Full Scale
Active Power Total [W]	0.1% of reading
Active Energy Total [Wh]	0.1% of reading
Reactive Power Total [VAR]	0.2% of reading
Reactive Energy Total [VARh]	0.2% of reading
Apparent Power Total [VA]	0.2% of reading
Apparent Energy Total [VAh]	0.2% of reading
Power Factor	0.2% of reading
Frequency [Hz]	+/- 0.007 Hz
Harmonic Distortion (1 to 99.99)%	+/- 2%

Note: See the Shark® 270 Meter User Manual for full accuracy specifications.

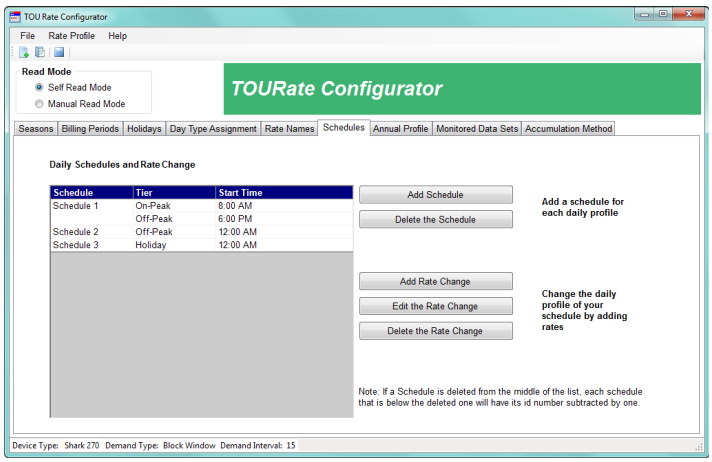
Transformer/Line Loss Compensation

Properly bill utility customers for energy usage even if the meter is placed on the secondary side of the transformer by using the meter's transformer and line loss compensation.



Time of Use

- Perpetual TOU calendar – set up only once and use indefinitely.
- Up to four customizable seasons.
- Up to 12 months per year - set independently from seasons.
- Flexible setup of billing periods/rates/holidays/schedules.
- Up to 16 configurable datasets consisting of 38 channels of data, including all energy channels and readings per quadrant and phase, and pulse aggregators.
- Cumulative and continuous cumulative demand.



CT/PT Compensation

The Shark® 270 meter has built-in features that allow a utility provider to adjust the energy meter to compensate for inaccuracies of the instrument transformers using both amplitude and phase angle adjustments.

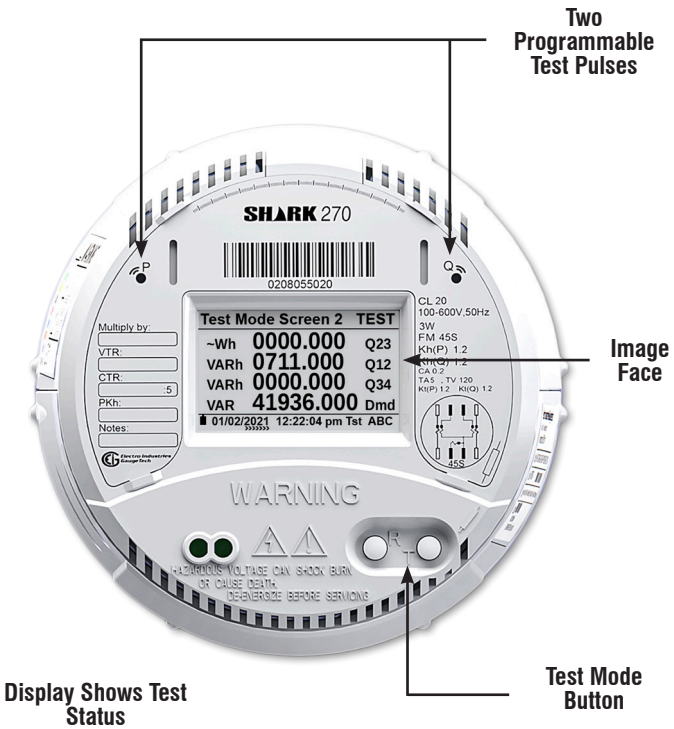
KYZ Pulse Outputs/Inputs

In addition to test mode pulses, the meter has one standard KYZ pulse output and up to eight optional pulse outputs that allow it to deliver energy pulses to a separate recorder, RTU, or other type of energy data collector.

The meter can also function as a recorder, by accepting up to eight optional pulse inputs. Energy values can be logged by the meter's internal profiling memory, for energy flow analysis over time, which is useful for billing, planning, and/or circuit efficiency analysis. The input values can also be totalized in the meter's aggregators.

Test Mode and Energy Presets

The two test pulses located on the meter's face can be used to simultaneously test watt hour and VAR hour readings for accuracy verification. When placed into test mode, the unit freezes and stores all energy parameters, allowing you to test and verify energy accuracy without changing meter readings. The meter can also receive preset energy values, so that it can replace an existing field installation without disturbing faceplate monthly energy reads.

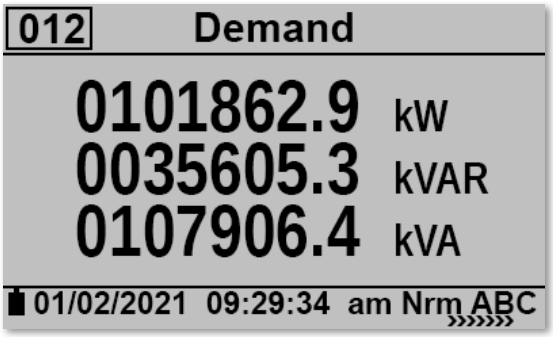


WYSIWYG Screen Designer

The Shark® 270 meter provides one of the industry's most advanced LCD display configuration technologies. The Screen Designer lets you create fully customized display screens for any specific application. Display screens can be programmed to provide information on anything the meter measures. In addition to the custom displays, the meter comes pre-programmed with multiple display screens.

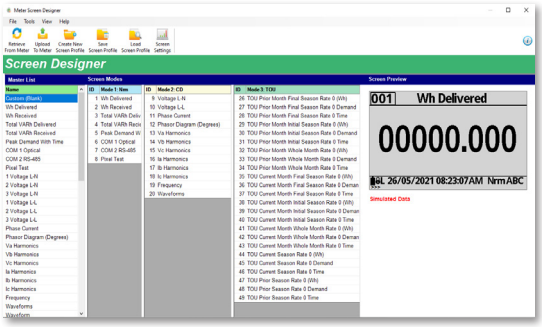
3 Display View Modes/250 Screens

Up to 250 custom and/or pre-programmed screens are available. These screens can be allocated to any of the three view modes, with any number of screens used in each of the modes.



Screen Designer to Meet Specific Needs

- Create custom screens that display any meter readings.
- Customize screen labels.
- Customize screen order.
- Display water, gas, and other types of usage.
- Add diagnostic information.
- Provide other critical operational data.
- Use the meter as an aggregator and display total usage.



Normal Mode

- Wh delivered and received.
- VAh delivered and received.
- VARh delivered and received.
- Com port settings.
- Peak Rolling Window demand.
- Peak Block Window demand.

Time of Use Mode

- Wh and W demand delivered and received, total.
- VARh and VAR demand delivered and received for each register.
- VAh delivered and received for each register.
- VAh delivered and received, total.
- Present season, past season.
- Present month, past month.
- Any other TOU measurements you need.

Pre-Configured Diagnostic Screens

Select from a large offering of diagnostic screens, such as:

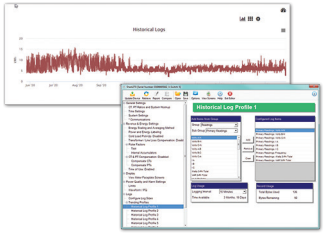
- Voltage phase angles.
- Harmonic magnitudes.
- Firmware versions.
- Meter status.
- Phasor diagram.
- Per phase current and power measurements.
- Segment checks.
- Meter configuration.
- Many additional diagnostic screens available.

Data Trending & Analysis

The Shark® 270 meter has up to 128 MB of memory for data logging, used for historical trends, limit alarms, I/O changes, and sequence of events. The meter's advanced storage means the unit can be programmed to store historical and waveform data for many years. Its real time clock allows for time stamping of all the data in the meter when log events are created. The clock is accurate to 3 ppm and is very stable over temperature.

Historical Logs

- 6 assignable historical logs.
- Independently programmed trending profiles.
- Up to 64 parameters per log.



Historical Trending

System Events Log

To protect critical billing information, the meter records and logs the following with a time stamp:

- Demand resets.
- System startup.
- Energy resets.
- Log resets.
- Critical data repairs.
- Programmable settings changes.
- Password requests/sealing switch 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.
- Email on alarm capability with INP100S Ethernet card.

Limit Alarms and Control Capability (V4 Option)

Limit Events:

- Any measured parameter.
- Up to 16 limits.
- Voltage unbalance.
- Current unbalance.
- Based on % of full scale settings.

Power Quality Measurement & Analysis

The Shark® 270 meter 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 128 MB of storage.

The meter's advanced DSP design allows power quality triggers to be based on a 1 cycle updated RMS. Hundreds of events can be stored until the memory fills. The meter stores waveform data in a first-in/first-out circular buffer to ensure data is always recording.

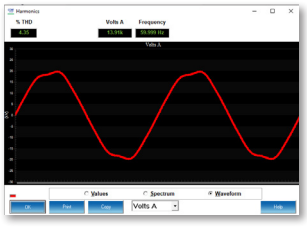
Optional Waveform Recorder

	Samples per Cycle	Pre Event Cycles	Post Event Cycles	Max Waveforms per Event
V4	32 64 128	16 8 4	48 24 12	128 64 32
V5	256 512	2 1	6 3	16 8

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. The waveform scope allows the meter to be used as a basic oscilloscope throughout a power system.



Waveform Scope Display

Standard Communication Capabilities

The Shark® 270 meter's communication architecture is flexible and designed to integrate directly into most existing systems. Connect to EIG's software and multiple third party SCADA or other systems using the meter's standard and optional communication. Standard protocols include Modbus RTU/ASCII and Level 2 DNP3. Standard ports include:

- Type 2 ANSI Optical Port.
- RS485 Port/KYZ Port.

Field-Expandable I/O & Optional Communication Capabilities

In addition to its standard communication, the Shark® 270 meter offers unequaled I/O and communication expandability through its two universal option card slots. The unit auto-detects installed option cards. Up to two I/O cards can be used per meter. The meter's optional communication cards support multiple open protocols, including Modbus ASCII/RTU/TCP, DNP3, and IEC 61850, for sending data to many different systems.

1. RS1S: Serial Communication Card

- Programmable RS485 or RS232 port.
- Up to 2 ports per meter in addition to the standard RS485 port.
- Supports Modbus ASCII/RTU and Level 2 DNP3.

2. INP100S: 100BaseT Ethernet Card*

- Embedded web server, smartphone compatible.
- Network Time Protocol (NTP) support (for Network clock synchronization).
- 12 simultaneous Modbus TCP/IP connections.
- 5 simultaneous Level 2 DNP3 over TCP/IP connections.
- Supports alarm emails and periodic email notification of meter status/reading data.
- Offers enhanced security to protect from unauthorized programming of meter settings.
- Supports data push to cloud servers.

3. INP300S: IEC 61850 Protocol Ethernet Card*

- Simultaneous Modbus TCP/IP and IEC 61850.
- 5 simultaneous MMS clients.
- Multiple Logical Nodes, including LLN0, LPHD, MMXU, MHAI, MMTR, and others.
- Polled operation mode (queried reports).
- Buffered and unbuffered reports.
- Configurable .CID file.
- Offers enhanced security to protect from unauthorized programming of meter settings.

4. 1mAOS: Four Channel Bi-directional 0-1 mA Outputs

- Assignable to any parameter.
- 0.1% of full scale.
- Max. load impedance 10 kΩ.
- Range +/- 0-1 mA.
- Designed for RTUs and generating stations.

5. 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.
- Ideal for any process control application.

6. 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.
- 120 mA continuous load current.
- Status inputs - dry contact status detection only.
- Provides KYZ outputs and pulse inputs counting.

7. RO1S: Two Relay Outputs / Two Status Inputs

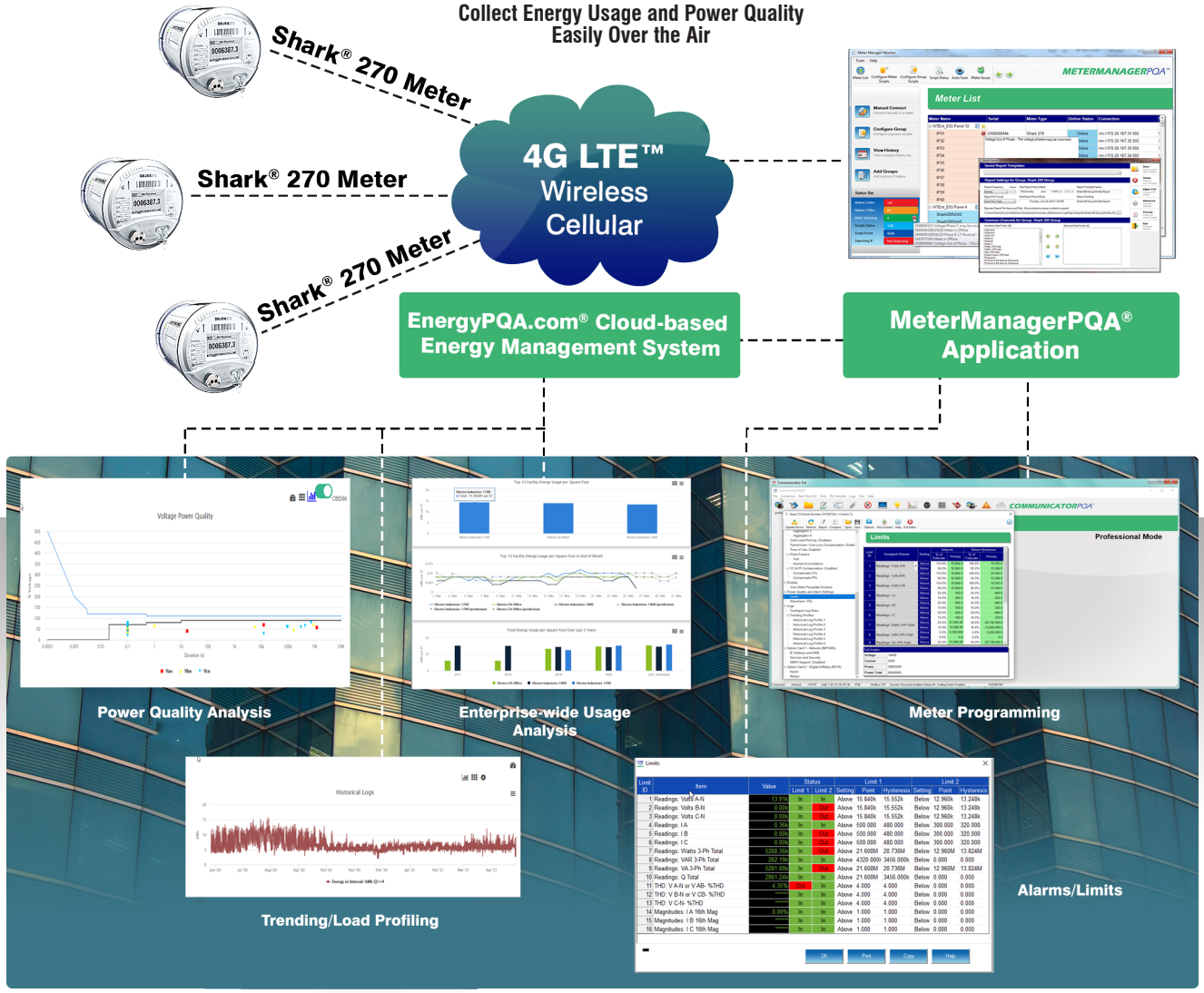
- 30 V AC / 30 V DC - 0.25 A relays, form C.
- Trigger on user set alarms.
- Set delays and reset delays.
- Status inputs – dry contact status detection only.
- Allows for control, alarms, and status (must be at V4 or higher for limit alarms and control).

*The socket meter allows only one Ethernet card OR one 4GLTE cell modem. Two Ethernet cards are supported in the switchboard case meter.

Shark® 270 Underglass Wireless Cellular Communication

- 4G LTE™ and 4G GSM (coming soon).*
- Verizon certified, AT&T and Rogers pending.
- Cost-effective solution to supplement or replace costly AMI infrastructure.
- High-speed protocol to program meters and download data.
- Collect data with EIG software and/or MV90.
- Commission independently or through EIG for easy install.
- Collect metering data and power quality waveforms from the same wireless connection.
- Secure communication using virtual private network infrastructure.

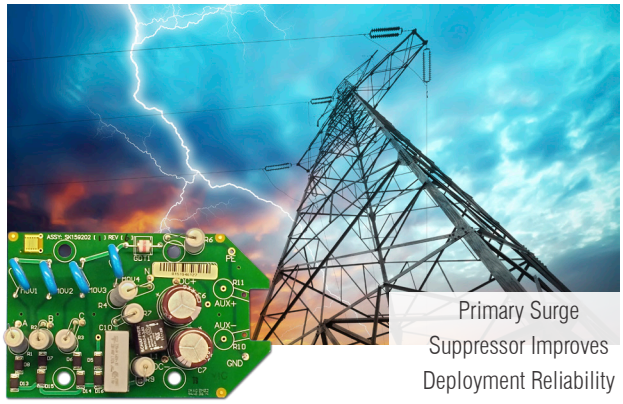
Secure VPN Communication Keeps Meters Off Public IP Networks



* 4GLTE is not available with the switchboard case meter. Only one 4GLTE card is supported per socket meter.

Surge Suppression Technology

The Shark® 270 meter withstands harsh electrical environments. Revenue meters are often placed in remote locations susceptible to transient events, surges, sags, and other electrical anomalies. The Shark® 270 meter uniquely filters these events to prevent damage to the electronics of the instrument without limiting its ability to record event waveforms. The meter has a protection module consisting of a combination of high-power metal oxide varistor, gas-tube, and high-power resistors to attenuate powerful surges the meter may receive.



Primary Surge Suppressor Improves Deployment Reliability

V-Switch™ Key Technology

The Shark® 270 meter is equipped with EIG's V-Switch™ key technology. With this firmware-based technology the meter can be upgraded in the field whenever more advanced features are needed.

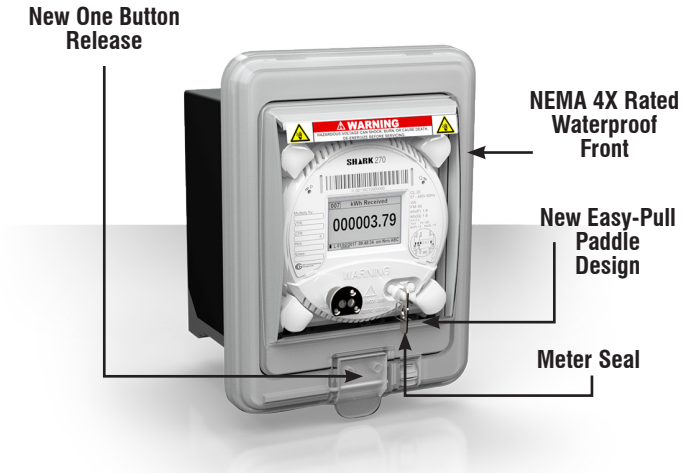
Features	V-Switch™ Key				
Measurements	**V1**	**V2**	**V3**	**V4**	**V5**
Multifunction Measurement	✔	✔	✔	✔	✔
Programmable Display	✔	✔	✔	✔	✔
Time of Use	✔	✔	✔	✔	✔
System Events		✔	✔	✔	✔
Input Status Change		✔	✔	✔	✔
Limits		✔	✔	✔	✔
Harmonics			✔	✔	✔
2 MB Memory (Up to 3 Historical logs)		✔			
4 MB Memory (Up to 3 Historical logs)			✔		
10 MB Memory (Up to 6 Historical logs)				✔	
128 MB Memory (Up to 6 Historical logs)					✔
Waveform 128 Samples per Cycle				✔	
Waveform 512 Samples per Cycle					✔
CT/PT Compensation	✔	✔	✔	✔	✔
TLC Compensation	✔	✔	✔	✔	✔
IEC 61850 Protocol			✔	✔	✔
Level 2 DNP3			✔	✔	✔
Modbus Protocol*	✔	✔	✔	✔	✔

*See the Shark® 270 Meter Modbus Protocol Application Guide for instructions on using Modbus with the meter.

Draw Out Switchboard Case - New SWB3 Relay Case Replacement

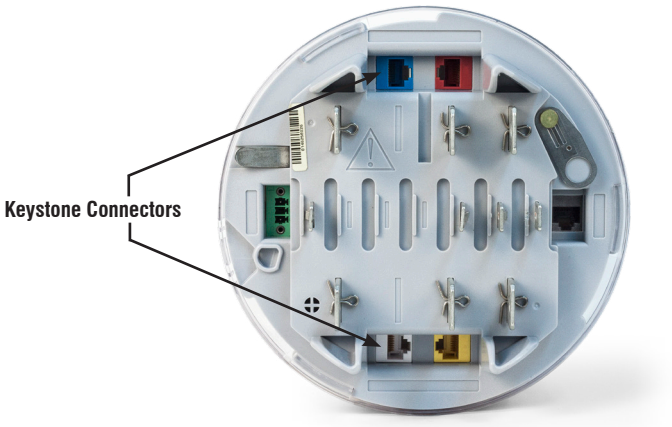
EIG has designed a superior direct replacement to the existing General Electric style S1 relay case-mounted meters. The new case has the same measurements as the S1 case and its wiring follows industry conventions, eliminating the need for new wiring. Our unique design improves on the old classic case with many new features, including:

- Draw out meter cradle for easy testing and replacement.
- Easy-remove hinged paddle to simplify installation.
- NEMA 4X-rated cover for use in outdoor substation control panels.
- One button cover release for simpler installation and testing.



Improved I/O Connectors

The Shark® 270 meter has keystone jacks to simplify I/O connection.



Superior Keystone Connectors for I/O

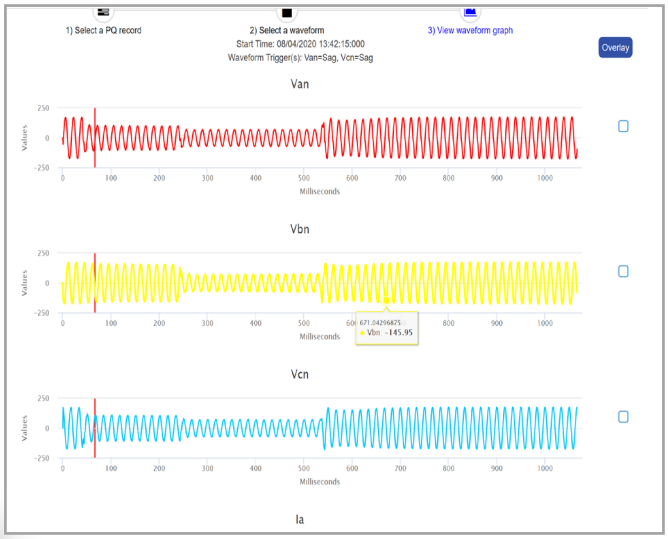
Utility Metering

Highly Accurate Measurements for Grid Metering and Power Generation

The Shark® 270 meter's high sampling rate and latest DSP technology provide highly accurate measurements. These measurements deliver reliable data for utility metering - from inter-tie billing and power generation to alternative energy solutions. The meter's precision and reliability provide an ideal solution not only for measuring energy, but also for providing accurate cost allocation and analysis.

Power Quality and Fault Analysis

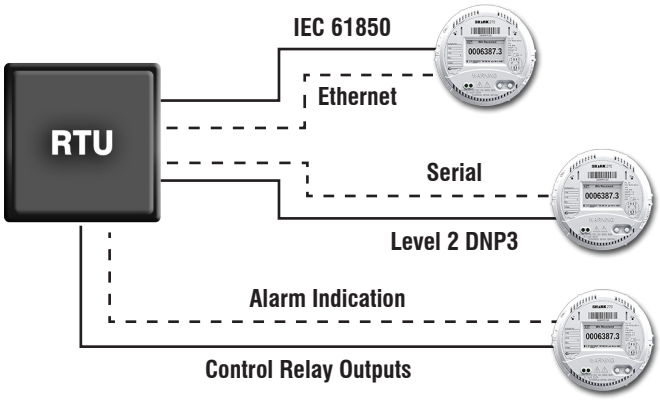
The Shark® 270 meter's power quality features provide access to fault data and power quality information via a host of analytical tools. These tools provide easy conversion to COMTRADE and PQDIF formats, making the meter very helpful in standardizing fault data power system-wide. The meter measures and records critical power quality data, such as harmonics, PF, and phase imbalance, to provide advanced analysis options for improving power system reliability.



View Waveform Recording

Better Communication for Advanced Smart Substation Applications

The Shark® 270 meter provides advanced communication usually found only in higher end, more costly, solutions. The meter has the ability to send data to multiple software systems, providing real time information as well as stored interval measurements. The Shark® 270 meter can communicate with an RTU to bring SCADA information back via one protocol, while itself being evaluated by other software systems for interval or power quality analysis.



Serial and Ethernet are Available Simultaneously

Cyber Security for NERC CIP Compliance

Meet your security initiatives with the Shark® 270 meter's advanced cyber security. Security features include:

- IP Whitelisting.
- Password and username encryption.
- Role-based authorization.

The meter additionally provides the following security features:

- Anti-tampering system events log.
- Port control for Ethernet option cards.
- Hardware locks and sealing switch to prevent remote tampering.

Industrial & Commercial Energy Metering

The Perfect Upgrade Solution to Existing Mechanical Meters

The Shark® 270 meter is an ideal upgrade to non-communicating mechanical or older solid state meters. Just replacing the existing meter with a Shark® 270 unit transforms basic metering capability into a communicating solution. The standard Shark® 270 unit has an RS485 Modbus port. With the optional Ethernet module, the meter can communicate over Ethernet to send Modbus data to most standard energy management and building automation systems.

Email and Data Push Features Perfect for Cloud and IOT (Internet of Things) Solutions

The Shark® 270 meter's Ethernet capability offers many advanced features that are useful for industrial and commercial applications. In addition to communicating via Modbus TCP, the meter can be configured to send email on alarm conditions. These emails alert facility managers to high demand conditions, alarms, and other issues that affect both energy reliability and cost.

Emails can also include periodic notification of metered values, such as demand and energy consumption. This is useful for sending data to energy dashboards and other cloud software applications. And it is essential for IOT applications, in which a user wants to integrate many, or all, electrical appliances and pieces of apparatus.

The Shark® 270 meter also supports data push to cloud servers that use the JSON structure, such as Lucid's BuildingOS. The meter can send up to 15 meter readings to the cloud service to support cloud-based building management applications.

Diagnose Power Quality Events at Incoming Circuits

With the Shark® 270 meter a facility manager or engineer can view power quality events that occurred at the incoming service point, allowing analysis to determine the cause of these events and to implement remediation. The Shark® 270 meter's power quality information lets users see how many and what types of events occurred and determine if these events could have affected their installed sensitive equipment.

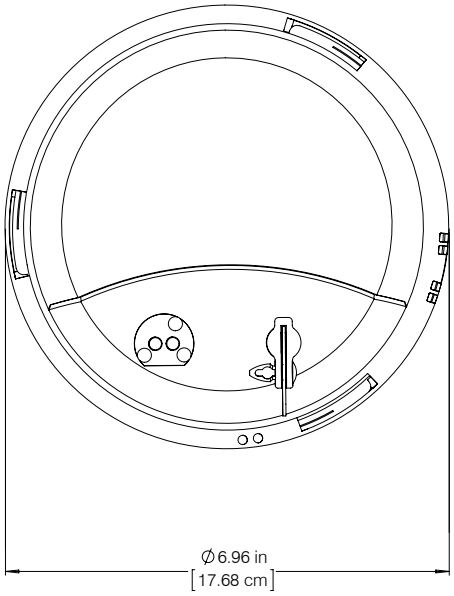
Power quality events include records of faults, voltage surges and sags, harmonics, imbalances, power factor, and many other indices. This data is automatically collected and stored in remote databases for system-wide analysis.

EnergyPQA.com® Cloud-based Energy Management System

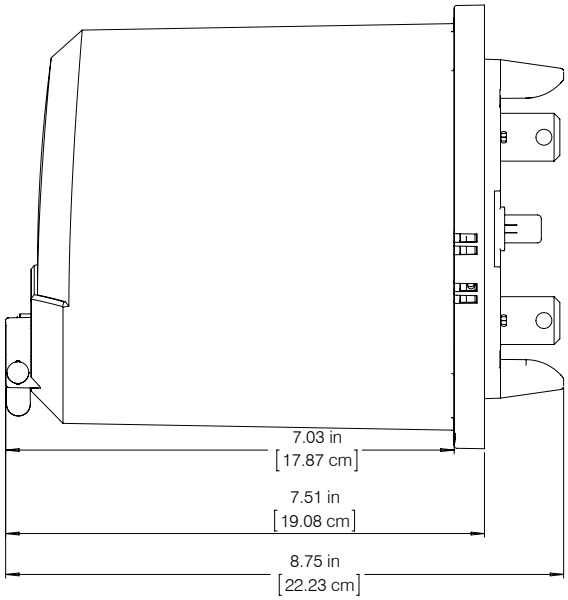
The EnergyPQA.com® system provides energy analytics and predictions enterprise-wide and deep insights into power quality.

- Increase energy usage efficiency by analyzing load disaggregation and usage comparisons.
- Perform cost allocation and submetering by properly billing for actual energy usage versus square footage estimations.
- Analyze enterprise carbon footprint to determine and improve impact on the environment.

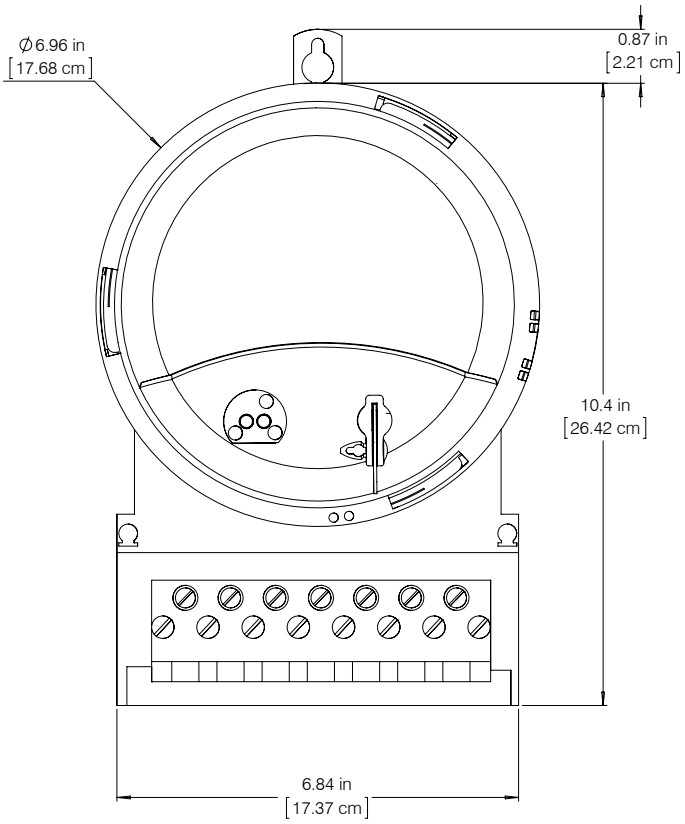
Shark® 270 Socket Meter Dimensional Drawings



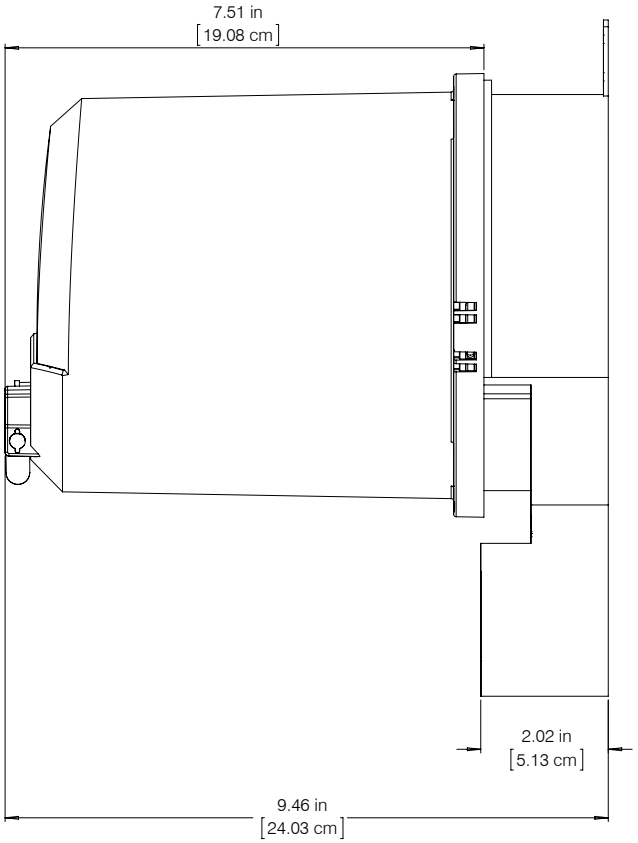
Shark® 270 Meter
Front Dimensions



Shark® 270 Meter
Side Dimensions

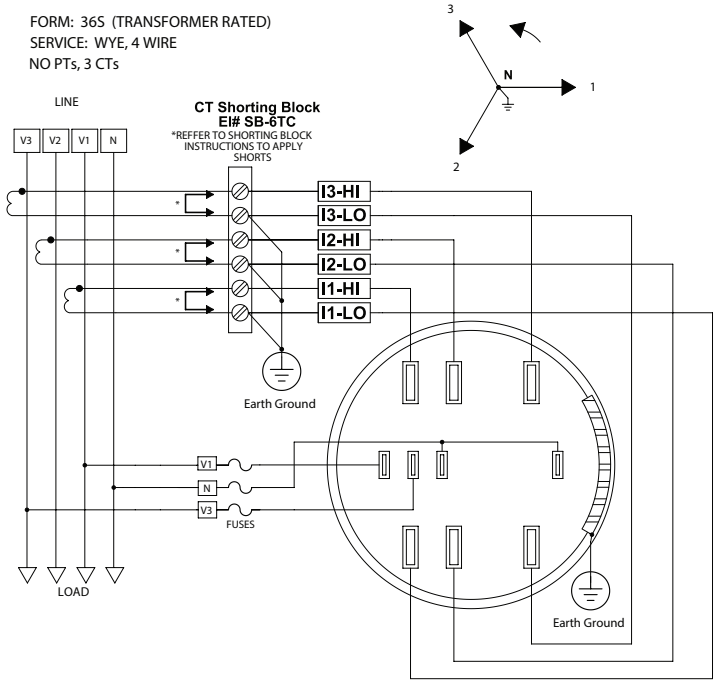


Shark® 270 Meter in A-Base
Front Dimensions

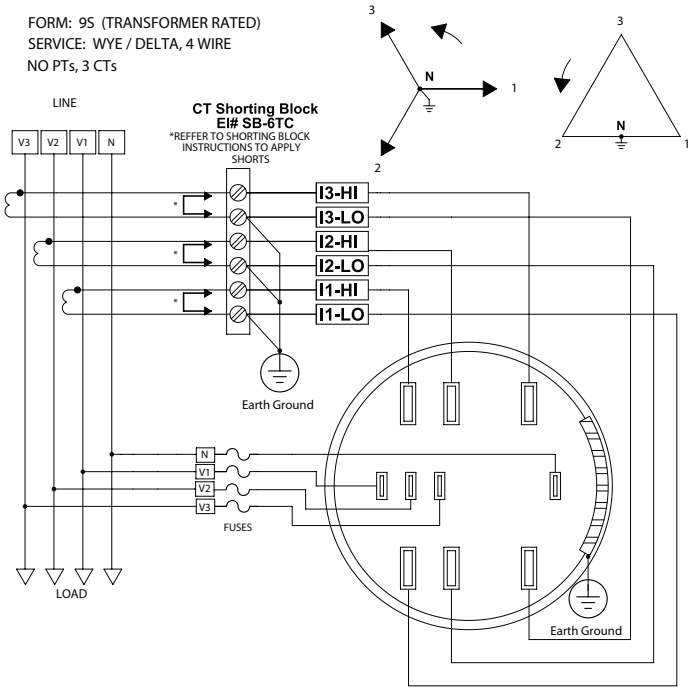


Shark® 270 Meter in A-Base
Side Dimensions

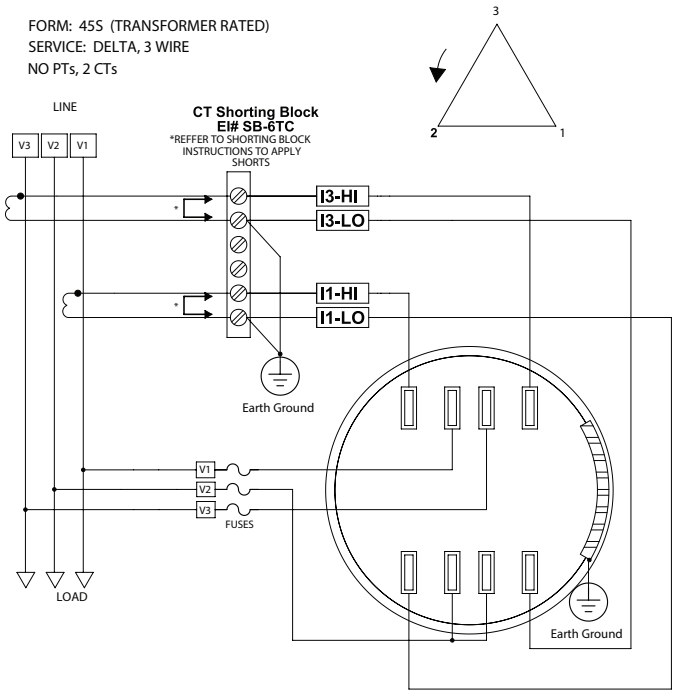
Shark® 270 Socket Meter Wiring Diagrams



Form 36S WYE
4 Wire



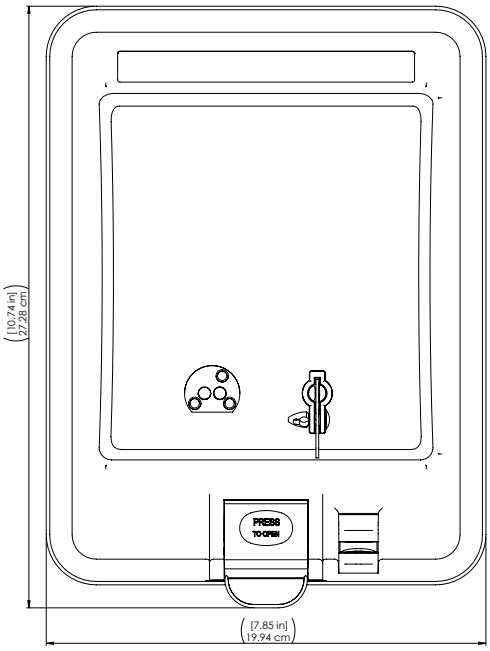
Form 9S WYE/DELTA
4 Wire



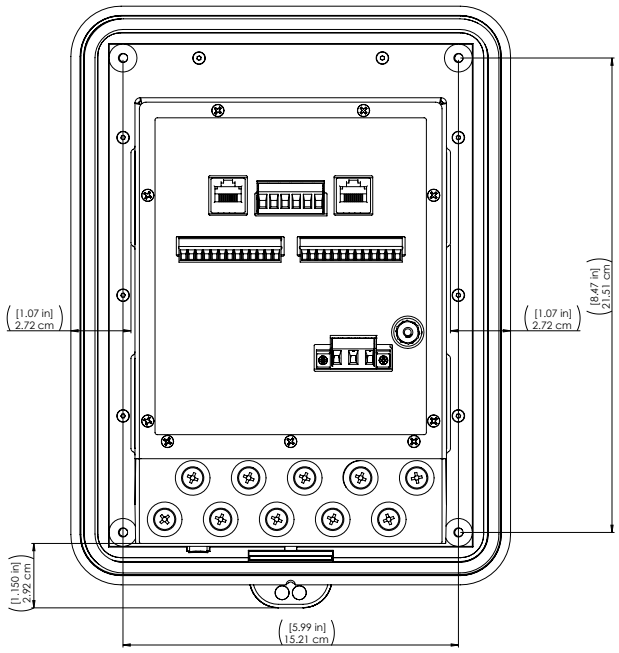
Form 45S DELTA
3 Wire

* See the Shark® 270 meter's User Manual for additional information and wiring diagrams.

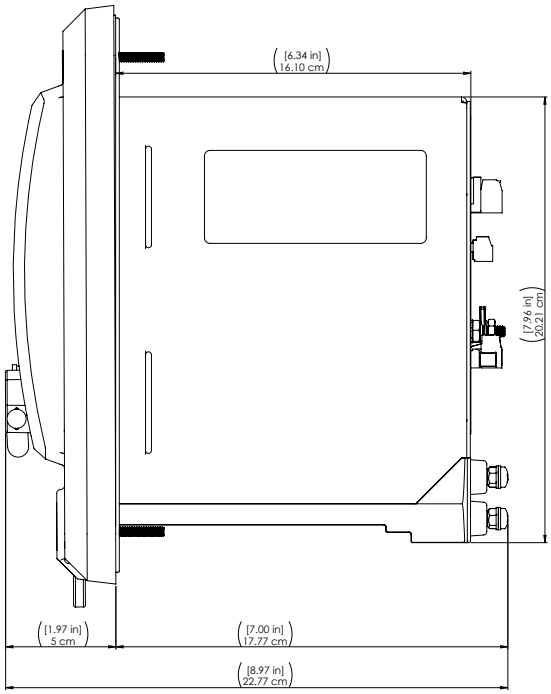
Shark® 270 Switchboard Case Dimensional Drawings



Front Dimensions

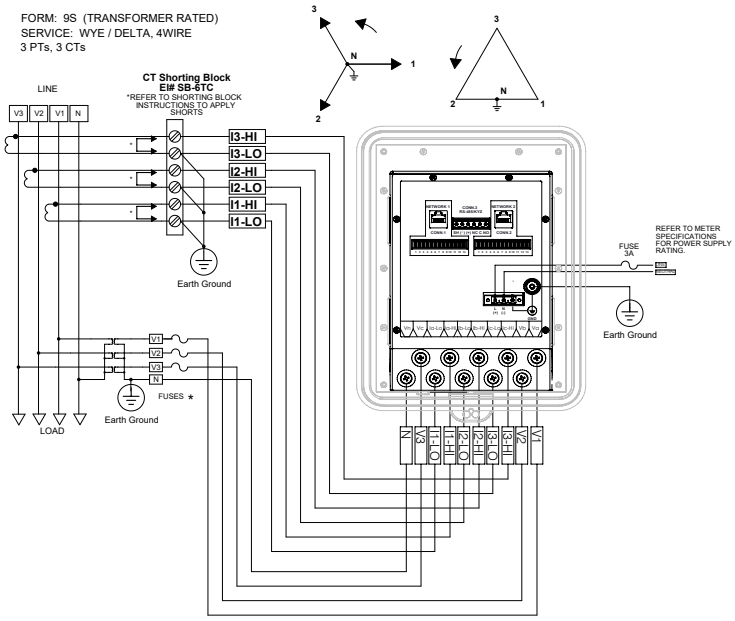


Back Dimensions

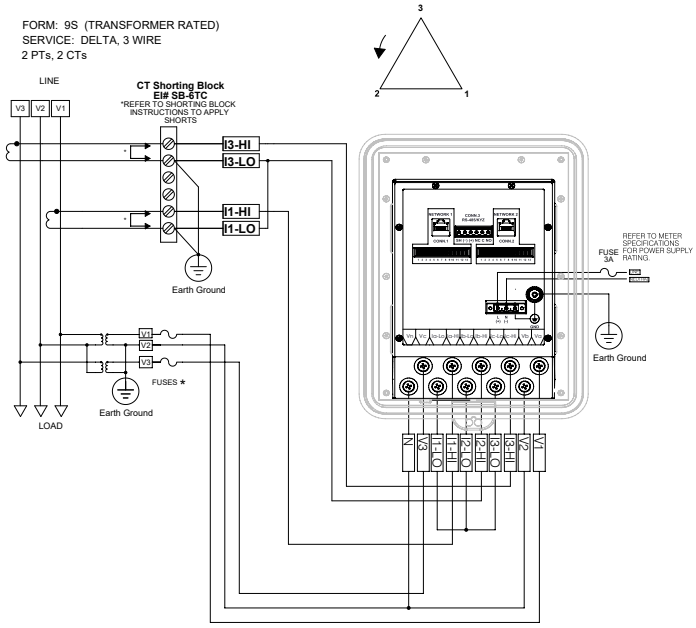


Side Dimensions

Shark® 270 Switchboard Form Meter Wiring Diagrams



Form 9S, 4 Wire WYE/Delta
3 PTs, 3 CTs



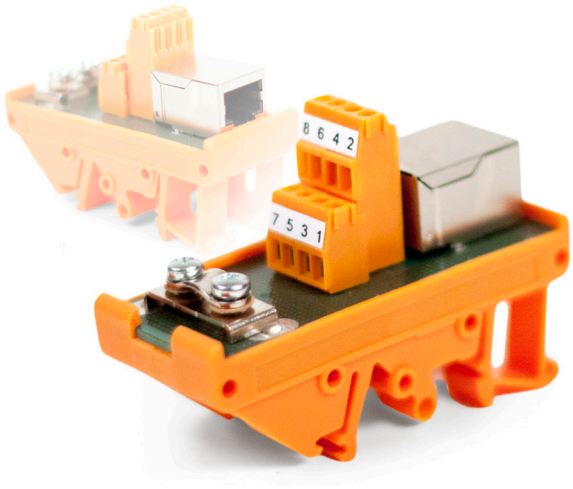
Form 9S, Delta 3 Wire
2 PTs, 2 CTs

* See the Shark® 270 meter's User Manual for additional information and wiring diagrams.

Shark® 270 Meter I/O Terminal Breakout Box Kit (for Socket Form Meter)

The CONN20163 gives you access to the meter's high accuracy without having to change your current wiring scheme. It lets you connect the Shark® 270 meter to your equipment in a simple, one-step process.

- Use the kit's cable to connect from one of the meter's RJ45 I/O connectors to the RJ45 port on the CONN20163 unit.
- The CONN20163 converts the RJ45 cable connection to an 8-pole screw terminal receptacle that you can use to connect I/O wiring to your equipment, saving you time and providing a convenient point of termination.



CONN20163

Specifications

Sense Inputs
Electrical Ratings
Current:

- Transformer rated
- Two or three current inputs depending on Form (Ia, Ib, Ic)
- Class 2 - 1 A nominal CT secondary, burden 0.0112 VA at 2 A input/phase
- Class 20 - 5 A nominal CT secondary, burden 0.0112 VA at 20 A input/phase
- Pickup Current: Shall begin reading at 0.001 A (1 mA) for Class 2 and 0.005 A (5 mA) for Class 20
- Continuous maximum ratings: Class 2 - 5 A AC, Class 20 - 30 A AC
- Overcurrent ratings as the factor of Current Class: 5x - for 10 seconds, 15x - for 3 seconds, 25x - for 1 second
- The current inputs are only to be connected to external CTs

Voltage:

- Absolute maximum rating, between any voltage inputs: Unit with external power connection: 720 V AC; Unit powered from voltage blades ("-S" option): 576 V AC
- Supported common Power Mains with direct voltage connections: Forms 9S, 36S, 45S with blade ("-S") or external ("-SE") power option; 57.7/100 V, 69/120 V, 120/208 V, 230/400 V, 277/480 V; Form 45S with external ("-SE") power option only: 347/600 V; for lower or higher voltage Power Mains use voltage transformers
- Input impedance: 4 MΩ per phase
- Surge withstand: See compliance section for details
- Burden: with external power connection: 0.09 VA/input at 600 V AC (4 MΩ/input); Unit powered from voltage blades: see power supply ratings

Power Supply:

- Input voltage range:
- Absolute maximum continuous: 576 V AC (between any voltage inputs in blade powered units, "-S" option); 300 V AC or 400 V DC (externally powered units, "-SE" option)
- Absolute minimum startup/dropout voltage for blade powered, fully loaded unit ("-S" option), at 60 Hz. All applicable blades are symmetrically energized:
  - 4W Wye service, Form 9S, 3 x L-N: 45/35 V AC
  - 4W Wye service, Form 36S, 2 x L-N: 50/45 V AC
  - 4W Delta service, Form 9S, 3 x L-N: 70(40)/52(30) V AC - high (low) phase
  - 3W Delta service, Form 45S, 3 x L-L: 65/55 V AC
- Absolute minimum startup/dropout voltage for externally powered, fully loaded unit ("-SE" option), at 75/70 V AC or DC
- Frequency range: (45 to 65) Hz or DC
- Ride through characteristics at 120 V maximum power consumption: ~33 ms
- Power consumption (burden), maximum: 8 VA/4.5 W per Phase – with 3 phase supply; typical burden with 1 Ethernet Card installed: 3.3 VA/1.7 W per phase – at 3 phase 120 V AC

Display:

- Graphical back-illuminated TFT LCD programmable display
- Pre-configured screens and Screen Designer for fully customized screens
- Size: 2.7"
- Resolution: 400 X 240

Isolation:

- Between human accessible I/O connections and power, voltage, current inputs: 2500 V AC
- Between power and voltage and current inputs: 2500 V AC
- Between human accessible I/O connections: 500 V AC
- Isolation is Hi-Pot test verified in factory

Memory:

- Up to 128 MB of flash memory

Standard Communication:

- LCD display
- ANSI Type 2 Optical port
- RS485 serial port
- Modbus® RTU, Modbus ASCII and Level 2 DNP3 protocols
- Data Speeds of up to 57600 bps

Optional Communication:

- INP100S: 10/100BaseT Ethernet with embedded Web server
- INP300S: IEC 61850 Protocol server
- Modbus TCP/IP, Level 2 DNP3, IEC 61850

Standard KYZ/RS485 Card Specifications:

- RS485 Port:
  - RS485 Transceiver; meets or exceeds EIA/TIA-485 Standard
  - Type: Two-wire, half duplex
  - Min. input impedance: 96 kΩ
  - Max. output current: ±60 mA
- Wh Pulse:
  - KYZ output contacts, and infrared LED light pulses through face plate - "P" light port, Kh value is user definable
  - Pulse Width: 100 ms, fixed
  - Full scale frequency: ~5 Hz
  - Contact type: SPDT (NO – C – NC)
  - Relay type: Solid state
  - Peak switching voltage: AC/DC 30 V
  - Continuous load current: 120 mA
  - Peak load current: 350 mA for 10 ms
  - On resistance, max.: 35 Ω
  - Leakage current: 1 μA maximum
  - Isolation: 3750 V AC
  - Reset state: (NC - C) Closed: (NO - C) Open

Clock Timing:

- Internal Clock Crystal - accuracy better than 15 seconds per month
- Line Frequency Clock Synchronization - accuracy better than 1 second per month
- Internet synchronization with optional Network card (SNTP Protocol)

4G LTE™ Option:

- Carrier: Verizon certified
- LTE™/4G Category: Cat-1
- LTE™/4G Band: 1700/2100/700 MHz
- Dual antennas for greater sensitivity and reception
- Modbus TCP compliant
- MV90 Capable

Environmental
(Temperature Specifications to Indirect Light):

- Operating Temp.: (-40 to +70) °C
- Display Operating Temp.: (-30 to +60) °C
- Humidity: 95% RH noncondensing
- Storage Temp.: (-40 to +85) °C
- S Form Meters - outdoor rated, raintight Lexan cover, UV protected; Switchboard meters NEMA 4X rated cover
- Protection Class: front IP65, rear IP51

Internal Battery (for Time Only):

- 3V Lithium Battery maintains time during outages - part #BATT21214
- Battery life 10 years from date of manufacture when properly installed in meter

Compliance:

- ANSI C12.20-2015, Accuracy Class 0.1 and C12.1 (Eurofins/MET Labs Certified)*
- ANSI C12.18 (Type 2 Optical Port, physical properties)
- FCC Part 15, Class B (Radiated and Conducted Emissions)*
- IEC 62052-11 (KEMA Laboratories Certified)*
  - IEC 62053-22, Accuracy Class 0.2S*
  - IEC 62053-23, Accuracy Class 2*
- CE (IEC 61000-6-2 & IEC 61000-6-4 & IEC 61326-1)*
  - IEC 61000-4-2 (Electrostatic Discharge)*
  - IEC 61000-4-3 (Radiated EM Immunity)*
  - IEC 61000-4-4 (EFT)*
  - IEC 61000-4-5 (Surge Immunity)*
  - IEC 61000-4-6 (Conducted Immunity)*
  - IEC 61000-4-8 (Magnetic Immunity)*
  - IEC 61000-4-11 (Voltage Variations Immunity)*
  - IEC/CISPR 11, Class B (Radiated Emissions)*
  - CISPR 16-2-1 (AC Mains Conducted Emissions)*
- IEC 61557-12 (Performance measuring and monitoring devices)
- IEEE C37.90.1 (Surge Withstand)
- IEEE C62.41 (Surge Immunity)
- Measurement Canada Approved
- EU Directive 2011/65/EU (RoHS 3 Directive)
- REACH Compliant

*Third party lab tested.

Shipping
Dimensions Socket:

- Size: 10" W x 10" D x 12" H
- Weight: 4.4 lbs./1.83 kg (with Option cards 5.6 lbs./2.54 kg)

Switchboard:

- Size: 13" W x 10" D x 11" H
- Weight: 16 lbs./7.25 kg (with Option cards 19 lbs./8.62 kg)

A-Base:

- Size: 14.5" W x 16" D x 11" H
- Weight 9 lbs./4.08 kg (with Option cards 9.5 lbs./4.31 kg)

Ordering Chart

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

	Model		Form		Frequency		Current Class		V-Switch™ Pack		Power Supply		I/O Slot 1		I/O Slot 2		Custom
Option Numbers:		-		-		-		-		-		-		-		-	
Example:	**Shark270**	-	**9S**	-	**60**	-	**2**	-	**V2**	-	**S**	-	**INP100S**	-	**X**	-	**MC**

Model	Form	Frequency	Current Class	V-Switch™ Pack	Power Supply	I/O Slot 1	I/O Slot 2	Custom
Shark270 (Revenue Meter)	**9S** 3 Element	**60** 60 Hz System	**2** 1 A Nominal CT Secondary	**V1** Multifunction Meter	**S** Blade Powered (Not available for SWB3)	**X** No Option	**X** No Option	**X** No Option
	36S 2.5 Element	**50** 50 Hz System	**20** 5 A Nominal CT Secondary	**V2** Standard Data Logging Memory	**SE** Externally Powered	**PO1S** 4 Pulses/4 Inputs	**PO1S** 4 Pulses/4 Inputs	****MC** Measurement Canada Seal
	45S 2 Element			**V3** Power Quality Harmonics		**RO1S** 2 Relays/2 Inputs	**RO1S** 2 Relays/2 Inputs	
	9A A Base			**V4** Multifunction 128 Samples/Cycle Waveform Recording		**1mAOS** 4 Channel Analog Output 0-1 mA	**1mAOS** 4 Channel Analog Output 0-1 mA	
	SWB3 Switchboard Case			**V5** 512 Samples/Cycle Waveform Recording Extended Memory		**20mAOS** 4 Channel Analog Output 4-20 mA	**20mAOS** 4 Channel Analog Output 4-20 mA	
						RS1S RS232/RS485 Comm Card	**RS1S** RS232/RS485 Comm Card	
						***INP100S** 100BaseT Ethernet	***INP100S** 100BaseT Ethernet	
						***INP300S** IEC 61850 Protocol Ethernet	***INP300S** IEC 61850 Protocol Ethernet	
							***4GLTE** Cell Modem (Not available with SWB3)	

* *Two Ethernet cards available with the switchboard case meter; the socket meter allows only one Ethernet card OR one 4GLTE cell modem.*
** *When MC is ordered, only 9S and 45S forms and PO1S and INP100S cards can be ordered.*

Accessories

Software		Communication Converters		Standalone I/O Module Kits for the Shark® 270 Socket Form Meter*	
COMPQA5P1Y	CommunicatorPQA® 5 Software for Windows Single-Computer License (One Year)	**E159343**	USB Communication Cable	**PO1S-KT**	4 Pulses/4 Inputs plus cable
		Unicom 2500	RS485 to RS232 Converter	**RO1S-KT**	2 Relays/2 Inputs plus cable
EnergyPQA-1Year	Cloud-based Energy Management Solution	**Conn20163-KT**	Terminal Breakout Box Kit for I/O (converts RJ45 cable connection to an 8-pole screw terminal receptacle)	**20mAOS-KT**	4 Channel, 4-20 mA, Analog Outputs plus cable
				1mAOS-KT	4 Channel, 0-1 mA, Analog Outputs
				****INP100S-KT**	100BaseT Ethernet plus cable
				****INP300S-KT**	IEC 61850 Protocol Ethernet plus cable
				RS1S-KT	RS232/RS485 plus cable

* *I/O cards can be ordered separately using the part numbers shown above.*
** *Only one of these cards can be ordered per meter for the socket form. Two cards can be ordered for the switchboard form.*

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**

Shark® 270 web page:

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