

iCONAPX Electric Meter

Electromagnetic Flow Measurement System

The smart meter...defined.

The iCONAPX 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 iCONAPX 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 iCONAPX meter's electricity management platform for unparalleled efficiency and responsiveness.



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
- Site and Tamper Monitoring
- Rolling Demand Meter
- Coincident Demand Meter
- Wiring Analyzer
- Communicating Meter

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
- 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

iCONAPX Meter Forms

Form	Construction	Service	Symmetrical Service	Blondel Solution
2S, 4S, 5S	1 element/3 wire	1 phase/3 wire	Yes	No
1S, 3S	1 element/2 wire	1 phase/2 wire		Yes
9S, 10A, 48A	3 element/4 wire	3 phase/4 wire (Wye)	Yes	Yes
		3 phase/4 wire (Delta)	No	Yes
12S, 13A	2 element/3 wire	3 phase/3 wire (Delta)	Yes	Yes
		1 phase/3 wire	Yes	Yes
		Network	Yes	Yes
16S, 16A	3 element/4 wire	3 phase/4 wire (Wye)	Yes	Yes
		3 phase/4 wire (Delta)	No	Yes
36S, 36A	2.5 element/4 wire	3 phase/4 wire (Wye)	Yes	No
45S, 45A	2 element/3 wire	3 phase/3 wire (Delta)	Yes	Yes
		3 phase/4 wire (Wye)	No	No
		3 phase/4 wire (Delta)	No	No
		1 phase/3 wire	Yes	Yes
		2 phase/5 wire	Yes	No

Specifications*

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

Accumulators	Five for measurement
Measures	Wlth 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
RTP	Real-time pricing available

Softswitches Add

B-Switch	By Quadrant measurements
C Switch	Call In on Outage (Modem)
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	Power Quality Measures
R Switch	Basic Recording (four-channel)
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 measures per set - V & I per phase)
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

SIO - Simple I/O	<ul style="list-style-type: none"> • Two - Form C • Single - Form A 	<ul style="list-style-type: none"> • RTP
MIO - Multifunction I/O Board	<ul style="list-style-type: none"> • Two - Form C • Four - Form A or C inputs for recording and Totalization • Six - Form A Outputs • RTP Input 	<ul style="list-style-type: none"> Programmable output: <ul style="list-style-type: none"> • Pulse Data • Load Control • Diagnostic and Caution Events • EOI

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
	<ul style="list-style-type: none"> • 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	27.3	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	25.3	13.0
15 Min	675.0	153.0	76.0	39.0
30 Min	1314.0	306.0	152.0	78.0
60 Min	2628.0	612.0	304.0	156.0



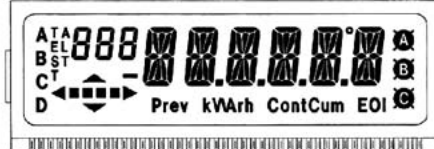
*Not all measurements communicated to AMI head-end.

Basic Power Quality

Alerts and Counters	<ul style="list-style-type: none"> Distortion alert with counter High demand alert DC detection alert Over voltage alert with counter Date & time of last outage (TOU or recording) 	<ul style="list-style-type: none"> High neutral current Power factor alert Under voltage alert with counter Outage counter
Instantaneous Measures	<ul style="list-style-type: none"> Per Phase Voltage V&I Phase Angles Reactive power Distortion power Distortion power factor (D/U) 	<ul style="list-style-type: none"> Per Phase Current Active power Power factor
Cumulative Measures	<ul style="list-style-type: none"> Distortion kVAh (with k switch) 	<ul style="list-style-type: none"> Cumulative power outage duration
Advance Power Quality	<ul style="list-style-type: none"> Voltage, Current, Frequency, THD, TDD, DPF Recorded as Min, Max, Avg (v^2h or I^2h) or end-of-interval (4 or 20 channels) 	
Distortion - Real Time and Cumulative Measures	<ul style="list-style-type: none"> Distortion kVA and kVAh Total Demand Distortion (TDD) = Total Harmonic Current/Rated Maximum Current per Phase 	<ul style="list-style-type: none"> Distortion Power Factor (DPF) = Distortion Power per phase and total Total Harmonic Distortion (THD) - Current and Voltage per phase
Instrumentation - Real Time Measures	<ul style="list-style-type: none"> Frequency Fundamental per phase voltage, current, and phase angles 	<ul style="list-style-type: none"> RMS Voltage (L-N) or (L-L) primary or secondary
Voltage Monitor	<ul style="list-style-type: none"> Softswitch enabled Voltage Sags per Phase Voltage Swells per Phase 0 to 100% in 1% steps (separate sag and swell thresholds) Reference voltage automatically determined or programmed 	<ul style="list-style-type: none"> Two types of events independently monitored Programmable Magnitude and duration thresholds 1 to 65 k cycles Event ends when all phases within threshold

Voltage Event Log	<ul style="list-style-type: none"> Separate Sag and Swell event counters Max (Swells) or Min (Sags) RMS cycle voltage for each phase 	<ul style="list-style-type: none"> Date and Time RMS coincident current Duration in cycles 200 events in log
Wave Form Capture	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 325.2 Samples per cycle Each sample set includes 3 voltage and 3 current samples (Phases A, B, and C)

Display

<ul style="list-style-type: none"> 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 Quadergy Separate indicator fore 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	<ul style="list-style-type: none"> Boxes represent 60%, 70%, 80%, 90% positions 	<ul style="list-style-type: none"> At 100% all boxes turn off
Display Mode	<ul style="list-style-type: none"> Normal Test 	<ul style="list-style-type: none"> Cautions/Errors Alternate display
Test Mode	<ul style="list-style-type: none"> Programmable time out Special test mode displays Prior subinterval demand Test pulses available from OPTOCOM port except when communicating 	<ul style="list-style-type: none"> Time remaining in subinterval Test switch cover Watthour accumulation Max demand since entering test mode Instantaneous demand

Specifications*

Display (continued)

- Security Log**
- Total number of: Outages, Demand resets, RTP, activations, Times programmed, OPTOCOM* communications
 - Date/time last: Outage¹, Demand reset¹, RTP, Programmed, Calibrated, OPTOCOM* communications 1 TOU Only
 - 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
- Operating Range**
- Voltage: 120 to 480 V (+10/-20%)
 - Frequency rated (5%)
 - Temperature: -40°C to +85°C
- Mechanical Design**
- Unbreakable one piece Lexan[®] cover
 - Magnetic switch activates Alternate displays
 - Rugged single action reset lever
- Applicable Standards**
- ANSI C12.1 Electricity metering; C12.10 Watt-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 class meters; C12.21 for Modem Communications
 - FCC Class B emissions
- Service Determination**
- iCONAPX 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

iCONAPX can be programmed to a fixed Service using Fitzall.

Diagnostics	Cautions
1 - Polarity, Cross Phase, Reverse Energy Flow	000400 - Under Voltage
2 - Voltage Imbalance	004000 - Demand Overload
3 - Inactive Phase Current	040000 - Leading kvarh
4 - Phase Angle Alert	Programmable duration
5 - High Distortion, DC detection	before activation - 5 seconds
6 - Under Voltage - Phase A	to 14 minutes
7 - Over Voltage - Phase A	
8 - High Neutral Current	

*Not all measurements communicated to AMI head-end.



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 IEEE[®], Q-hour, "Fuzzy" vars
- Demand calculations (maximum, cumulative or continuously cumulative): Block, Rolling. Intervals, Exponential (thermal emulation)
- 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, season, 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)