## Specifications

**Display (continued)**

### Security Log
- Total number of: Outages, Demand resets, RTP, activations, Times programmed, OPTOCOM™ communications
- Date/time last: Outage, Demand reset, RTP, Programmed, Calibrated, OPTOCOM™ communications
- ID of last calibrator and last programmer
- Number of EEPROM reads and writes

### Accuracy
- ± 0.2% at standard test points for energy and demand (typical)
- Meets ANSI C12.20 Class 0.2

### Ratings
- Volts: 120 to 480 V
- Frequency: 50-60 Hz
- Current Class: 20, 200, 320
- Current: 48A
- Temperature: -40°C to +85°C

### Operating Range
- Voltage: 120 to 480 V (+10/-20%)
- Frequency: 50-60 Hz

### Mechanical Design
- Unbreakable one piece Lexan® cover
- Magnetic switch activates Alternate displays
- Rugged single action reset lever

### Applicable Standards
- ANSI C12.1 Electric metering: C12.10
- Wait-hour meters: C12.16 Solid-state meters
- C12.18 Protocol Specification for ANSI Type II optical ports
- C12.19 Utility Industry End Device Data Tables: C12.20 for 0.2 and 0.5 accuracy classes
- C12.21 for Modern Communications
- FCC Class B emissions

### Service Determination
- iCONAX automatically determines service by sensing voltage phase angles at Power Up (after any outage) and 10 minutes after Power Up. It can also be programmed to check service:
  - Daily (programmable)
  - Service Error displayed if wired improperly
  - After demand reset (programmable)
  - Optional service determination at demand reset

The iCONAX can be programmed to a fixed Service using Fitzall.

### Diagnostics

<table>
<thead>
<tr>
<th>Condition</th>
<th>Measurements</th>
<th>Time (seconds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - Polarity, Cross Phase</td>
<td>Voltage, Power Factor</td>
<td>10</td>
</tr>
<tr>
<td>2 - Voltage Imbalance</td>
<td>Phase Angle</td>
<td>5</td>
</tr>
<tr>
<td>3 - Inactive Phase Current</td>
<td>Harmonics</td>
<td>10</td>
</tr>
<tr>
<td>4 - Phase Angle Alert</td>
<td>Temperature</td>
<td>5</td>
</tr>
<tr>
<td>5 - High Distortion, DC detection</td>
<td>Power</td>
<td>10</td>
</tr>
<tr>
<td>6 - Under Voltage - Phase A</td>
<td>Current</td>
<td>10</td>
</tr>
<tr>
<td>7 - Over Voltage - Phase A</td>
<td>Harmonics</td>
<td>10</td>
</tr>
<tr>
<td>8 - High Neutral Current</td>
<td>Harmonics</td>
<td>10</td>
</tr>
</tbody>
</table>

### AC Instrumentation
- Phasor Diagram of current circuit conditions (current and voltage magnitude phase angles and phase rotations)
- 3 Phase L-L and L-N RMS Voltage with and without harmonics
- RMS per phase and imputed neutral current with and without harmonics
- Frequency
- Power Factor with and without harmonics
- Current and Voltage THD per phase
- TDD (harmonic current/Max. current) per phase
- Active, Reactive, Phasor, Distortion, Arithmetic Apparent and Vector Apparent Power with and without harmonics (also by quadrant and phase i.e., delivered, received, lagging and leading, phase A, B, C).
- Unidirectional (delivered plus received or lagging plus leading) and detented measurement (delivered minus received or lagging minus leading)
- Automatic Service Detection, Installation Check, Circuit Monitoring and Tamper Detection - Circuit Diagnostics and Cautions

### Measurement Choices
- Measure fundamental only or fundamental plus harmonics
- Demand measures: kWh, kvar, kVAR
- Demand calculations (maximum, cumulative or continuously cumulative): Block, Rolling, Intervals, Experimental (thermal emulaton)
- Intervals
- Active, Reactive, Phasor, Imaginary (“Fuzzy”) Arithmetic, and Vector Apparent Power with and without harmonics (also by quadrant and phase i.e., delivered, received, lagging and leading)
- Thermal Demand emulation
- Q-Hour Demand (note: not reactive)
- Coincident demands (up to 10)
- Average Power Factor (distortion and active power factors)
- Instantaneous, Block, Rolling (Sliding Window), Cumulative, and Continuously Cumulative demand by TOU period, peak present and past billing period
- Demand intervals from 1-60 minutes
- Up to 20 values can be recorded with up to 4 totalized channels including 4 external input channels for recording values from external devices (min, max, sampled, and interval count recording)

### Features

**General**
- Multifunction Meter
- Revenue Meter
- Power Quality Monitor
- AC Instrumentation
- Communications
- Softswitch Upgradable
- Functionality

**Basic Functions (No Softswitches)**
- Simple Demand Meter
- Exponential Demand Meter
- Bidirectional Meter
- Communications
- TOU Meter
- Bidirectional Meter
- Voltage Recorder
- Power Quality Meter
- Sag and Swell Monitor
- Real-Time Multifunction Instrument

**Multifunction Meter (Softswitches & Option Boards)**
- kVA, kvar Demand Meter
- TOU Meter
- Interruptable Rate Meter
- 20-Channel Recorder
- Current Recorder
- Power Quality Meter
- Sag and Swell Monitor
- Real-Time Multifunction Instrument

### iCONAX Meter Forms

<table>
<thead>
<tr>
<th>Form</th>
<th>Construction</th>
<th>Service</th>
<th>Symmetrical Service</th>
<th>Blondel Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>2S, 4S, 5S</td>
<td>1 element/3 wire</td>
<td>1 phase/3 wire</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>1S, 3S</td>
<td>1 element/2 wire</td>
<td>1 phase/2 wire</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>9S, 10A, 48A</td>
<td>3 element/4 wire</td>
<td>3 phase/4 wire (Wye)</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>12S, 13A</td>
<td>2 element/3 wire</td>
<td>3 phase/3 wire (Delta)</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>16S, 16A</td>
<td>3 element/4 wire</td>
<td>3 phase/4 wire (Wye)</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>36S, 36A</td>
<td>2.5 element/4 wire</td>
<td>3 phase/4 wire (Wye)</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>4S, 45A</td>
<td>2 element/3 wire</td>
<td>3 phase/3 wire (Delta)</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Not all measurements communicated to AMI head-end.**

### Specifications

- APX
- Commercial & Industrial meter provides stability in the fluid landscape of the developing smart grid.
- Today’s commercial and industrial electricity applications require a smart metering device with the flexibility to balance a wide variety of ever changing factors and service quality demands.
- Offering nearly 300 measurable quantities, the iCONAX delivers the accuracy, reliability and quality you’ve come to expect from Sensus.
- Combined with our FlexNet advanced meter infrastructure, electricity providers can instantly configure, upgrade and customize the iCONAX meter’s electricity management platform for unparalleled efficiency and responsiveness.
Specifications*

The iCONAPX with no softswitches is a bi-directional coincident demand meter with the following capabilities:

Accumulators
- Five for measurement

Measures
- With Delivered, Received, Net or Total (with or without harmonics) and Frequency

Demands
- Five (a demand for each measure)

Coincident
- Two values for each demand from list

Power Quality
- Diagnostics and Cautions, momentary values
- Monitoring
  - Cautions (8), Diagnostics, Errors

Real Data
- Voltage, Current and Frequency

Recording
- Self Reads recording

Display
- 75 Items

Data
- Priority Reset

Logging

RTP
- Real-time pricing available

Softswitches Add

B-Switch
- By Quadrant measurements

C Switch
- Call In on Outage (Modern)

E Switch
- 500 Event Log

I Switch
- Instrument Transformer Correction

K Switch
- kVA - Power Factor, kvar and kVA measures

L Switch
- Transformer Loss Compensation

M Switch
- Expanded Measures - per phase measurement

N Switch
- Demand Measures

Q Switch
- Basic Power Quality Measures

R Switch
- Basic Recording (four-channel; 4 channels of data 64 k)

S Switch
- Expanded Recording (Twenty-channels of data)

T Switch
- Time of Use

V Switch
- Fast Voltage, Event Monitor and Log (sag and swell, 1 to 65 k cycles)

W Switch
- Waveform Capture (70 sample sets - 6 swell, 1 to 65 k cycles)

X Switch
- Expanded Recording (20-channel)

Z Switch
- Totalization

iCONAPX Softswitches can be added or removed from the meter

Option Boards
Option boards add inputs, outputs and communications

SI0 - Simple I/O
- Two - Form C
- Single - Form A

MIO - Multifunction I/O Board
- Four - Form A or C
- inputs for recording and Totalization
- Six - Form A Outputs
- RTP Input

Recording
- Softswitch-driven - no option board required. However, battery required to maintain time during power outages
- Activating recording adds time stamping to the meter's logs (adding TOU is an alternate way to add time stamping)
- Recording memory is configurable; the number of channels and length of channels is programmable.
- Adding recording also adds 12 self reads

No Load Profile (R or X) Softswitch is required for Self Reads

Types of Recording
- Load Profile Data
  - Maximum value in interval
  - End of interval value
  - Minimum value in interval

R Switch
- Basic Recording (Four-channel; 4 channels of data 64 k)

Days of Recording by Interval and Channels

1 Ch 2 Ch 3 Ch 4 Ch
1 Min 14.6 7.3 5.5 4.0
5 Min 73.0 36.7 27.5 20.0
15 Min 219.0 110.0 82.0 60.0
30 Min 438.0 220.0 164.0 120.0
60 Min 876.0 440.0 328.0 240.0

X Switch
- Expanded Recording (Twenty-channels of data)

Days of Recording by Interval and Channels

1 Ch 5 Ch 10 Ch 20 Ch
1 Min 43.8 10.2 5.1 2.6
5 Min 219.0 51.0 25.5 13.9
15 Min 676.0 153.0 76.0 38.0
30 Min 1314.0 306.0 152.0 78.0
60 Min 2628.0 612.0 304.0 156.0

Basic Power Quality

Alerts and Counters
- Distortion alert with counter
- High demand alert
- DC detection alert
- Over voltage alert with counter
- Date & time of last outage (TOU or recording)
- High neutral current
- Power factor alert
- Under voltage alert with counter
- Outage counter

Voltage Event Log
- Separate Sag and Swell event counters
- Max (Swells) or Min (Sags) RMS cycle voltage for each phase
- Date and Time
- RMS coincident current
- Duration in cycles
- 200 events in log

Wave Form Capture
- 70 Sample sets in memory @ 60 Hz
- 54.2 sample sets per cycle
- Waveform data used for harmonic analysis by MeterMate
- Data capture initiated by local or remote read

Display
- Alphanumeric
- Programmable labels (3)
- Active TOU rate indicator
- Blinking block disk analog
- Programmable display time
- Programmable display order
- Arrows show energy flow direction and lagging or leading
- Quadxy
- Separate indicator for each phase voltage
- Three to six digits for demand and energy displays with zero to four digits after the decimal
- 70 displayable items from list of more than 900 possible items including current billing period, previous period and previous session data, previous Self Reads
- New Disk Analog Scroll
  - Boxes represent 60%, 70%, 80%, 90% positions
  - At 100% all boxes turn off

Display Mode
- Normal
- Cautions/Errors
- Alternate display

Test Mode
- Programmable time out
- Special test mode displays
- Prior subinterval demand
- Event when all phases within threshold
- Time remaining in subinterval
- Test switch cover
- Watthour accumulation
- Max demand since entering test mode
- Instantaneous demand

*Not all measurements communicated to ARR head-end.

For more information, visit us at sensus.com
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The **iCONAPX** Electric Meter

**Electromagnetic Flow Measurement System**

---

### Specifications*

The **iCONAPX** with no softswitches is a bi-directional coincident demand meter with the following capabilities:

- **Accumulators**: Five for measurement
- **Measures**: With Delivered, Received, Net or Total (with or without harmonics) and Frequency
- **Demands**: Five (a demand for each measure)
- **Coincident**: Two values for each demand from list
- **Power Quality**: Diagnostics and Cautions, momentary values
- **Monitoring**: Cautions (8), Diagnostics, Errors
- **Real Data**: Voltage, Current and Frequency
- **Recording**: Self Reads recording
- **Display**: 75 Items
- **Data**: Prior Reset
- **Logging**: No. Outages, No. Demand Resets, No. Programmed, No. Comm Sessions

---

#### R Switch

**Basic Recording (Four-channel; 4 channels of data 64 k)**

<table>
<thead>
<tr>
<th>Days of Recording by Interval and Channels</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Ch</td>
</tr>
<tr>
<td>1 Min</td>
</tr>
<tr>
<td>5 Min</td>
</tr>
<tr>
<td>15 Min</td>
</tr>
<tr>
<td>30 Min</td>
</tr>
<tr>
<td>60 Min</td>
</tr>
</tbody>
</table>

#### X Switch

**Expanded Recording (Twenty-channels of data)**

<table>
<thead>
<tr>
<th>Days of Recording by Interval and Channels</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Ch</td>
</tr>
<tr>
<td>1 Min</td>
</tr>
<tr>
<td>5 Min</td>
</tr>
<tr>
<td>15 Min</td>
</tr>
<tr>
<td>30 Min</td>
</tr>
<tr>
<td>60 Min</td>
</tr>
</tbody>
</table>

---

#### Recording

- Softswitch-driven - no option board required. However, battery required to maintain time during power outages
- Activating recording adds time stamping to the meter’s logs (adding TOU is an alternate way to add time stamping)
- Recording memory is configurable; the number of channels and length of channels is programmable.
- Adding recording also adds 12 self readings
- No Load Profile (R or X) Softswitch is required for Self Reads

#### Types of Recording

- Load Profile Data
  - Maximum value in interval
  - End of interval value
  - Minimum value in interval

---

#### Basic Power Quality

<table>
<thead>
<tr>
<th>Alerts and Counters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distortion alert with counter</td>
</tr>
<tr>
<td>High demand alert</td>
</tr>
<tr>
<td>Over voltage alert with counter</td>
</tr>
<tr>
<td>Date &amp; time of last outage (TOU or recording)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Voltage Event Log</th>
</tr>
</thead>
<tbody>
<tr>
<td>Separate Sag and Swell event counters</td>
</tr>
<tr>
<td>Max (Swells) or Min (Sags) RMS cycle voltage for each phase</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Waveform Capture</th>
</tr>
</thead>
<tbody>
<tr>
<td>70 Sample sets in memory @ 60 Hz</td>
</tr>
<tr>
<td>54.2 sample sets per cycle</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage, Current, Frequency, THD, TDD, DPF Recorded as Min, Max, Avg (x/h or p/h) or end-of-interval (4 or 20 channels)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>54.2 sample sets per cycle</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Voltage Monitor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Softswitch enabled</td>
</tr>
<tr>
<td>Voltage Sags per Phase</td>
</tr>
<tr>
<td>Voltage Swells per Phase</td>
</tr>
<tr>
<td>0 to 100% in 1% steps (separate sag and swell thresholds)</td>
</tr>
<tr>
<td>Reference voltage automatically determined or programmed</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Voltage Event Log</th>
</tr>
</thead>
<tbody>
<tr>
<td>Separate Sag and Swell event counters</td>
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<td>Max (Swells) or Min (Sags) RMS cycle voltage for each phase</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Display Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
</tr>
<tr>
<td>Cautions/Errors</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Test Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>Programmable time out</td>
</tr>
<tr>
<td>Special test mode displays</td>
</tr>
<tr>
<td>Prior subinterval demand</td>
</tr>
<tr>
<td>Test pulses available from OPTOCOM port except when communicating</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Test Switch Coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remaining in subinterval</td>
</tr>
<tr>
<td>Watthour accumulation</td>
</tr>
<tr>
<td>Max demand since entering test mode</td>
</tr>
</tbody>
</table>

---

### Option Boards

**SI0 - Simple I/O**

- **Two - Form C**
- **Single - Form A**
- **RTP**

**MIO - Multifunction**

- **Two - Form C**
  - Programmable output:
    - **Four - Form A or C**
    - **Six - Form A Outputs**
    - **RTP Input**

**I/O Board**

- **Two - Form C**
  - Programmable output:
    - **Four - Form A or C**
    - **Six - Form A Outputs**
    - **RTP Input**

**SIO - Simple I/O**

- **Two - Form C**

**MIO - Multifunction**

- **Two - Form C**

---

*Not all measurements communicated to ARR head-end.

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Specifications*

**Display (continued)**

**AC Instrumentation**
- Phasor Diagram of current circuit conditions (current and voltage magnitude phase angles and phase rotations)
- 3 Phase L-L and L-N RMS Voltage with and without harmonics
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- Average Power Factor (distortion and active power factors)
- Block, Rolling, Sliding Window, Cumulative, and Continuously Cumulative demand by TOU period, season, present and past billing period
- Demand intervals from 1 to 60 minutes
- Up to 20 values can be recorded with up to 4 totalized channels including 4 external input channels for recording values from external devices (min, max, sampled, and interval count recording)

**Features**

**General**
- Multifunction Meter
- Revenue Meter
- Power Quality Monitor
- AC Instrumentation
- Communications
- Softswitch Upgradable
- Functionality

**Basic Functions**
- Simple Demand Meter
- Exponential Demand Meter
- Bidirectional Meter
- Site and Tamper Monitoring
- Rolling Demand Meter
- Coincident Demand Meter
- Wiring Analyzer
- Communicating Meter

**Multifunction Meter**
- kVAr, kVAR Demand Meter
- TOU Meter
- Interbreakable Demand Meter
- 20-Channel Recorder
- Current Recorder
- Power Quality Meter
- Sag and Swell Monitor
- Real-Time Multifunction Instrument
- Loss and Accuracy Compensation
- Q-Hour Meter
- Real Time Pricing Meter
- 4-Channel Recorder
- Voltage Recorder
- Totalizing Meter
- Bidirectional Meter
- 200-Event Power Quality Log
- Phasor Meter

**ICONAX Meter Forms**

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<td>No</td>
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<td>1 element/2 wire</td>
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<td>Yes</td>
<td>Yes</td>
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<td>Yes</td>
</tr>
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<td>16S, 16A</td>
<td>3 element/4 wire</td>
<td>3 phase/4 wire (Wye)</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>36S, 36A</td>
<td>2 element/4 wire</td>
<td>3 phase/4 wire (Wye)</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>45S, 45A</td>
<td>3 element/3 wire</td>
<td>3 phase/3 wire (Delta)</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>1 phase/3 wire</td>
<td>No</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 phase/5 wire</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Diagnose**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Test</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - Polarimeter</td>
<td>Cross Phase, Reverse Energy Flow</td>
<td>2 to 20 minutes</td>
</tr>
<tr>
<td>2 - Voltage Imbalance</td>
<td>5 to 10 minutes</td>
<td></td>
</tr>
<tr>
<td>3 - Inactive Phase Current</td>
<td>5 to 10 minutes</td>
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<td>4 - Phase Angle Alert</td>
<td>5 to 10 minutes</td>
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<tr>
<td>5 - High Distortion, DC detection</td>
<td>5 to 10 minutes</td>
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<tr>
<td>6 - Under Voltage - Phase A</td>
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<td>7 - Over Voltage - Phase A</td>
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</tr>
<tr>
<td>8 - High Neutral Current</td>
<td>5 to 10 minutes</td>
<td></td>
</tr>
</tbody>
</table>

**Specifications**

- **Power Supply:** 120 to 480 V (+10/-20%)
- **Frequency:** 50-60 Hz
- **Current Class:** 20, 200, 320
- **Temperature:** -40°C to +85°C
- **Unbreakable one piece Lexan® cover**
- **Magnetic switch activates Alternate displays**
- **Rugged single action reset lever**
- **Standards**
  - ANSI C12.1 for Modem Communications
  - ANSI C12.20 for 0.2 and 0.5 accuracy optical ports
  - ANSI C12.19 for Utility Industry End Device
  - ANSI C12.18 for Protocol Specification for ANSI Type II
  - ANSI C12.17 for Type III
  - ANSI C12.16 for Solid-state meters
  - ANSI C12.10 for Electricity metering
  - ANSI C12.00 for Electrical Power Measurement

**Features**

- **Display:** Total number of: Outages, Demand resets, RTP, activations, Times programmed, OPTOCOM® communications
- **Date/time last read:** Outage, Demand reset, RTP, Programmed, Calibrated, OPTOCOM® communications
- **ID of last calibrator and last programmer**
- **Number of EEPROM reads and writes**
- **Accuracy:** ± 0.2% at standard test points
- **Applications:**
  - ± 0.2% at standard test points
  - ± 0.5% at standard test points
  - ± 0.25% at standard test points

**Diagnose**

- **Code:**
  - 004000 - Leading kvarh
  - 004000 - Demand Overload
  - 040000 - Leading kvar

**Specifications**

- **Totalizing Meter**
- **Bidirectional Meter**
- **Voltage Recorder**
- **4-Channel Recorder**
- **TOU Meter**
- **Real-Time Pricing Meter**
- **Voltage Recorder**
- **Totalizing Meter**
- **Bidirectional Meter**
- **200-Event Power Quality Log**
- **Phasor Meter**

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