

# Commercial & Industrial Electricity Metering

## Versatile metering for demanding applications

GE Digital Energy's kV2c meter family is designed for revenue class metering in commercial and industrial applications. The kV2c meter moves beyond revenue metering to real time instrumentation, true power quality monitoring and real cost of service measurements. Whether you are metering the simplest energy rate or collecting critical quality of service and load analysis information on a polyphase or a single phase circuit, there is a kV2c meter configuration to meet your needs.

The GE kV2c meter family is one of the most widely accepted ANSI® commercial and industrial meters with over 2 million units deployed in the field since its introduction. The robust revenue-grade meter design is based on GE's cutting edge technology that provides high accuracy and reliability.

The GE kV2c product family includes 2 models to provide the ultimate in flexibility and customer choice, including a polyphase product available for 600V applications.

## Commercial & Industrial Meters



### kV2c

#### Solutions for the Most Demanding Applications

Offering the required revenue grade metering functionality and advanced power quality monitoring for polyphase metering



### kV2c+

#### AMI/AMR Communication for Extreme Conditions

Ideal for extremely harsh environments, building on our kV2c design and includes a more robust power supply and suitability for 600V applications



## Communications

- AMI/AMR options including RF, Power Line Carrier, Cellular Networks, Ethernet
- Allows interchangeability of AMR/AMI plug & play options
- Supports connectivity and integration with 3rd party communications solutions providers

## Smart Configuration

- Customize advanced metering options to suit customer needs
- Versatile programming softswitches allowing the selection of advanced functionality such as expanded recording features, harmonic analysis, time of use, load profile, and power quality measures.
- Options available to provide totalization capability, pulse outputs, telephone modem, and RS-232/485 communications
- Tamper detection tools and installation verification capabilities to automatically catch errors, wiring changes, tampering, and billing issues.

## Reliability

- Robust revenue-grade watt-hour and demand meter with advanced recording options.
- Based on GE's high-quality technology, providing 0.2% accuracy and reliability.
- Provide utilities with tools to lower operational cost and provide accurate metering solutions



## Reliable Metering

In this dynamic time of regulatory scrutiny and customer engagement, you can be assured of the product and the company behind the product. We have ANSI and ISO certified labs to ensure that our product design and manufacturing processes yield a robust product.

Our testing procedures go well beyond the ANSI and IEC requirements for which we design to, including some of the most aggressive internal standards. We now have included world-class Radio Frequency (RF) communications expertise to ensure that our meter products are hardened to withstand even the harshest of RF environments without sacrificing the quality or integrity of the metrology or the communications technology.

## Accurate & Dependable

Typically measured at +/- 0.2%, the GE KV2 family of meters provides outstanding capabilities for accuracy. Combined with the low starting watts, the utility can have confidence in the metered value and measured electricity usage.

## Integrity of Supply

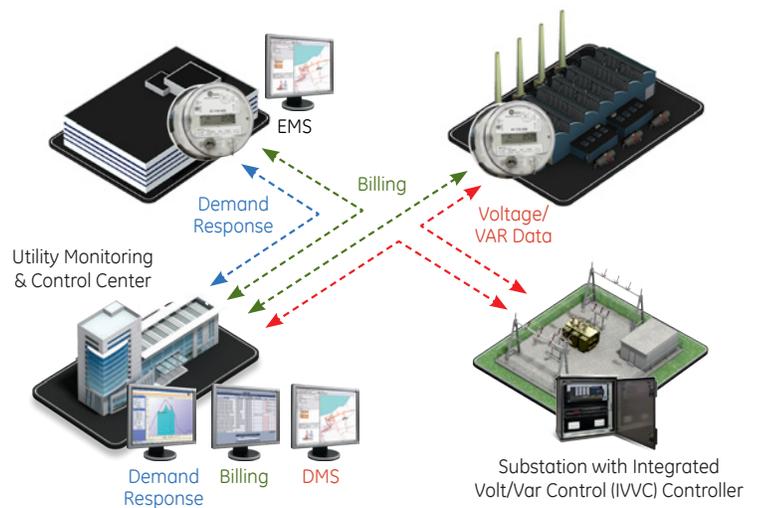
Having a partner that can provide assurance in supply is critical when a utility begins a mass deployment of meters. GE's process focus and rigor around supply chain excellence minimizes the risk to the utility, giving them confidence to manage installation crews and provide accurate scheduling to customers.

## Broad Communications Support

The KV2 family has been designed to allow for the interchangeability of AMR/AMI modules and cover the broadest range of possible AMI communication technologies including RF Mesh, Cellular, Power Line and Ethernet. Modules can be added at the GE factory, after the fact, or replaced with another compatible module if the meter is redeployed.

## Billing & Smart Applications

Traditional billing continues to be a vital component of today's solid state meters, but they are also now a vital part of your grid operation. We have leveraged the strength and knowledge of GE around distribution automation, volt-var control, demand optimization, and distributed generation to develop a line of metering products that are designed to integrate and provide the critical information needed to optimize all of these grid operation solutions. As we continue to build on its Smart Grid solutions, you can count on GE and our new metering products to include innovative and unique capabilities you never thought possible.



## With GE meters, your business case just got a whole lot better

At GE, we've leveraged our expertise to ensure you get the most out of your investment in GE products and solutions. The capability available in the GE Smart Meter's provide for data that can be used to optimize a number of utility operational systems outside of traditional billing. These integrated solutions include:

- Outage events and alarms integrated into PowerOn™, GE's Outage Management Solution
- Voltage and Var data, provided in real-time, to enhance distribution automation solutions for Conservation Voltage or Integrated Volt/Var Coordination
- Integration with GE's GridIQ™ Demand Optimization Solution for coordinated load control and demand response for surgical implementation of load shedding and load deferral



# kV2c

## Solutions for the Most Demanding Applications



GE's most advanced electricity metering product, the kV2c, delivers world class capability around revenue metering and protection, power quality, and cost of service measurements. Designed around a GE proprietary data acquisition chip, this product outperforms the market in relation to sampling and data analytics capability.

### Versatility

The kV2c meter family is a versatile metering platform for commercial and industrial applications. The kV2c meter offers easy and powerful functional upgrades with a unique combination of softswitches and option boards to meet your metering needs in a rapidly evolving smart metering space. The kV2c starts as a bi-directional, coincident demand meter with five demand measures, real-time pricing, and real time data monitoring.

Softswitches are available to add such functions as TOU, transformer and line loss compensation, power factor, 4 quadrant measurements, instrument transformer correction, and increased recording channels. For a full description of available firmware enhancements, see the attached product specification table.

### Power Quality

The kV2c meter offers advanced power quality tools to measure compliance to power quality agreements or gather data to help set power quality requirements. These tools include:

- Programmable sag and swell monitor that logs voltage sag and swell duration down to one cycle, minimum or maximum voltage, coincident current, and date and time of occurrence.
- Voltage and Current THD per phase, TDD (Total Demand Distortion), Distortion Power Factor, Displacement Power Factor, Distortion KVA, and Distortion kVAh (all recordable).
- Harmonic analysis (MeterMate 5.00 and above) plots odd and even harmonic magnitudes and phase angles.
- Programmable diagnostics for voltage imbalance, distortion, current imbalance, reversed polarity, high neutral current. These events may be logged, set an alert, and initiate a call-in.

### Features & Benefits

- AMR/AMI Plug and Play designed to accommodate: RF, PLC, Cellular (GPRS/CDMA), Ethernet (See attached table for currently offered factory integrated solutions)
- Complete range of S-base and A-base forms
- 4-quadrant industrial or substation measures
- Powerful functional upgrades provide 4-channel 64 kb, 20-channel 192 kb, or 20-channel 384 kb recording for voltage, current, energy, apparent power, reactive power, distortion power, power factor, THD, TDD, DPF.
- Per phase AC instrumentation (amps, volts, and frequency)

### Inventory Management

The kV2c wide range voltage power supply (120V to 480V) combined with the Fitzall™ feature enables a significant meter inventory reduction while covering all applications. Fitzall is a GE exclusive tool for commercial and industrial electronic meter inventory reduction, which allows two meter forms, 9S for transformer rated and 16S for self-contained to meter any service type.

### Installation Verification and Tamper Detection

The Site Genie™ Monitor provides a simple, automatic way to catch errors, tampering and wiring changes before billing problems occur. Site Genie also provides the phasor information and diagnostics needed to fix the problems it finds.

### Cost of Service Measurements

Knowing what it costs to serve a site is a key piece of competitive information for both Generation and Distribution utilities. With modern loads, measuring energy and power factor isn't enough. The kV2c family of meters will simultaneously measure all of the components of service cost (real & reactive – with and without harmonics, distortion, and vector apparent power).

### Communications

The kV2c meter family offers a wide range of AMI communication technologies including RF Mesh, Cellular, Power Line Carrier and Ethernet to support your Smart Grid applications. Additionally, the kV2c family provides "KYZ" and other I/O options to support local energy management solutions typically found in commercial and industrial facilities. The kV2c has a standard AMI interface that allows the capability to transmit all metering data available at the meter through the AMI communication network. See the attached table for a complete listing of AMI technologies that are currently offered as a factory integrated solution into the kV2c meter family.

# kV2c+

## AMI/AMR Communication for Extreme Conditions

The kV2c+ comes equipped with a more robust power supply to accommodate the additional power requirements of today's AMI communications. This model is also available with a 57 – 120V auto-ranging power supply for low voltage applications or a 600V power supply for 3-phase 3-wire 600 volt distribution applications.

### Reliability

The kV2c+ Revenue Guard option board powers the meter even when the A phase voltage is lost; any available line-to-line or line-to-neutral voltage will be used. Revenue Guard Plus softswitch enhances Revenue Guard. It preserves billing integrity when a phase voltage is lost on a 4 wire wye service by converting the 3 element meter to "2 ½" element operation. Even with a lost phase voltage, Revenue Guard Plus provides accurate revenue metering.

### Features & Benefits

- The kV2c+ offers the following features & benefits in addition to those offered with the kV2c:
  - Enhanced power supply to support a variety of AMI technology
  - 57-120V auto-ranging power supply for low voltage applications
  - Ability to serve 600V applications
  - Revenue Guard option preserves billing integrity when a phase voltage is lost
  - Available in Switchboard form (Z base)



# MeterMate

## Full featured, secure metering software

GE's innovative MeterMate™ software suite enables meter administrators to easily configure and manage GE's meter family. Each software component in the MeterMate suite is optimized to address the different aspects of a meter's life cycle. MeterMate program creation software enables the user to effortlessly configure the meter's basic and advanced functionality, ranging from creating a simple demand program to setting up the meter display to configuring the meter's I/O and alerts. With MeterMate reading and programming software, MM Comm, a user can read, program and perform real-time instrumentation and power quality monitoring on a meter, via a variety of different communication methods: local OPTOCOM™, remote telephone, RS-232/485 and IP communications.



The suite also provides the MeterMate Batch Control, MeterMate Load Profile (MMLp) and MeterMate XTR utilities. MeterMate Batch Control enables the user to automate remote meter reading. MeterMate Load Profile (MMLp) provides analysis of load profile data and MeterMate XTR supports the export of meter data to the MV-90 HHF format.

### Features & Benefits

- One software suite to configure and read the GE portfolio of meters: kV family, I-210 family, SM11x and SM3xx family
- Fully supports the ANSI C12.19 communication protocol
- Multiple methods to communicate with meters: USB & RS232 OPTOCOM, RS485, Modem
- Modular configuration workflow that enable the reuse of frequently used configuration settings and measurements
- Various reports to display information for meter management, auditing, billing and monitoring power quality
- Command line interface and batch-control enabling automated and scheduled meter operations
- Configurable role-based access control security

# AMI Integrations

## Factory integrated AMI communication options for kV2c/kV2c+

GE's kV2c and kV2c+ meters are integrated with a wide variety of AMI communication modules. GE is constantly seeking to provide diverse solutions suitable for each customer's AMI needs. The following table summarizes current factory installed communication options.

AMI Technologies	Type	kV2c		kV2c+	
		120-480V	120-480V EPS	120-480V	600V
Aclara® (UMT-C)	PLC	X			
Itron (53ESS ERT®)	RF (AMR), 900 MHz	X		X	X
L+G Gridstream® (TS1/TS2)	PLC	X			
L+G Gridstream (Command Center)	RF Mesh, 900MHz		X		
L+G Gridstream (UtiliNet Solution Center)	RF Mesh, 900MHz	X			
Sensus (FlexNet®)	RF (Tower-based)	X			X
Silver Spring Networks® (NIC)	RF Mesh, 900 MHz		X		
Trilliant CDMA (CellReader®)	Cellular		X		
Trilliant GPRS (CellReader)	Cellular			X	X
Trilliant (SecureMesh™)	RF Mesh, 2.4 GHz		X		

## Technical Specifications

General	
Multifunction Meter	<ul style="list-style-type: none"> <li>Revenue Meter</li> <li>AC Instrumentation</li> <li>Power Quality Monitor</li> <li>Communications</li> </ul>
Accuracy	<ul style="list-style-type: none"> <li>±0.2% at standard test points for energy and demand (typical)</li> <li>Meets ANSI C12.20 Class 0.2</li> </ul>
Ratings	<ul style="list-style-type: none"> <li>Voltage: 120 to 480 volts, kV2c+ options:                             <ul style="list-style-type: none"> <li>- 57-120 volts</li> <li>- 600 volts</li> </ul> </li> <li>Current: Class 20, Class 200, Class 320</li> <li>Frequency: 50 or 60 Hz</li> </ul>
Operating Range	<ul style="list-style-type: none"> <li>Voltage: 120-480V (+10/-20%)</li> <li>With Enhanced Power Supply: 120-480V (+20/-20%)</li> <li>Frequency: rated (5%)</li> <li>Temperature -40°C to 85°C</li> </ul>
Mechanical Design	<ul style="list-style-type: none"> <li>Durable one piece LEXAN™ cover</li> <li>Rugged single action reset lever</li> <li>Magnetic switch activates Alternate and Site Genie displays</li> </ul>

Available Forms	
S-base	CL20: 3S, 4S, 9S, 36S, 45S, 56S CL200: 1S, 2S, 12S, 16S CL320: 2S, 12S, 16S
A-base	CL20: 10A, 36A, 45A, 48A CL150: 13A, 16A
Z-base*	CL20: 3Z, 9Z, 36Z, 45Z

Basic Functions	
No Softswitches	<ul style="list-style-type: none"> <li>Simple Demand Meter</li> <li>Rolling Demand Meter</li> <li>Exponential Demand Meter</li> <li>Coincident Demand Meter</li> <li>Bi-directional Meter</li> <li>Site and Tamper Monitoring</li> <li>Communicating Meter</li> <li>Wiring Analyzer</li> </ul>

The kV2c with no softswitches is a bi-directional coincident demand meter	
Accumulators	5 for measurements
Measures	Wh Delivered, Received, Net, or Total (with or without harmonics) and Frequency
Demands	5 (a demand for each measure)
Coincident	2 values for each demand from demand list
Power Quality	Diagnostics and Cautions, momentary values
Monitoring	Site Genie, Cautions (8), Diagnostics, Errors
Real Data	Voltage, Current, and Frequency
Recording	Self Reads recording
Display	75 Items
Data	Prior Reset
Logging	# Outages, # Demand Resets, # Programmed, # Comm sessions
RTP	Real-time pricing available if I/O board or AMI module present

Multifunction Meter	
With softswitches and option boards	<ul style="list-style-type: none"> <li>kVA, kvar Demand Meter</li> <li>Q-Hour Meter</li> <li>"Real-Time-Pricing"</li> <li>TOU Meter</li> <li>Interruptible Rate Meter</li> <li>20-Channel Recorder</li> <li>Current Recorder</li> <li>Power Quality Meter</li> <li>Sag and Swell Monitor</li> <li>200-Event Power Quality Log</li> <li>Real-Time Multifunction Instrument</li> <li>Phasor Meter</li> <li>Loss and Accuracy Compensation</li> <li>4-Channel Recorder</li> <li>Voltage Recorder</li> <li>Totalizing Meter</li> <li>Bi-directional Meter</li> </ul>

\*Available for kV2c+ only

## Technical Specifications (Continued)

Softswitches Add	
B Switch	By Quadrant measurements
C Switch	Call In on Outage (Modem)
E Switch	500 Event Log
G Switch*	Revenue Guard Plus
H Switch	Expanded Flash Memory (20-channel, 384 kB)
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 (4-channel, 64 kB )
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, 192 kB)
Z Switch	Totalization

Recording	
<ul style="list-style-type: none"> <li>No option board required since recording is a softswitch-enabled function. However, a battery is required to maintain time during power outages.</li> <li>Activating recording adds time stamping to the meter's logs (adding TOU is an alternative way to add time stamping).</li> <li>Recording memory is configurable; the number of channels and length of channels is programmable.</li> <li>Adding recording also adds 12 self reads.</li> <li>No Load Profile (R or X) Softswitch is required for Self Reads</li> </ul>	
Types of Recording	<ul style="list-style-type: none"> <li>Load Profile</li> <li>Data:                             <ul style="list-style-type: none"> <li>Maximum value in interval</li> <li>Minimum value in interval</li> <li>End of interval value</li> </ul> </li> </ul>

R Switch (Basic Recording, 64 kB)				
Basic Recording- 4 Channels of data				
Days of Recording by Interval and Channels (4 Ch)				
	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 (Additional Recording, 192 kB)				
Expanded Recording - 20 Channels of Data				
Days of Recording by Interval and Channels (20 Ch)				
	1Ch	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

H Switch (Additional Recording, 384 kB)				
Expanded Recording - 20 Channels of Data				
Days of Recording by Interval and Channels (20 Ch)				
	1Ch	5 Ch	10 Ch	20 Ch
1 Min	87.6	20.4	10.2	5.2
5 Min	438	102	50.6	26
15 Min	1350	306	152	78
30 Min	2628	612	304	156
60 Min	5256	1224	608	312

Option Boards	
SIO – Simple I/O	<ul style="list-style-type: none"> <li>2 Form C Outputs • RTP Input</li> <li>1 Form A Output</li> </ul>
MIO - Multifunction I/O Board	<ul style="list-style-type: none"> <li>2 Form C Outputs Outputs programmable as:                             <ul style="list-style-type: none"> <li>Pulse Data</li> <li>Load Control</li> <li>Diagnostic and Caution Alerts</li> <li>EOI</li> </ul> </li> <li>4 Form A or C Inputs for recording and Totalization</li> <li>6 Form A Outputs</li> <li>RTP Input</li> </ul>
T1 – Telephone Modem	<ul style="list-style-type: none"> <li>Call in during outage with C Softswitch and battery</li> <li>Communications up to 2400B</li> <li>Suitable for outdoor installation</li> <li>Wide temperature range –20 to +75C</li> <li>Line sharing, up to 5 T1 modems on a phone line</li> <li>MV90 compatible</li> <li>3 phone numbers</li> <li>Supports on-line read data with MeterMate</li> <li>Call-in and call-out windows</li> </ul>
RSX – Serial Communications Board	<ul style="list-style-type: none"> <li>RS-232 communications to 9600B</li> <li>External Modems or wireless modems</li> <li>Simple Serial/RS-232 drive for devices within 50 feet</li> <li>Simple Serial/RS-485 drive for devices within 3500 feet</li> </ul>
Revenue Guard Board*	<ul style="list-style-type: none"> <li>Preserves billing integrity when A-Phase voltage is lost*</li> </ul>

Security Log
• Total number of outages
• Cumulative power outage duration
• Date & time of last outage (TOU only)
• Total number of demand resets
• Date & Time of last demand reset (TOU only)
• Total number of times programmed
• Date & time of last RTP
• Total number of RTP activations
• Date & time last programmed
• ID of last programmer
• Date & time last calibrated
• ID of last calibrator
• Total number of OPTOCOM communications
• Date & time of last OPTOCOM communication
• Number of EEPROM reads and writes

\*Available for kV2c+ only

## Technical Specifications (Continued)

Display	
• Alphanumeric display	
• Programmable labels (3)	
• Blinking block disk analog	
• Arrows show energy flow direction and lagging or leading Quadergy	
• Separate indicator for each phase voltage	
• Active TOU rate indicator	
• Three to six digits for demand and energy displays with zero to four digits after the decimal	
• 70 displayable items from list of over 910 possible items including current billing period, previous period and previous season data, previous Self Reads	
• Programmable display time	
• Programmable 3-digit display identifiers	
• Programmable display order	
Disk Analog Scroll	<ul style="list-style-type: none"> <li>• Boxes represent 60%, 70%, 80%, 90% positions</li> <li>• At 100% all boxes turn off</li> </ul>
Display Mode	<ul style="list-style-type: none"> <li>• Normal</li> <li>• Test</li> <li>• Cautions and Errors</li> </ul>
Test Mode	<ul style="list-style-type: none"> <li>• Programmable time out</li> <li>• Test switch under cover</li> <li>• Special test mode displays</li> <li>• Watthour accumulation</li> <li>• Prior subinterval demand</li> <li>• Max demand since entering the test</li> <li>• Time remaining in subinterval</li> <li>• Instantaneous demand</li> <li>• Test pulses available from OPTOCOM port except when communicating</li> </ul>

Site Genie
<b>Alerts and Diagnostics:</b> <ul style="list-style-type: none"> <li>• Polarity, cross phase, reverse flow</li> <li>• Phase voltage alert</li> <li>• Inactive phase current</li> <li>• Phase angle alert</li> <li>• Distortion alert (Total, A, B, C)</li> <li>• High neutral current</li> <li>• High Demand</li> <li>• Over and Under Voltage</li> </ul>
<b>Phasor Information:</b> <ul style="list-style-type: none"> <li>• VRMS per phase</li> <li>• IRMS per phase</li> <li>• Voltage phase angles</li> <li>• Current phase angle</li> <li>• Number of EEPROM reads and writes</li> </ul>

Service Determination
Meter 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: <ul style="list-style-type: none"> <li>• Daily (programmable)</li> <li>• Service Error displayed if wired improperly</li> <li>• After demand reset (programmable)</li> <li>• Optional service determination at demand reset</li> </ul>
kV2c can be programmed to a fixed Service using Fitzall

Power Quality	
Alerts and Counters	<ul style="list-style-type: none"> <li>• Distortion alert with counter</li> <li>• High neutral current alert with counter</li> <li>• High demand alert</li> <li>• DC detection alert</li> <li>• Over voltage alert with counter</li> <li>• Outage counter</li> <li>• Date &amp; time of last outage (TOU or recording)</li> <li>• Power factor alert</li> <li>• Under voltage alert with counter</li> </ul>
Instantaneous Measures	<ul style="list-style-type: none"> <li>• Per Phase Voltage</li> <li>• V&amp;I Phase Angles</li> <li>• Reactive power</li> <li>• Distortion power factor (D/U)</li> <li>• Per Phase Current</li> <li>• Active power</li> <li>• Power factor</li> </ul>
Cumulative Measures	<ul style="list-style-type: none"> <li>• Distortion kVAh (with k Switch)</li> <li>• Cumulative power outage duration</li> </ul>
Advance Power Quality	<ul style="list-style-type: none"> <li>• Voltage, Current, Frequency, THD, TDD, DPF Recorded as Min, Max, average (V2h or I2h) or end-of-interval (4 or 20 channels)</li> </ul>
Distortion - Real Time and Cumulative Measures	<ul style="list-style-type: none"> <li>• Distortion kVA and kVAh</li> <li>• Distortion Power Factor (DPF) = Distortion Power/Apparent Power per phase and total</li> <li>• Total Demand Distortion (TDD) = Total Harmonic Current / Rated Maximum Current per phase</li> <li>• Total Harmonic Distortion (THD) - Current and Voltage per phase</li> </ul>
Instrumentation - Real Time measures	<ul style="list-style-type: none"> <li>• Frequency</li> <li>• RMS Voltage (L-N) or (L-L) primary or secondary</li> <li>• Fundamental per phase voltage, current, and phase angles</li> </ul>
Voltage Monitor	<ul style="list-style-type: none"> <li>• Softswitch enabled</li> <li>• Two types of events independently monitored</li> <li>• Voltage Sags per phase</li> <li>• Voltage Swells per phase</li> <li>• Programmable Magnitude and duration thresholds</li> <li>• 0 to 100% in 1% steps (separate sag and swell thresholds)</li> <li>• 1 to 65 k cycles</li> <li>• Event ends when all phases within threshold</li> <li>• Reference voltage automatically determined or programmed</li> </ul>
Voltage Event Log	<ul style="list-style-type: none"> <li>• Separate Sag and Swell event counters</li> <li>• Date and Time</li> <li>• RMS coincident current</li> <li>• Max (Swells) or Min (Sags) RMS cycle voltage for each phase</li> <li>• Duration in cycles</li> <li>• 200 events in log</li> </ul>
Waveform Capture	<ul style="list-style-type: none"> <li>• 70 sample sets in memory @ 60 Hz</li> <li>• 325.2 Samples per cycle</li> <li>• 54.2 sample sets per cycle</li> <li>• Each sample set includes 3 voltage and 3 current samples (Phases A, B, and C)</li> <li>• Waveform data used for harmonic analysis by MeterMate</li> <li>• Data capture initiated by local or remote read</li> </ul>

\*Available for kV2c+ only

## Technical Specifications (Continued)

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

AC Instrumentation
• Phasor Diagram of current circuit conditions (current and voltage magnitude phase angles, and phase rotation)
• 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
• ID of last programmer
• Date & time last calibrated
• ID of last calibrator
• Total number of OPTOCOM communications
• Date & time of last OPTOCOM communication
• Number of EEPROM reads and writes

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
• 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 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)
• High demand alert and end of demand interval output pulses

Applicable Standards
• ANSI C12.1 – Electricity metering
• ANSI C12.10 – Watt-hour meters
• ANSI C12.16 – Solid-state meters
• ANSI C12.18 – Protocol Specification for ANSI Type II optical ports
• ANSI C12.19 – Utility Industry End Device Data Tables
• ANSI C12.20 for 0.2 and 0.5 accuracy class meters
• FCC Class B emissions (Class A for 600v)
• ANSI C12.21 for Modem Communication

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