

SHARK[®] 270

SOCKET FORM REVENUE METER

Economical and Highly Featured



www.electroind.com

Revenue Meter

- 0.15% Energy Accuracy
- Compliant with ANSI C12.20 Class 0.2 and IEC 62053-22 Class 0.2S
- Time of Use, Transformer/Line Loss Compensation, and Test Mode
- Real Time SCADA Communication Capability: Modbus RTU Modbus TCP/IP, Level 2 DNP3, and IEC 61850
- 3 Communication Ports
- Rugged Design with New Advanced Primary Surge Suppression

Power Quality Meter

- Power Quality Analyzer with Limits, %THD Monitoring and Harmonics Recording
- 512 Samples/Cycle Waveform Recorder on Surges and Sag Events
- Onboard Storage to Retain Data for Later Retrieval
- Extensive Logging and Recording
- Ethernet Communication Offers Data Push to Cloud Servers
- Enhanced Security with IP Whitelisting

New

DESCRIPTION

The Shark® 270 is a socket form revenue meter designed for both critical meter applications and basic commercial/industrial metering applications. It is a significant departure from existing technology, incorporating high-end revenue metering functions in an economical design.

The Shark® 270 meter is a full four quadrant, bidirectional revenue meter that can also be used for inter-tie metering. Its 0.15% metrology accuracy meets and exceeds all the accuracy requirements of ANSI C12.20 Class 0.2% and IEC 62053-22 CL 0.2S. The meter has advanced revenue metering features that allow it to be used not only for measuring basic energy, but also for providing a full complement of necessary tools, such as transformer/line loss compensation, CT/PT compensation, advanced test mode, perpetual TOU, and extensive logging for interval energy storage.

The Shark® 270 meter is designed to be field upgradeable. When enabled, the meter will provide extensive power quality features, including the ability to measure harmonics to the 40th order. In addition, it will provide a captured waveform of voltage surges and sags; current fault events; imbalance analysis, including symmetrical components; and much more.



All data can be analyzed using EIG's software, or converted to PQDIF® or COMTRADE® formats for analysis by third party systems.

The Shark® 270 meter also has one of the industry's most comprehensive communication capabilities, including extensive Ethernet functionality. It can send out data via a host of protocols, including Modbus, DNP3, and IEC 61850, to help in solving any metering data dilemma.

FROM THE SIMPLE TO THE COMPLEX

- 0.15% revenue certifiable energy and demand metering
- Meets ANSI C12.20 Class 0.2% and IEC 62053-22 CL 0.2S
- Time of Use functionality
- Transformer/line loss and CT/PT compensation
- Test mode and energy presets
- Multifunction measurement including voltage, current, power, frequency, energy, etc.
- Configurable pulse accumulators and aggregators
- Ten logs, including six historical logs for trending data
- Up to 128 MB memory for logging and data storage and analysis
- Power quality measurement of %THD and alarm limits, symmetrical components, voltage and current unbalance
- Sampling rate of up to 512 samples per cycle for waveform recording
- Multiple standard and optional communication ports
- Optional 100BaseT Ethernet with embedded web server*
- Optional IEC 61850 Protocol server*
- Cyber security, including multilevel passwords and physical sealing switch

* Only one Ethernet card (INP100S or INP300S) can be used in the meter.

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]	0.15% of reading
Active Energy Total [Wh]	0.15% 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.

Applications

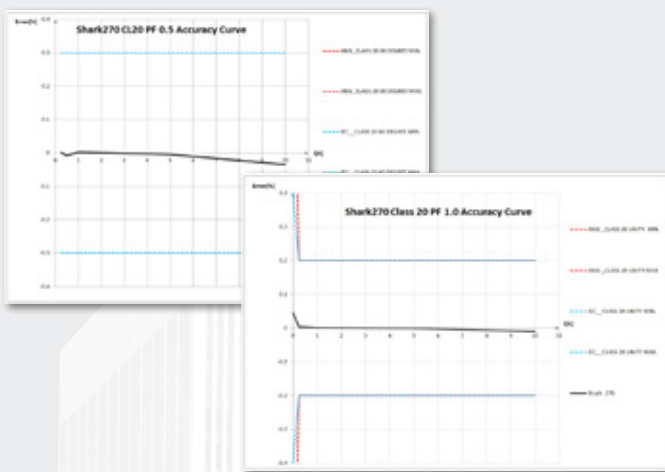
- Primary revenue metering
- Industrial and commercial metering and sub-metering
- Advanced metering infrastructure
- Customer power quality
- Grid monitoring and substation metering
- Distribution automation

PRIMARY REVENUE METERING

Advanced Energy Metrology

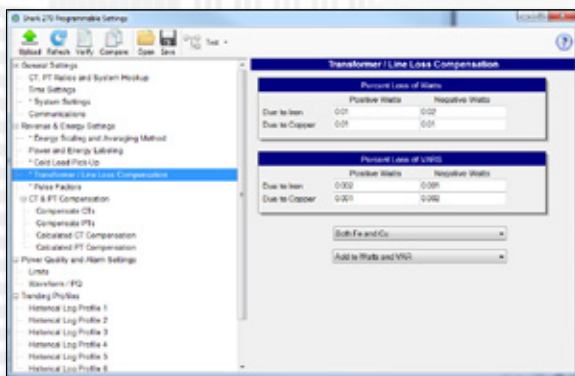
Utilities today face many challenges when metering customers. Installed meters need to be highly accurate and verifiable. Due to reductions in labor force, modern meters need to be both reliable and designed for a long operation life. The Shark® 270 meter meets these requirements with advanced metering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

The meter is an ANSI C12.20 Class 0.2% meter that also conforms to the IEC 62053-22 CL 0.2S standard for accuracy. The Shark® 270 meter is designed to provide precise and reliable measurements that are highly stable, and that maintain accuracy over a long period of time.



Loss Compensation

The meter can compensate energy readings for transformer and line losses. This allows a utility to properly bill a customer for usage, even if the meter is placed on the secondary side of the transformer.



CT/PT Compensation

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

Time of Use

The Shark® 270 meter uses a perpetual Time of Use (TOU) calendar that only needs to be set up once. The TOU implementation allows the user to set up multiple rates to meet any contractual obligation. It also allows the user to customize any energy parameter for TOU. The 16 available TOU registers can be configured not only for TOU built-in energy readings, but also for any stored data from pulses.

- Perpetual TOU calendar – set up only once and use indefinitely
- Up to four seasons - seasons can be customized
- Up to 12 months per year - set independently from seasons
- Flexible billing periods/rates/holidays/schedules setup
- Perform TOU on 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 are available

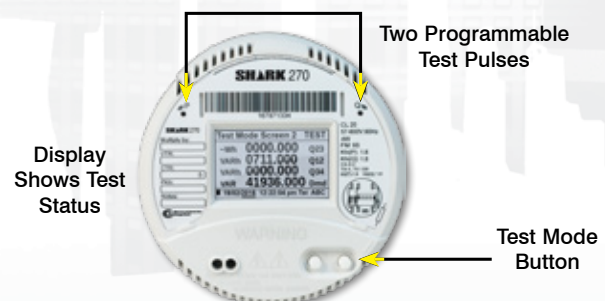
KYZ Pulse Outputs/Inputs

In addition to test mode pulses, the meter has one standard KYZ pulse output, and up to 8 optional pulse outputs, that allow the meter to deliver energy pulses to a separate recorder, RTU or other type of energy data collector.

The meter can also function as a recorder itself, by accepting up to 8 optional pulse inputs. These energy values can be logged by the meter's internal profiling memory, allowing 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

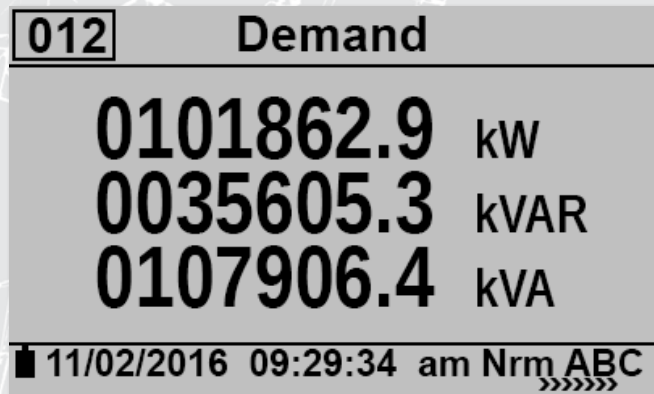
Two test pulses located on the meter's face can be used to simultaneously test watt hour and VAR hour readings for accuracy verification. When placed into test mode, the unit freezes and stores all the energy parameters, allowing users to test and verify energy accuracy without changing meter readings.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



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

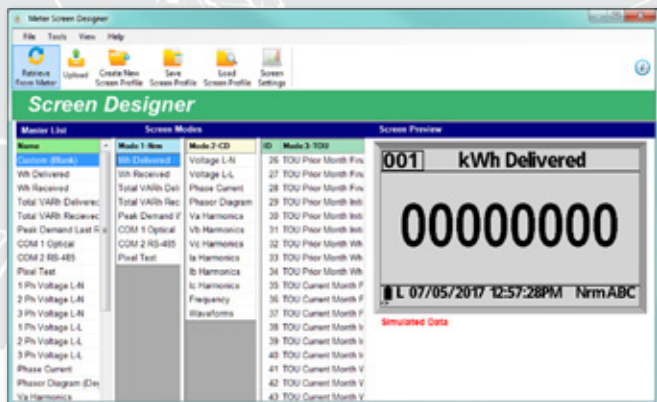
3 Display View Modes/250 Screen Slots

The meter's memory has 250 slots for custom and/or pre-programmed screens. These slots can be allocated to any view mode, with any number of slots used in each of the modes.



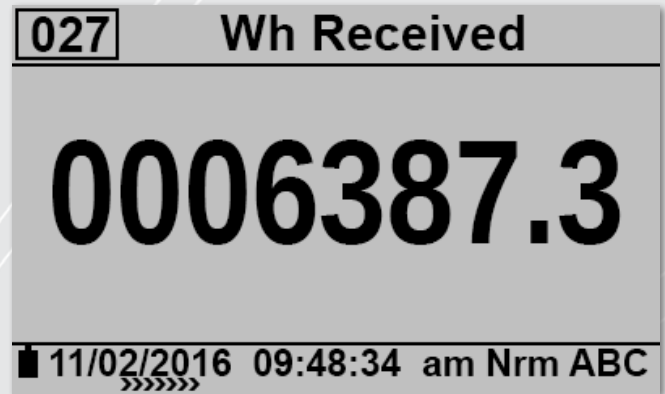
Screen Designer to Create Exactly What's Needed

- Make custom screens that display any meter readings
- Customize screen labels
- Customize screen numbering and order
- Display water, gas and other types of usage
- Add diagnostic information
- Provide ambient and transformer temperature, or any other desired 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 needed TOU measurements

Pre-Configured Diagnostic Screens

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

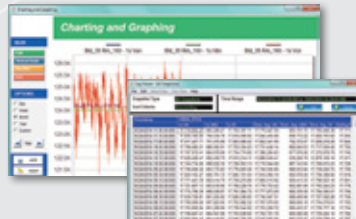
- Voltage phase angles
- Harmonic magnitudes
- Firmware versions
- Meter status
- Phasor diagram
- Per phase current and power measurements
- Segment checks
- Meter configuration
- Many additional diagnostic screens available

DATA TRENDRING AND 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. The unit's real-time clock allows for time stamping of all the data in the instrument 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

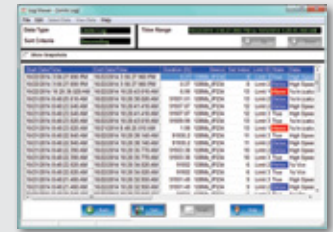
System Events Log

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

- Demand resets
- Energy resets
- Critical data repairs
- Password requests/sealing switch changes
- System startup
- Log resets
- Programmable settings changes

I/O Change Log

- Provides a time stamped log of any relay output
- Provides a time stamped log of input status changes
- 2048 events available



Alarm Log

Limit/Alarm Log

- Provides magnitude and duration of an event
- Includes time stamps & alarm value
- 2048 events available
- Email on alarm capability with INP100S Ethernet card



Limit Setup

Limit Alarms and Control Capability (V4 Option)

Limit Events:

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

POWER QUALITY MEASUREMENT AND 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 insure data is always recording.

Optional Waveform Recorder

	Samples per Cycle	Pre Event Cycles	Post Event Cycles	Max Waveform per Event
V4	32	16	48	128
	64	8	24	64
	128	4	12	32
V5	256	2	6	16
	512	1	3	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 to view the real time waveform for voltage and current. The waveform scope allows the meter to be used as a



Waveform Scope Display

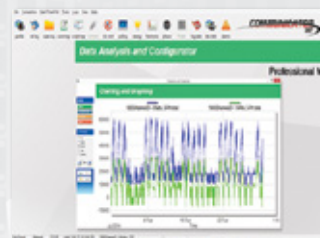
basic oscilloscope throughout a power system.

Independent CBEMA Log Plotting

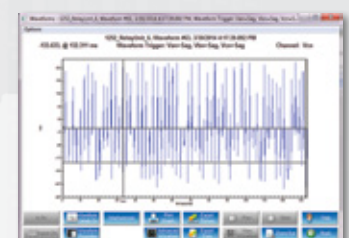
The meter stores an independent CBEMA log for magnitude and duration of voltage events. This allows a user to quickly view total surges, total sags and duration, without retrieving waveform data.

Harmonic Recording to the 40th Order

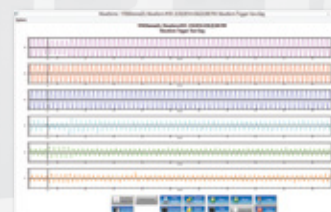
The Shark® 270 meter provides advanced harmonic analysis to the 40th order for each voltage and current channel, in real time. Using the stored waveforms, harmonic analysis is available to the 255th order.



Harmonic Spectrum (40th Order)



Waveform Zoomed



6 Channels of Waveforms

STANDARD AND OPTIONAL COMMUNICATION CAPABILITY

The meter has a standard RS485 serial port that can be used for either Modbus RTU /ASCII or Level 2 DNP3. The optional INP100S Ethernet card allows the meter to speak multiple sessions of Modbus TCP and DNP3. The optional INP300S Ethernet card allows the meter to speak via Modbus TCP and IEC 61850. The meter supports a comprehensive array of different communication options, including serial, Ethernet, and optical through the IR port. Using the Ethernet and/or serial port, the meter can be easily connected to multiple third party systems and to EIG's meter reading software, Energy Manager EXT.

ANSI Optical Port

- ANSI Type 2 Optical port for laptop PC read and programming
- Modbus RTU/ASCII
- Up to 57.6k baud

RS485 Port

- Modbus RTU/ASCII
- Level 2 DNP3
- Up to 57.6k baud
- Convertible to USB using RS485 to USB cable, E159343

FIELD EXPANDABLE I/O AND COMMUNICATION CAPABILITIES

The Shark® 270 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. For metering applications, it is imperative to not only measure the energy data, but also to be able to communicate this real time data, in order to meet many operational needs. The Shark® 270 meter is able to send data to many different systems, using multiple open protocols. These protocols include Modbus RTU/ASCII/TCP, DNP3 and IEC 61850. The meter's communication architecture is flexible, and designed to integrate directly into most existing systems.

1. INP100S: 100BaseT Ethernet Capability

Provides the meter with 100BaseT Ethernet functionality.

- Embedded web server, smartphone compatible
- Network Time Protocol (NTP) support (Network Clock Sync)
- 12 simultaneous Modbus TCP/IP connections
- 5 simultaneous 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
- Supports data push to cloud servers



- Max. Load Impedance 10 k Ω
- Range +/- 0-1 mA
- Designed for RTUs and generating stations



4. 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

5. P01S: 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 KY outputs and pulse input counting



2. INP300S: IEC 61850 Protocol Ethernet Card

- Simultaneous Modbus TCP/IP and IEC 61850
- 5 simultaneous MMS clients
- Multiple Logical Nodes, including LLNO, 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



6. R01S: 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, alarm and status (must be at V4 or higher for limit alarms and control)



3. 1mAOS: Four Channel Bi-directional 0-1 mA Outputs

- Assignable to any parameter
- 0.1% of full scale



6 *Only one Ethernet card (INP100S or INP300S) can be used.

V-SWITCH™ KEY TECHNOLOGY

The Shark® 270 meter is equipped with EIG's V-Switch™ key technology. This technology uses an algorithm to generate a code that activates more advanced features for the meter. This code can be applied in the field, without needing to remove the meter from installation.

The base Shark® 270 meter with V1 provides basic features, including highly accurate energy measurement and Time of Use. Many users will find this sufficient for base applications. But when applications become more complex, addressing the need for advanced features is simple. The user only needs to contact EIG and purchase a V-Switch™ key for whichever meters need upgrading.

The minimum V-Switch™ key for load profiling is the V2 option. This option allows up to 3 assignable logs and more than 3 months of storage. If the need for additional logs and storage arises, the unit can be easily upgraded to allow for more features and memory allocation.

V-Switch™ key technology is important to conserve economic resources, because cost-effective solutions can be mass-deployed, and then units can be upgraded on an as-needed basis. The chart on the right explains the V-Switch™ keys available for the Shark® 270 meter.

Features	V1	V2	V3	V4	V5
Multifunction Measurement	✓	✓	✓	✓	✓
Programmable Display	✓	✓	✓	✓	✓
Time of Use	✓	✓	✓	✓	✓
System Events		✓	✓	✓	✓
Input Status Change		✓	✓	✓	✓
Limits		✓	✓	✓	✓
Harmonics			✓	✓	✓
2 MB Memory*		✓			
4 MB Memory*			✓		
10 MB Memory**				✓	
128 MB Memory**					✓
Waveform 128 Samples per Cycle				✓	
Waveform 512 Samples per Cycle					✓
CT/PT Compensation	✓	✓	✓	✓	✓
TLC Compensation	✓	✓	✓	✓	✓
IEC 61850 Protocol			✓	✓	✓
Level 2 DNP3			✓	✓	✓
Modbus Protocol	✓	✓	✓	✓	✓

* Enables up to 3 Historical logs. **Enables up to 6 Historical logs.

UNIQUE SURGE SUPPRESSION MODULE TO PROTECT AGAINST DAMAGING SURGES

The Shark® 270 meter is designed to withstand harsh electrical environments. Revenue meters are often placed in remote locations that can be susceptible to transient events, surges, sags and other electrical anomalies. The Shark® 270 meter uniquely filters these events from damaging the electronics of the instrument, while still providing the ability to record the waveforms of their occurrence.

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. The unique network created by these parts assures that the energy from the surges is well-absorbed before it can reach the meter's sensitive electronic circuitry. The heat dissipation from the surges is distributed evenly between the protective components, which increases the transient suppression device's longevity and effectiveness.

In addition, immunity against high frequency interference signals is enhanced by additional filtering circuits, which are included in the protection module. The protection module was created to be an independent hardware, dedicated to dealing with the offending signals, and housed separately from the rest of the circuits, in a compartment just large enough for it to perform its function.



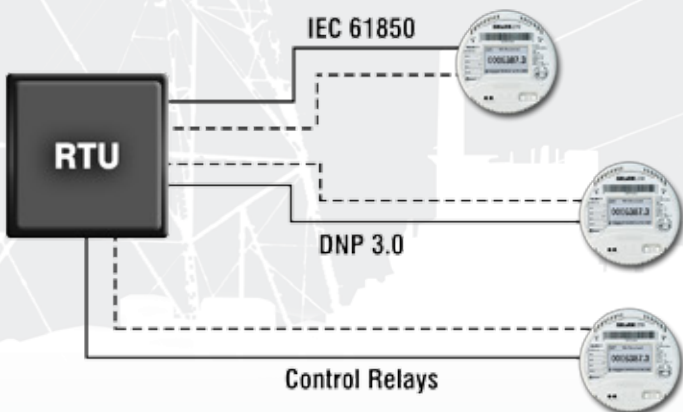
Highly Accurate Measurements for Grid Metering and Power Generation

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



Better Communication for Advanced Smart Substation Applications

With the Shark® 270 meter, the user obtains advanced communication usually found only in higher-end, more costly, solutions. Whether it's communicating DNP3 or IEC 61850 in smart substation applications, the meter has the ability to send data to multiple software systems, providing real time information as well as stored interval data. The Shark® 270 meter is capable of communicating 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.



Power Quality and Fault Analysis

The Shark® 270 meter's power quality features allow a user to not only analyze real time data, but to have 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.



Waveform Zoomed

The Perfect Upgrade Solution to Existing Mechanical Meters

The Shark® 270 meter is an ideal upgrade to existing, non-communicating mechanical, or older solid state, meters. By just replacing the existing meter with the new Shark® 270 unit, the basic metering capability is transformed into a communicating solution. With the standard Shark® 270 unit, the meter is provided with an RS485 Modbus port. With the optional Ethernet module, the meter is capable of communicating 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 Ethernet capability of the Shark® 270 meter 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 emails on alarm conditions. These emails allow facility managers to be made aware of high demand conditions, alarms and other issues that affect both energy reliability and cost.

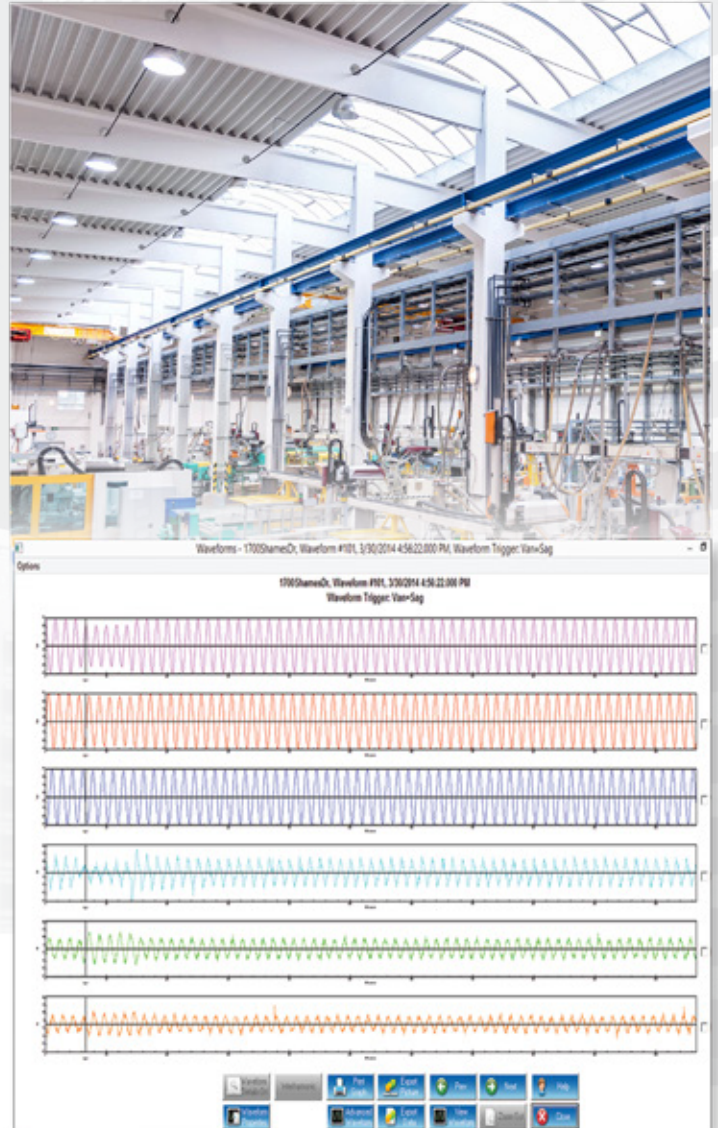
The email feature also allows users to send periodic notifications of values, such as demand and energy consumption. This is useful for energy dashboards and other cloud software applications, which can receive data on usage and alarms in this way. And it is essential for IOT applications, in which a 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 BuildingOS® Data Push. The meter can send up to 15 meter readings to the cloud service, to support cloud-based building management applications.

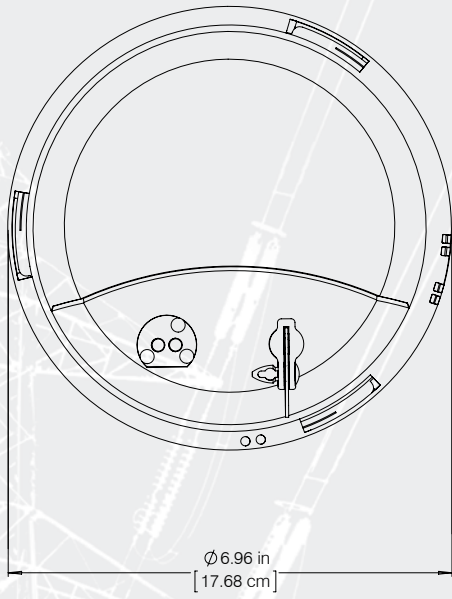
Diagnose Power Quality Events at Incoming Circuits

With the Shark® 270 meter, a facility manager or engineer can view power quality events that occurred at the incoming service point, allowing him or her to analyze the cause of these events and implement remediation. With the Shark® 270 meter's power quality information, users will be able to see how many events occurred and what types of events were experienced, and also be able to determine if these events could affect their installed sensitive equipment.

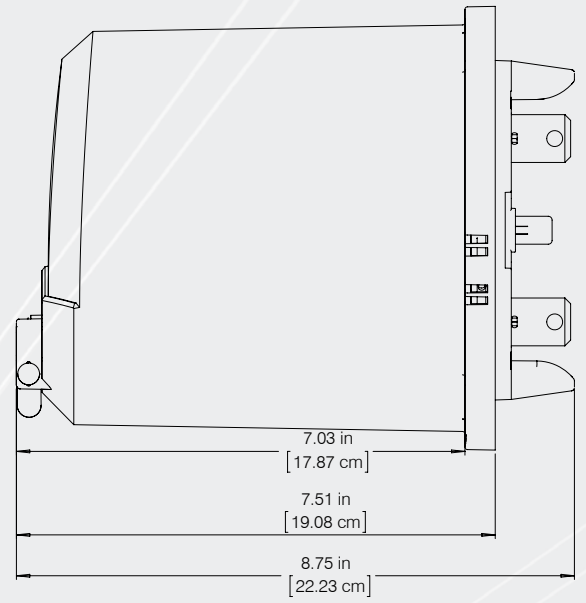
Power quality events include records of faults, voltage surges and sags, harmonics, imbalances, power factor and many other indices. This data is automatically collected and stored in remote databases for system-wide analysis.



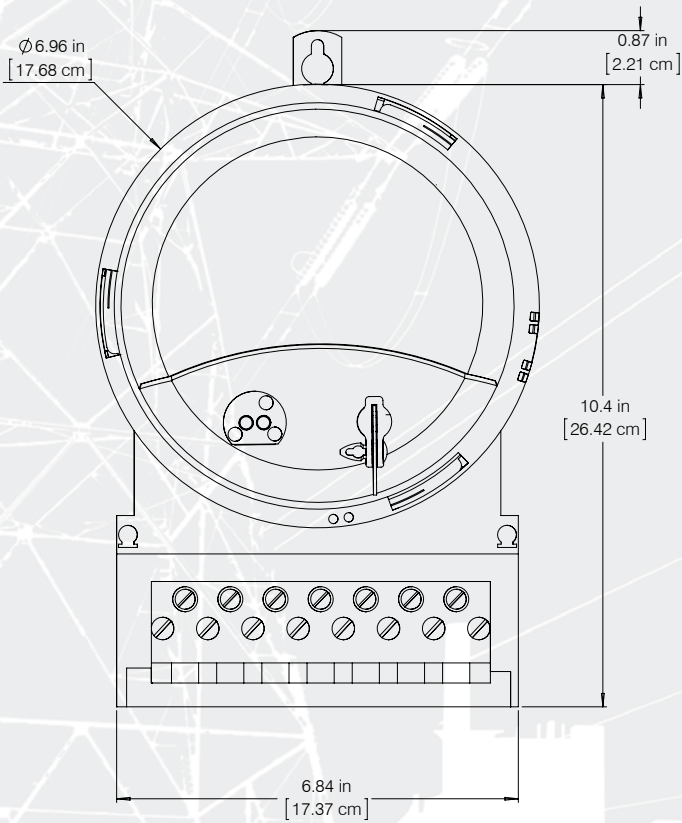
Multi-Cycle Fault Events



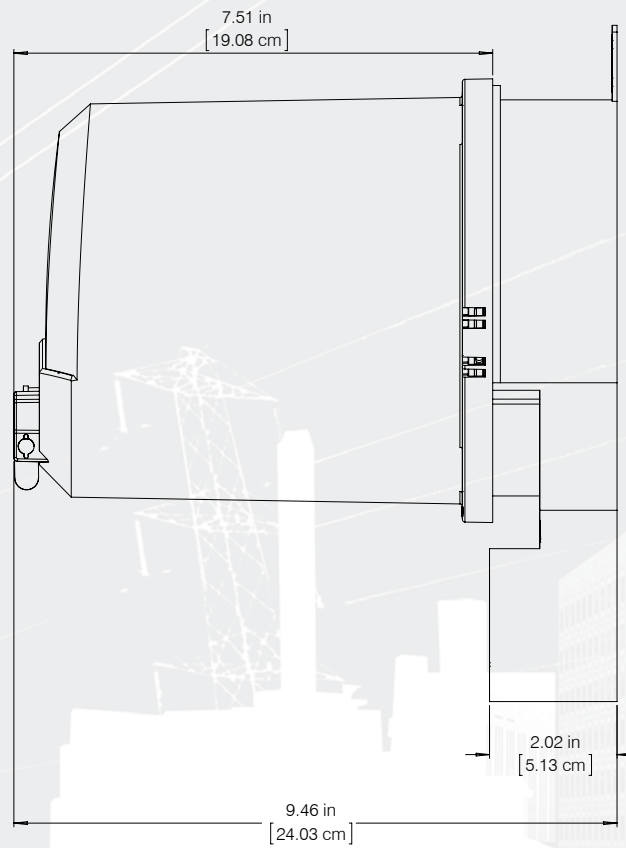
Shark® 270 Meter S-Base Front View



Shark® 270 Meter S-Base Side View



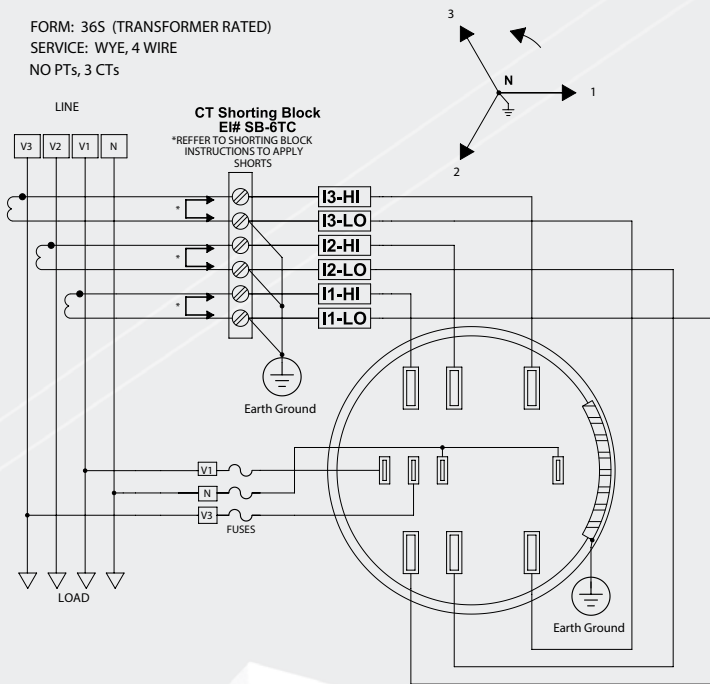
Shark® 270 Meter A-Base Front View



Shark® 270 Meter A-Base Side View

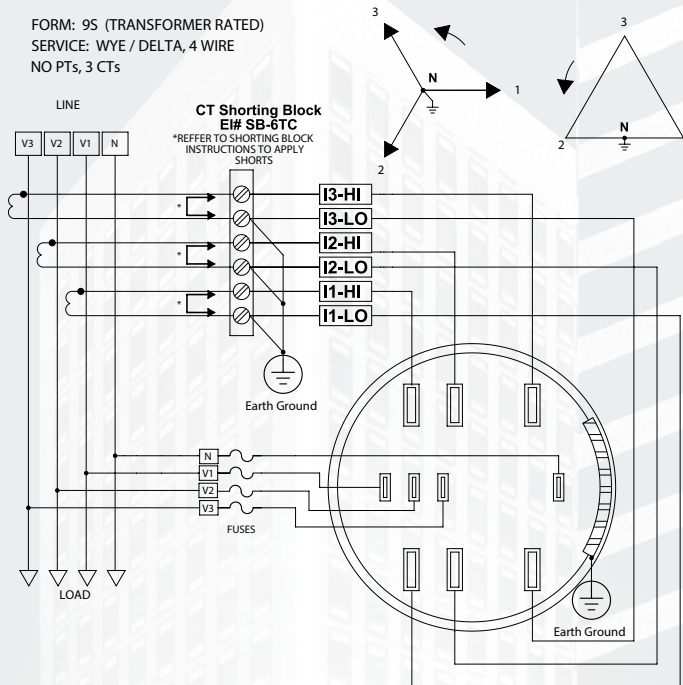
WIRING DIAGRAMS

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



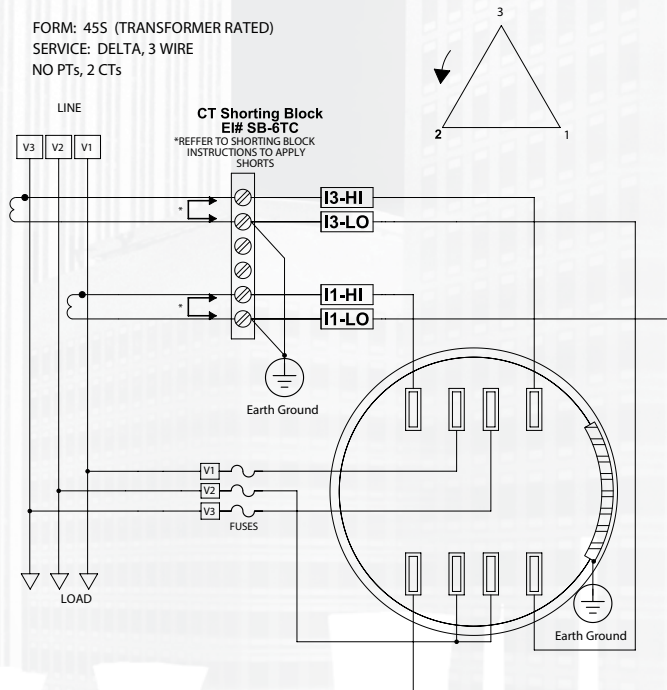
Form 36S WYE, 4 WIRE

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



Form 9S WYE/DELTA, 4 WIRE

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



Form 45S DELTA, 3 WIRE

Specifications

Sense Inputs Electrical Ratings Current

- Transformer rated
- Two or three current inputs depending on Form (Ia, Ib, Ic)
- Class 2 - 1 A nominal, burden 0.0112 VA at 2 A Input/phase
- Class 20 - 5 A nominal, 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 Mohm 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); 277 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 DNP3 protocols
 - Data Speeds of up to 57600 bps

Optional Communication

- INP100S: 10/100BaseT Ethernet with Total Web Solutions
- INP300S: IEC 61850 Protocol server
- Modbus TCP/IP, 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)

Environmental (Temperature Specifications to Indirect Light)

- Operating Temperature: (-40 to +70)°C
- Display Operating Temperature: (-30 to +60)°C
- Humidity: 95% RH non-condensing
- Storage Temperature: (-40 to +85)°C
- Raintight Lexan Cover, UV protected
- 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 C12.18 (Type 2 Optical Port)
- ANSI C12.20 0.2% Accuracy Class (METLAB tested)
- CE (IEC 61000-6-2 & IEC 61000-6-4)
- EU Directive 2014/32/EU (Measuring Instruments Directive)
- EU Directive 2011/65/EU (RoHS 2 Directive)
- FCC Class B (Radiated* and Conducted Emissions)
- IEC 61000-4-2 (Electrostatic Discharge)
- IEC 61000-4-3 (Radiated EM Immunity)
- IEC 61000-4-4 (EFT)
- IEC 62052-11 (General Requirements; Mechanical Properties; Climactic Influences)
- IEC 62053-22 CL 0.2S (0.2% Accuracy)
- IEC/CISPR 11 (Radiated Emissions)
- IEEE C37.90.1 (Surge Withstand)
- IEEE C62.41 (Surge Immunity)
- REACH Compliant
- RoHS Compliant

* With no I/O card installed. Other tests are pending. Contact factory for details.

Shipping Dimensions

- Size: 10" W x 10" D x 12" H
- Weight: 5.6 lbs/2.54 kg
- Meter weight without Option cards: 4.4 lbs/1.83 kg

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	50 Hz System	2 A Secondary	V1 Multifunction Meter	S Blade Powered	X None	X None
	36S	60 Hz System	20 A	V2 Standard Data Logging Memory	SE Externally Powered	PO1S 4 Pulses / 4 Inputs	PO1S 4 Pulses / 4 Inputs
	45S	60 Hz System	20 A	V3 Power Quality Harmonics		RO1S 2 Relays / 2 Inputs	RO1S 2 Relays / 2 Inputs
	9A			V4 128 Samples/Cycle Waveform Recording		1mAOS 4 Channel Analog Output 0-1 mA	1mAOS 4 Channel Analog Output 0-1 mA
				V5 512 Samples/Cycle Waveform Recording Extended Memory		20mAOS 4 Channel Analog Output 4-20 mA	20mAOS 4 Channel Analog Output 4-20 mA
						INP100S 100BaseT Ethernet	
						INP300S IEC 61850 Protocol Ethernet	

Additional Accessories

Communication Converters

- E159343 - RS485 to USB Converter Cable
- Unicom 2500 - RS485 to RS232 Converter

Software

- COMEXT4P - Communicator EXT™ 4.0 Software, Single License

Converter

- CONN20163-KT - Terminal Breakout Box Kit for I/O (converts RJ45 cable connection to an 8 pole screw terminal receptacle)

Standalone I/O Module Kits for the Shark® 270 Meter

- PO1S-KT - 4 Pulses/4 Inputs plus cable
- RO1S-KT - 2 Relays/2 Inputs plus cable
- 20mAOS-KT - 4 Channel, 4-20 mA, Analog Outputs plus cable
- *INP100S-KT - 100BaseT Ethernet plus cable
- *INP300S-KT - IEC 61850 Protocol Ethernet plus cable

* Only one Ethernet card, INP100S-KT or INP300S-KT, can be used in a meter.



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Tel: 516-334-0870 • **Web Site:** www.electroind.com • **Fax:** 516-338-4741

* Only one Ethernet card, INP100S or INP300S, can be used in a meter.

Shark® 270 Webpage

