SHARK® 270

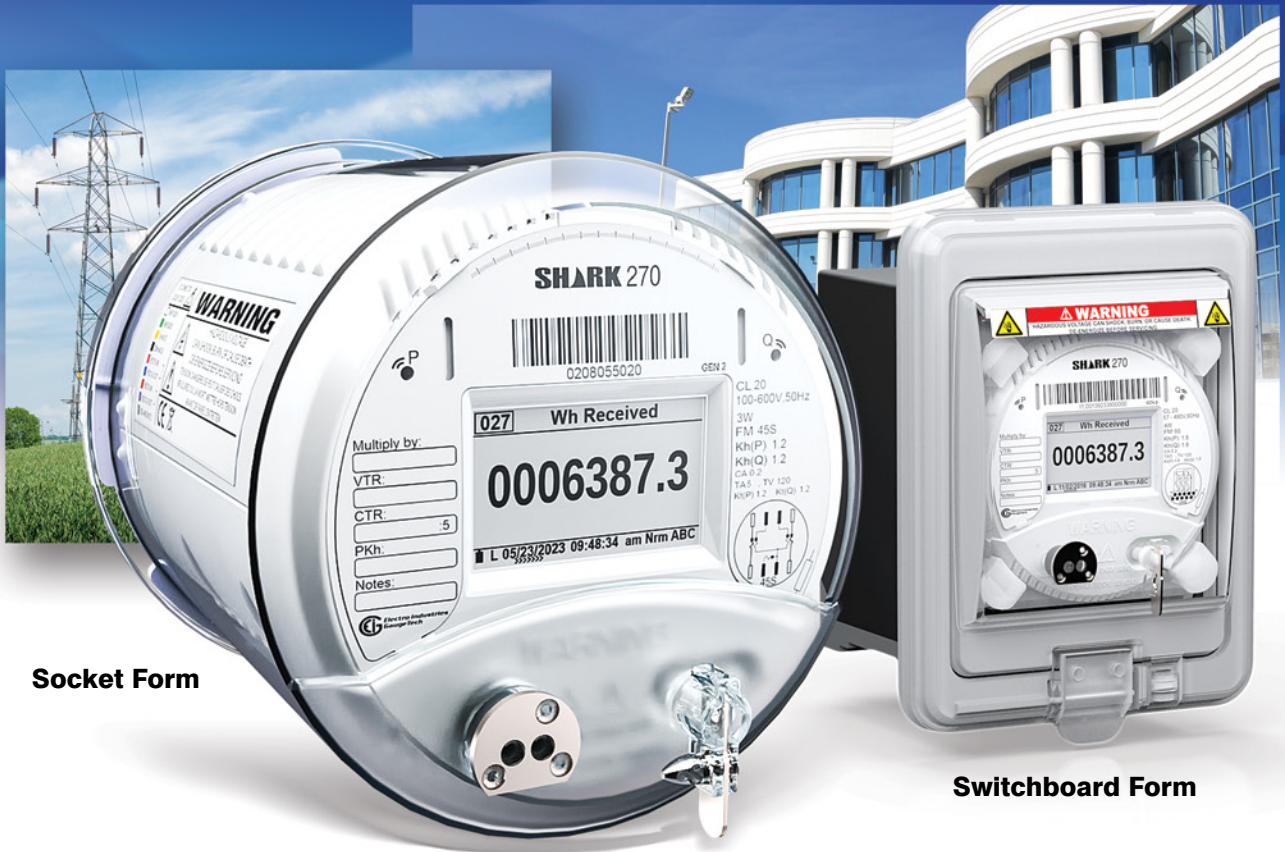*Socket and Switchboard Form Revenue Meter*

Socket Form

Switchboard Form

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

- Role-based Cyber Security with IP Firewalls, Encryption, and Digital Firmware Signature

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

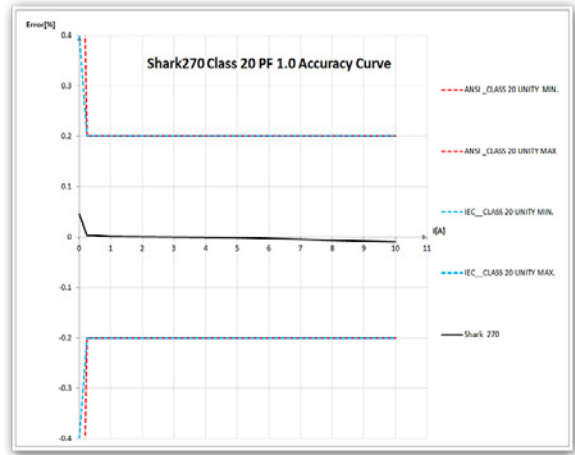- Email Alarm on Power Quality Events

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

- Encrypted Email with SMTPS and Ethernet Card Firewalls Prevent Unauthorized Access and Hacking of Power System Data

- Certified Verizon 4G Under-glass Wireless Cellular

- Built-in I/O Instead of Expansion Modules

- Superior Keystone Connectors for I/O

HUBBELL

Electro Industries GaugeTech™

CE   ISO   MV90 COMPATIBLE   KEMA   MET

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's advanced revenue metering capability includes extensive load profiling, transformer/line loss, and CT/PT compensation. Its advanced power quality monitoring provides 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, Level 2 DNP3, IEC 61850, and MV90. It is fully compatible with the EnergyPQA.com® AI driven 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 submetering.

Shark® 270 Meter Typical Accuracy

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, using the meter's transformer and line loss compensation.

Primary Revenue Metering

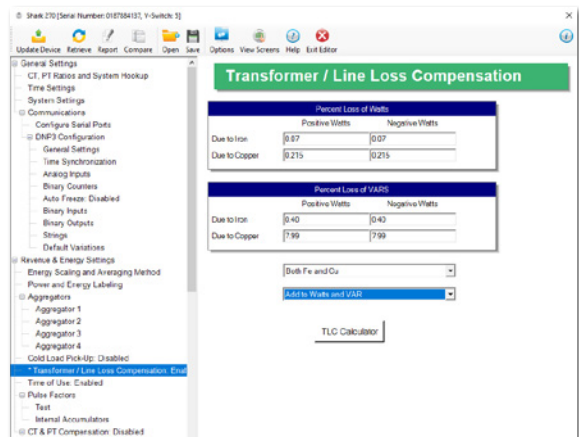### 0.1% Class Certified Energy Accuracy for Grid Metering and Power Generation

Utilities today face multiple challenges when metering customers. Installed meters need to be highly accurate and verifiable. Due to reductions in labor force, modern meters must be both reliable and designed for a long operation life. The Shark® 270 meter is designed with the latest DSP technology. It offers highly accurate measurements, providing reliable data for intertie billing, power generators, and distributed energy solutions. It provides a versatile, reliable solution for measuring energy and performing accurate cost analysis and allocation. Its advanced metering technology and superior engineering improve both meter reliability and longevity.

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, readings per quadrant and phase, and pulse aggregators.

- Cumulative and continuous cumulative demand.
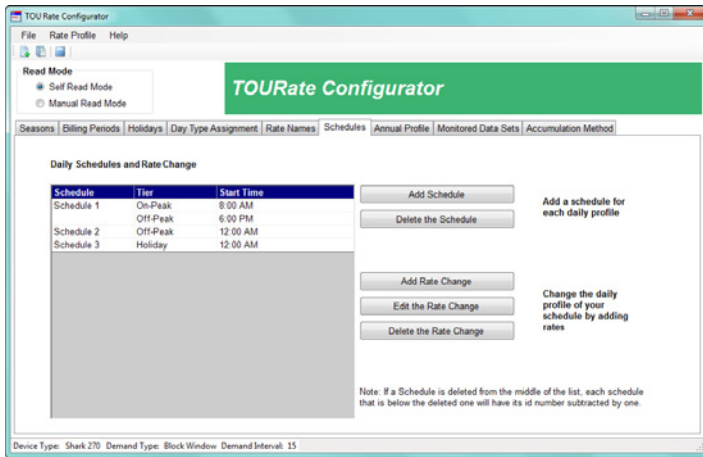
CT/PT Compensation

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.
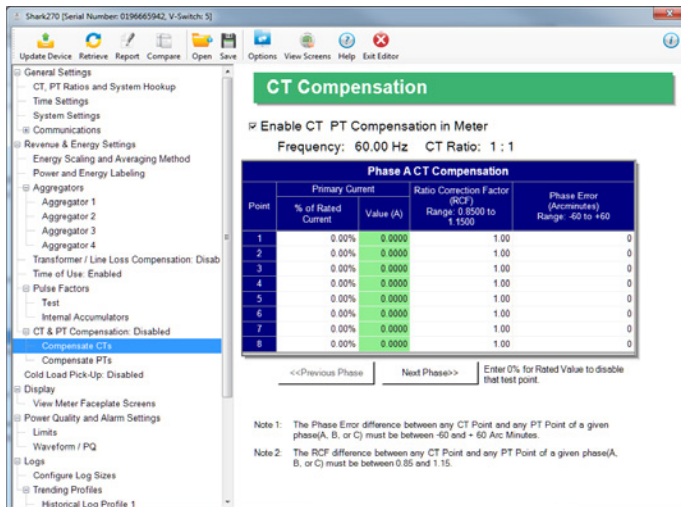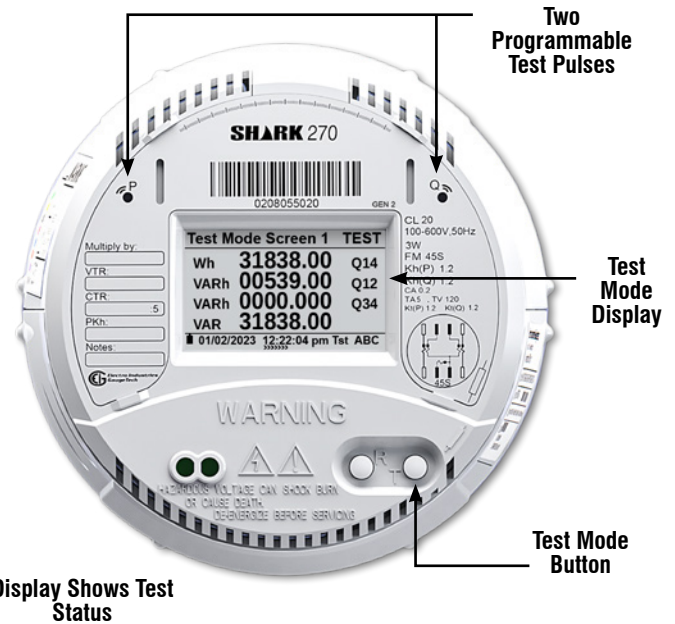

KYZ Pulse Outputs/Inputs

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.
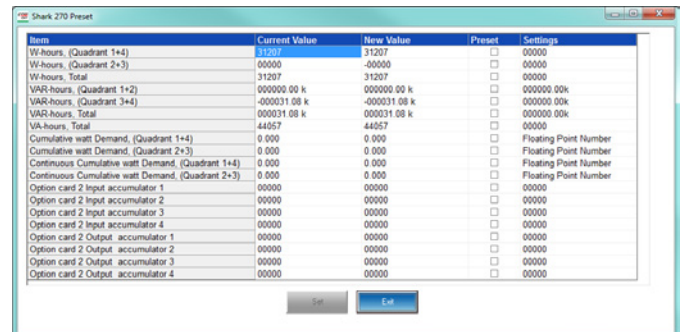
Program Preset Energy

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 with customized scaling.
- 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.
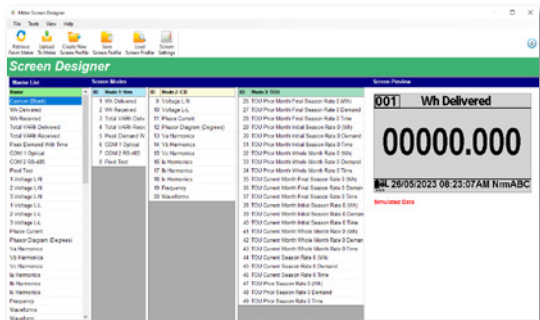
Normal Mode

- 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 timestamping 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.
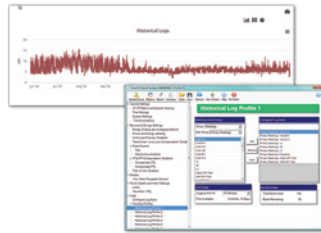
Historical Trending

System Events Log

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

- 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 timestamped log of any relay output.

- Provides a timestamped log of input status changes.

- 2048 events available.

Limit/Alarm Log

- Provides magnitude and duration of an event.

- Includes timestamps 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.
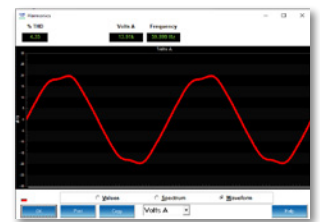
Waveform Scope Display

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 a Type 2 ANSI optical port and an RS485/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.
- Adds up to 2 ports per meter.
- Supports Modbus and Level 2 DNP3.

2. INP100S: 100BaseT Ethernet Card

- Supports IPv4 and IPv6.
- Embedded HMTL5-based web server, smartphone compatible.
- Network Time Protocol support for clock sync.
- 12 simultaneous Modbus TCP/IP connections.
- 5 simultaneous Level 2 DNP3 over TCP/IP connections.
- Encrypted alarm emails (with SMTPS) and periodic email notification of meter status/reading data.
- Firewalls to prevent unauthorized access.
- Digital firmware signature.

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) and buffered and unbuffered reports.
- Configurable .CID file.
- Enhanced security to prevent unauthorized access.

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 applications.

6. PO1S: Four Pulse Outputs / Four Status Inputs

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

8. IRG1: IRIG-B / Four Pulse Outputs

- Enables IRIG-B clock synchronization.
- KYZ pulse outputs programmable to any energy parameters and pulse value; programmable for end of interval.
- Form A: Normally open contacts.

Shark® 270 Under-glass Wireless Cellular Communication

- 4G LTE™ communication.*

- Certified Verizon wireless cellular.

- 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.

- 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

Collect Energy Usage and Power Quality Easily Over the Air

Shark® 270 Meter

Shark® 270 Meter

Shark® 270 Meter

4G LTE™ Wireless Cellular

EnergyPQA.com® AI Driven Energy Management System

MeterManagerPQA® Application

Power Quality Analysis

Enterprise Wide Usage Analysis

Meter Programming

Trending/Load Profiling

Alarms/Limits
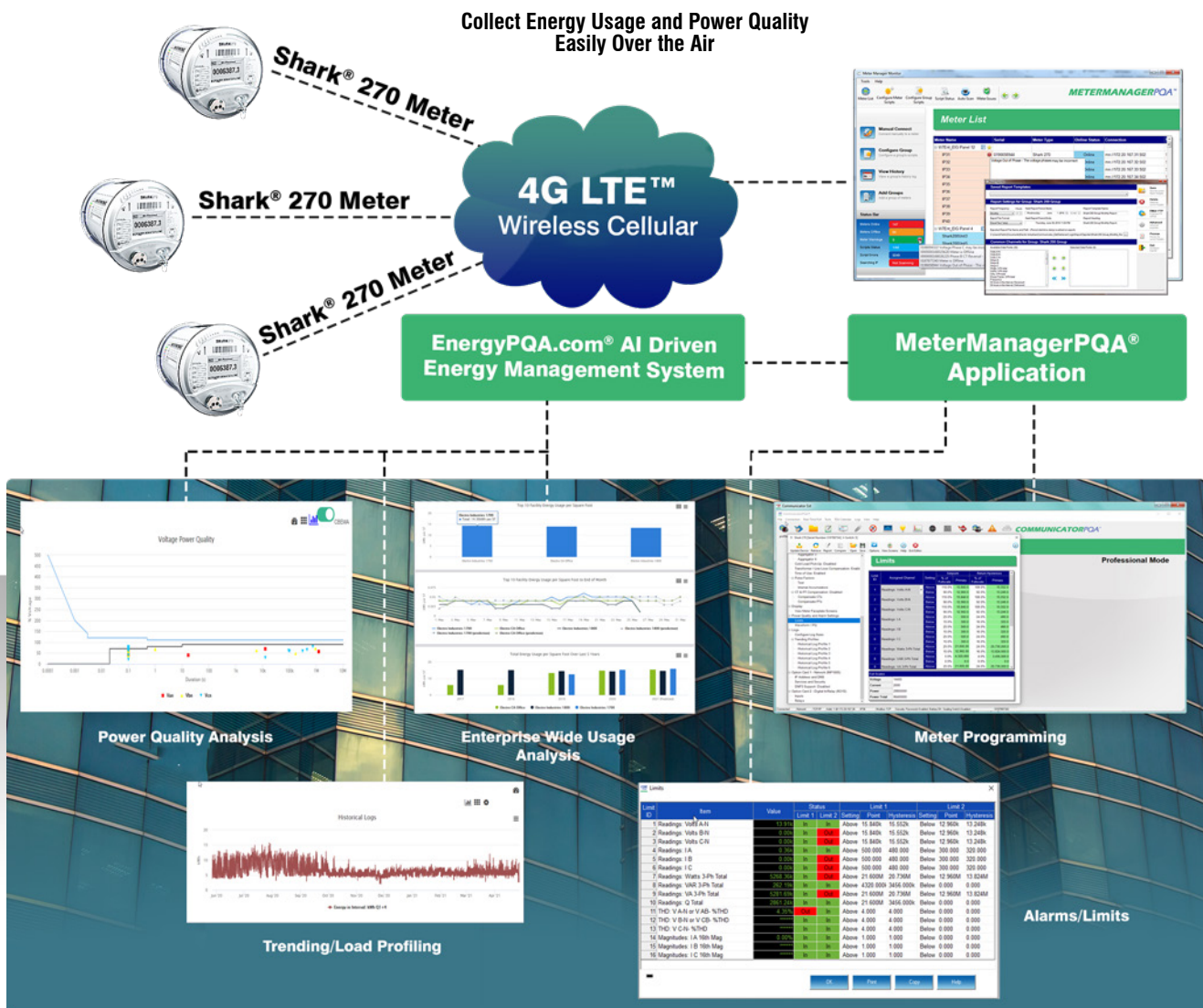
* The cellular modem is not available with the switchboard case meter.

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
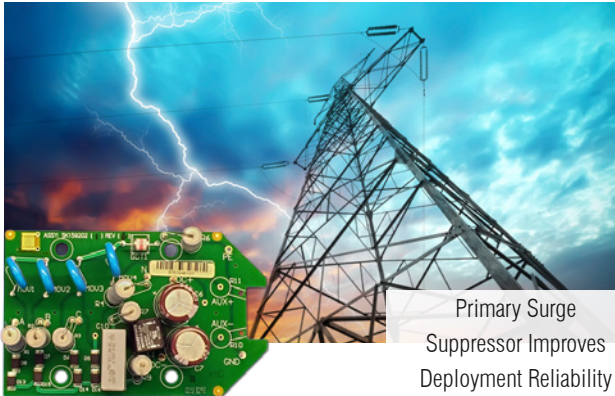
V-Switch™ Key Technology

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*	✔	✔	✔	✔	✔

*The meter now supports Modbus map customization. See the *CommunicatorPQA*® *and MeterManagerPQA*® *Software User Manual* for instructions on programming a custom Modbus map for the meter.

Draw Out Switchboard Case - New SWB3 Relay Case Replacement

EIG has designed a superior direct replacement of the existing General Electric style S1 relay case. 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.

New One Button Release

NEMA 4X Rated Waterproof Front

New Easy-pull Paddle Design

Meter Seal
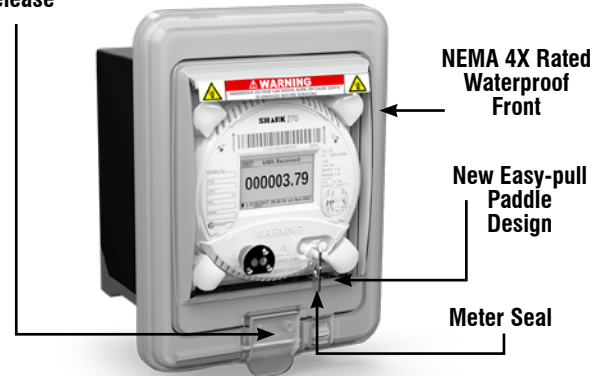
Improved I/O Connectors

The Shark® 270 meter has keystone jacks to simplify I/O connection. All I/O uses standard RJ45 wiring, allowing cable lengths to be determined in the field.

Keystone Connectors
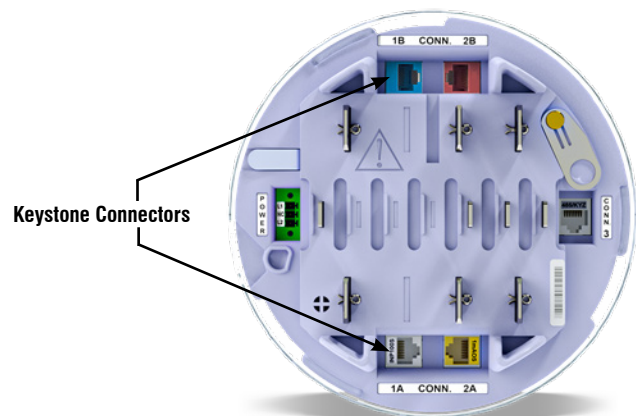
Superior Keystone Connectors for I/O

Utility Metering

Highly Accurate Measurements for Grid Metering, Power Generation, and Distributed Energy

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 intertie billing and power generation to distributed 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.


## 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.
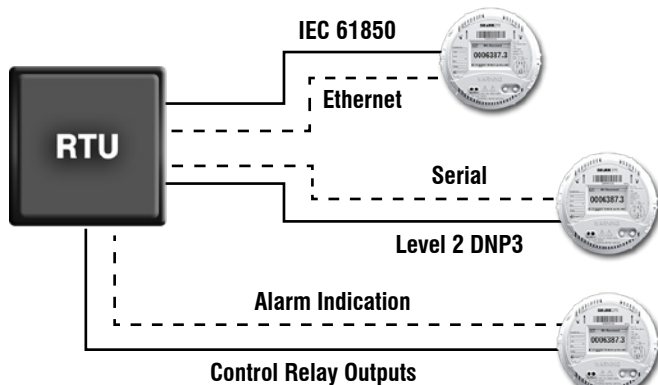
Serial and Ethernet are Available Simultaneously

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.
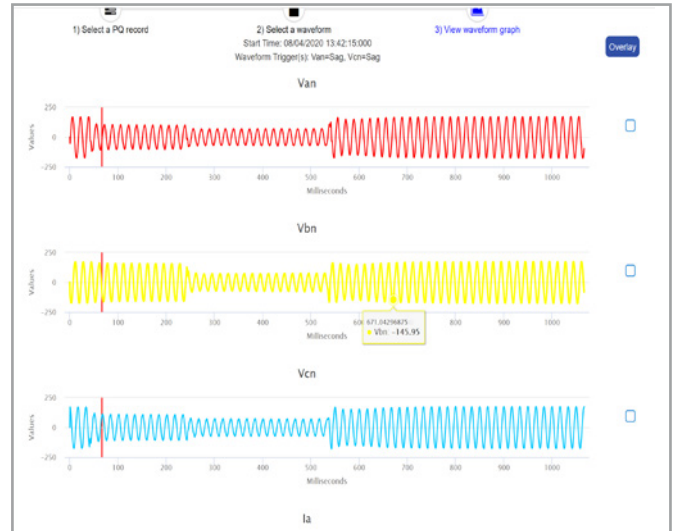
View Waveform Recording

Cyber Security for NERC CIP Compliance

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

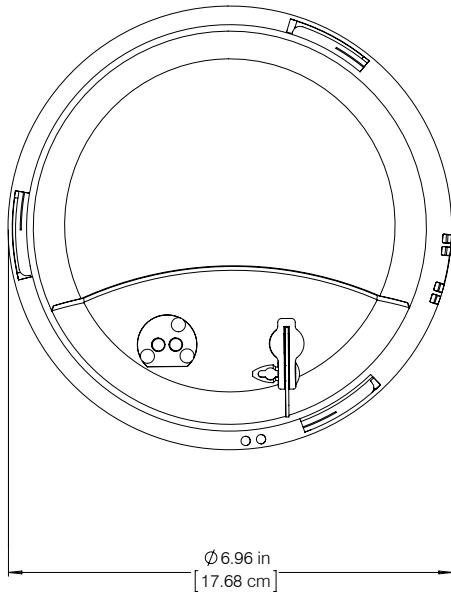- IP Allow and Block lists.
- Password and username encryption.
- Role-based authorization (user-configurable permissions).
- Digital firmware signature.

The meter additionally provides the following security features:
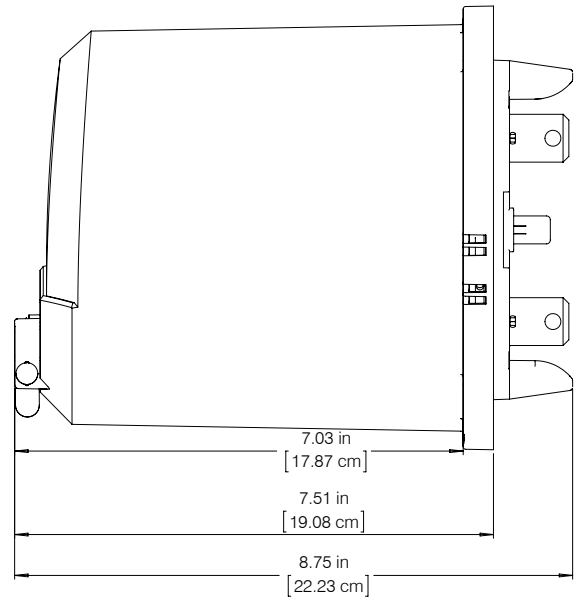
- Anti-tampering system events log.
- Port control, firewalls, and email encryption with SMTPS for Ethernet option cards.
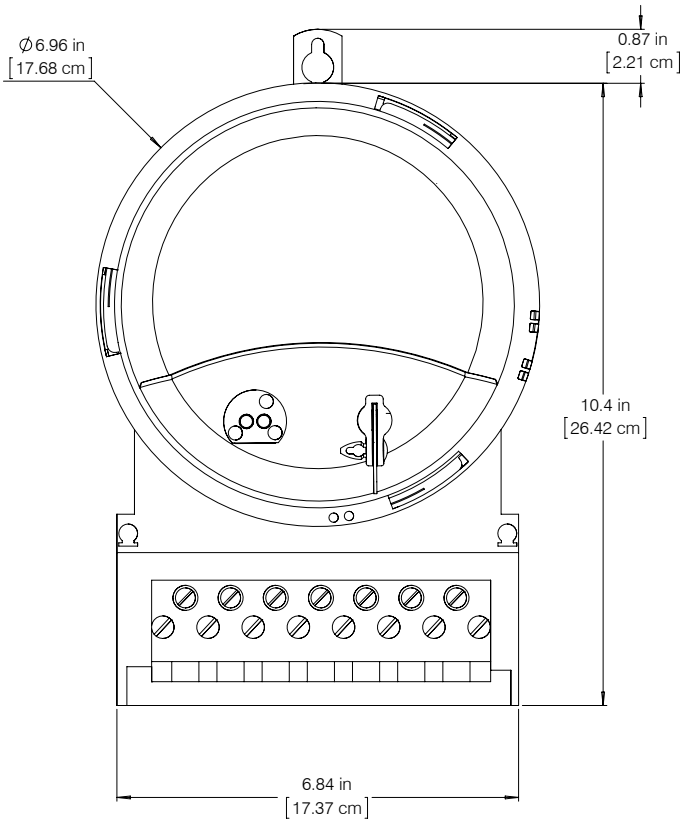- Hardware locks and sealing switch to prevent remote tampering.

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 on Alarm Conditions and Periodic Notifications

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.

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 might 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® AI Driven 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.

∅ 6.96 in
[17.68 cm]

**Shark® 270 Meter
Front Dimensions**

7.03 in
[17.87 cm]

7.51 in
[19.08 cm]

8.75 in
[22.23 cm]

**Shark® 270 Meter
Side Dimensions**

∅ 6.96 in
[17.68 cm]

0.87 in
[2.21 cm]

10.4 in
[26.42 cm]

6.84 in
[17.37 cm]

**Shark® 270 Meter in A-Base
Front Dimensions**

7.51 in
[19.08 cm]

2.02 in
[5.13 cm]

9.46 in
[24.03 cm]

**Shark® 270 Meter in A-Base
Side Dimensions**

11

FORM: 36S (TRANSFORMER RATED)
SERVICE: WYE, 4 WIRE
NO PTs, 3 CTs

LINE

V3 V2 V1 N

CT Shorting Block
EI# SB-6TC
*REFFER TO SHORTING BLOCK
INSTRUCTIONS TO APPLY
SHORTS

I3-HI
I3-LO
I2-HI
I2-LO
I1-HI
I1-LO

Earth Ground

V1
N
V3   FUSES

LOAD

Earth Ground

**Form 36S WYE
4 Wire**

FORM: 9S (TRANSFORMER RATED)
SERVICE: WYE / DELTA, 4 WIRE
NO PTs, 3 CTs

LINE

V3 V2 V1 N

CT Shorting Block
EI# SB-6TC
*REFFER TO SHORTING BLOCK
INSTRUCTIONS TO APPLY
SHORTS

I3-HI
I3-LO
I2-HI
I2-LO
I1-HI
I1-LO

Earth Ground

N
V1
V2
V3   FUSES

LOAD

Earth Ground

**Form 9S WYE/DELTA
4 Wire**

FORM: 45S (TRANSFORMER RATED)
SERVICE: DELTA, 3 WIRE
NO PTs, 2 CTs

LINE

V3 V2 V1

CT Shorting Block
EI# SB-6TC
*REFFER TO SHORTING BLOCK
INSTRUCTIONS TO APPLY
SHORTS

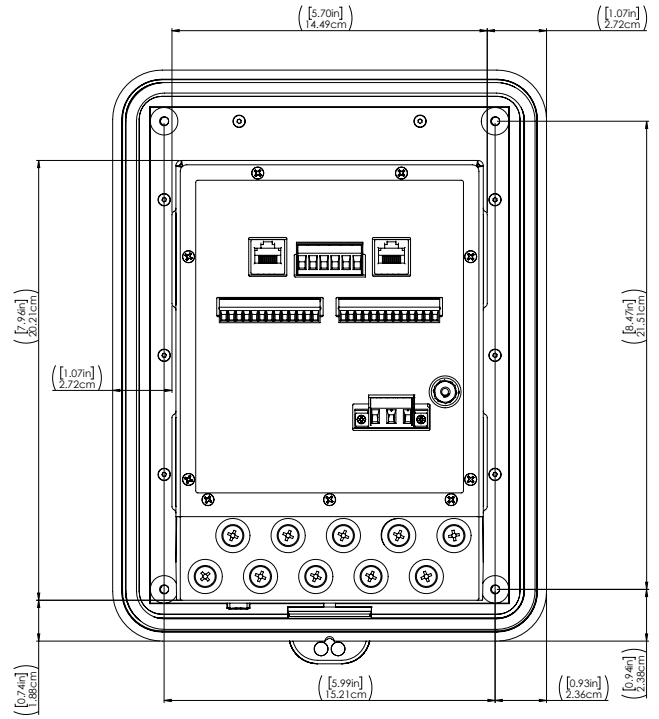I3-HI
I3-LO

I1-HI
I1-LO

Earth Ground

V1
V2
V3   FUSES

LOAD

Earth Ground

**Form 45S DELTA
3 Wire**

See the *Shark® 270 Meter User Manual* for additional information and wiring diagrams.

**Front
Dimensions**

**Back
Dimensions**

**Side
Dimensions**

13
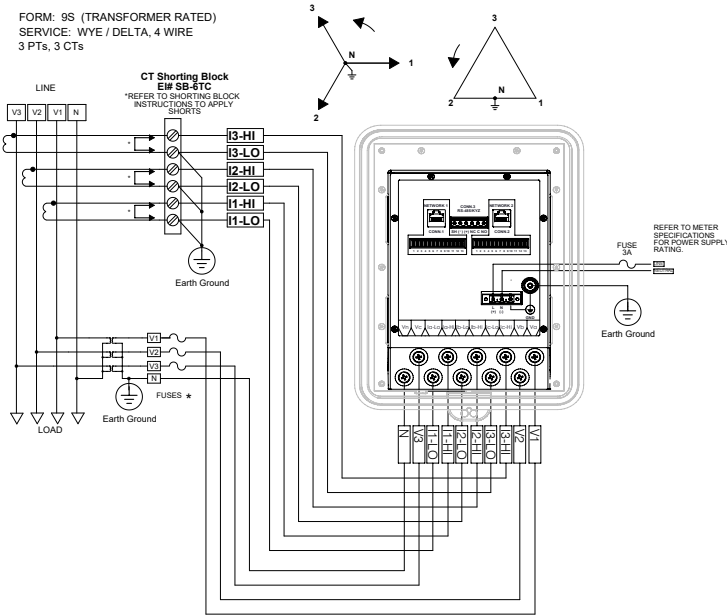
**Form 9S, 4 Wire WYE/Delta
3 PTs, 3 CTs**
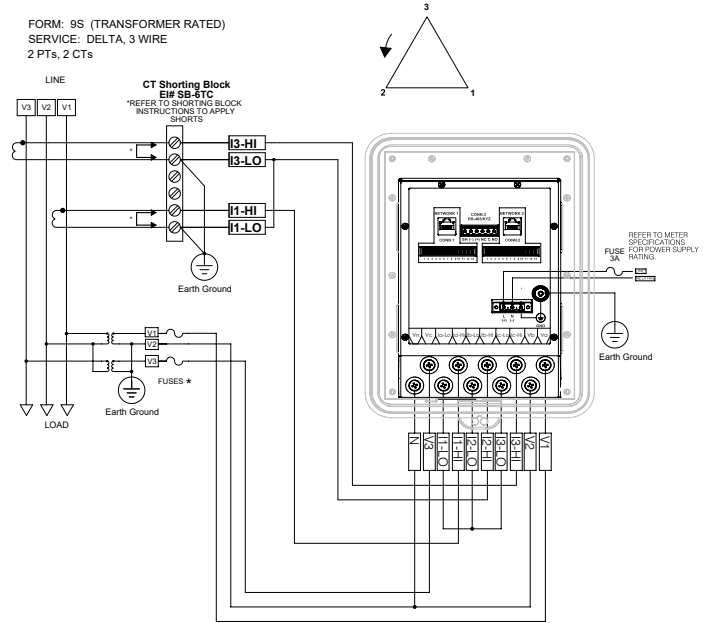
**Form 9S, Delta 3 Wire
2 PTs, 2 CTs**

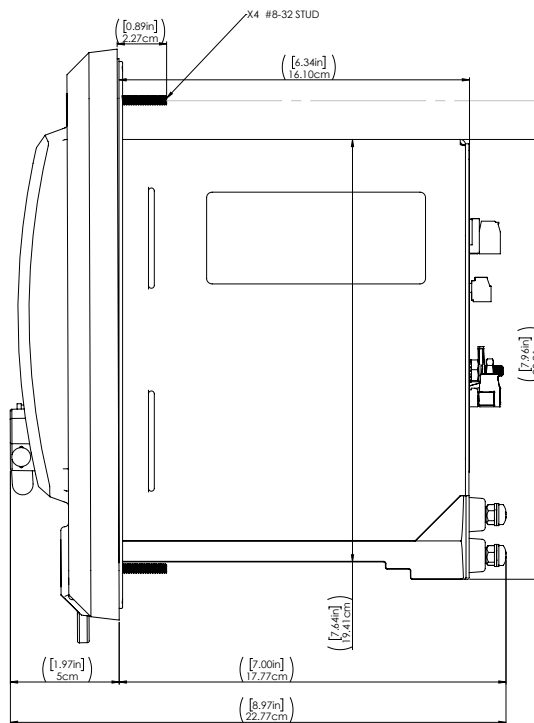See the *Shark® 270 Meter User Manual* for additional information and wiring diagrams.

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.
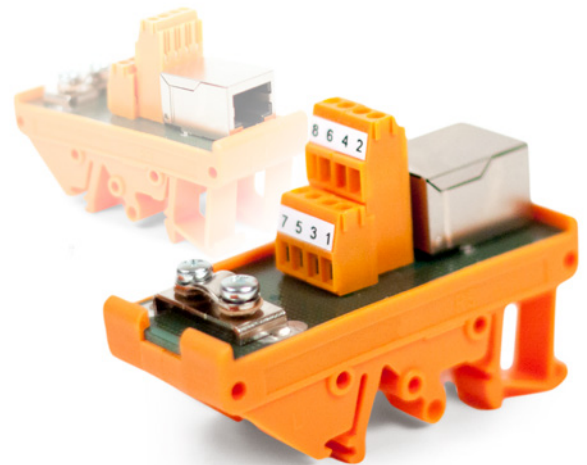
CONN20163

Specifications

Voltage Inputs:
- Absolute max. rating between any voltage inputs:
  - External power connection: 720 V AC
  - Powered from voltage blades ("S" option): 576 V AC
- Supported 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
- 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

Current Inputs:
- 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

Power Supply:
- 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 at 120 V max. power consumption: ~33 ms
- Burden max: 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:
- Back-lit TFT
- Size: 2.7"; 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
- Hi-pot isolation tested in factory

Memory:
- Up to 128 MB of flash memory

Standard Communication:
- ANSI Type 2 Optical Port
  - Modbus ASCII/RTU protocol
  - Data speeds of up to 57600 bps
- RS485 serial port
  - Modbus ASCII/RTU and DNP3 Level 2 protocols
  - Data speeds of up to 115200 bps
  - 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 max.
  - Isolation: 3750 V AC
  - Reset state: (NC - C) Closed: (NO - C) Open

Optional Communication:
- INP100S: Ethernet with embedded HTML5-based Web server; Modbus TCP/IP and DNP3 Level 2; IPv4 and IPv6
- INP300S: Ethernet with IEC 61850 Protocol server; Modbus TCP/IP and IEC 61850

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

Environmental (Temp. Specs. 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: outdoor rated, raintight Lexan cover, UV protected; Switchboard: NEMA 4X rated cover
- Protection Class: front IP65, rear IP51

Internal Battery (for Time Only)**:**
- 3V Lithium battery maintains time during outages - replacement part #BATT21214
- Battery life typically 10 years from date of manufacture

Compliance:
- ANSI C12.20 2015 and C12.1 2014, 0.1 Accuracy Class (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)
- EU Directive 2011/65/EU (RoHS 3 Directive)
- REACH Compliant

*Third party lab tested.

Shipping Dimensions
Socket:
- Size: 10" W x 10" D x 11.50" H
- Weight: 4.4 lbs./1.83 kg (with Option cards 5.6 lbs./2.54 kg)

Switchboard:
- Size: 16" W x 14" D x 11" H
- Weight: 16 lbs./7.25 kg (with Option cards 19 lbs./8.62 kg)

A-Base:
- Size: 16" W x 14" 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
Option Numbers:		-	-	-	-	-	-	-
Example:	Shark270	- 9S	- 60	- 2	- V2	- S	- INP100S	- X
	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
		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
		45S 2 Element			**V3** Power Quality Harmonics		**RO1S** 2 Relays/2 Inputs	**RO1S** 2 Relays/2 Inputs
		9A A Base			**V4** 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
							IRG1 IRIG-B and Pulse Outputs	**IRG1** IRIG-B and Pulse Outputs
								*4GLTE Verizon Cert. Cell Modem (Not available with SWB3)

*A Shark® 270 meter cannot have more than one INP300S card, cannot have more than one 4GLTE card, and cannot have both an INP300S card and a 4GLTE card. The switchboard meter does not support the 4GLTE card. Note that the meter must be at V3 or higher to use the INP300S card.

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	AI Driven Energy Management System	**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 plus cable
				INP100S-KT	100BaseT Ethernet plus cable
				INP300S-KT	IEC 61850 Protocol Ethernet plus cable
				RS1S-KT	RS232/RS485 plus cable
				IRG1-KT	IRIG-B and 4 pulse outputs plus cable

* I/O cards can be ordered separately using the part numbers shown above. See I/O card note in the Ordering Chart.

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