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Comparison of Residential to Commercial Meters

Introduction:

The terms residential meter and commercial meter tend to have slightly different meanings depending on the audience since meters and rate schedules are frequently interchanged. It is possible and many times practical to install a residential class meter on a commercial service and possible but generally not practical to install a commercial class meter on a residential service.

For the most part, BWP uses commercial class meters on customers billed on a commercial rate schedule and a residential class meter on customers billed on a residential rate schedule. The exceptions are for those very small commercial customers who use small amounts of energy or those very large residential customers that use large amounts of electric energy.

Today, Burbank has chosen the GE Model I210+c for residential metering and the GE model KV2c for commercial metering.

Metrology Differences:

Both commercial and residential meters employ microprocessors and DSPs (Digital Signal Processors) to measure and compute voltage, current and energy. Commercial meters have more advanced circuitry to not only allow them to measure but also derive additional instrumentation/metering quantities. Both meters can record these measurements and store the values in memory commonly referred to as a channel at time intervals ranging from 1 minute to 1 hour. At BWP, the recording intervals are configured at 5 minutes (commercial) and 15 minutes (residential)

The metering and measurement (instrumentation) functions provided in the commercial meter are much more numerous than compared to the residential meter. The commercial meter has the capability of recording 20 channels of data while the residential can only record 4 channels of data. Both meters are considerably more sophisticated and capable than meters available and universally deployed 10 years ago. In both meters, many of these capabilities are inherent in the meter and are only activated with the purchase of a soft-key from GE

The following chart compares the basic configuration of both meter models being installed at BWP today. The commercial meters have a capability of 20 channels but only have 13 configured now. The residential meters have only 4 channels and all are configured.

Channel	Commercial Meter	Residential Meter
1	Active Energy Delivered	Active Energy Delivered
2	Active Energy Received	Active Energy Received
3	Apparent Energy (KVA)	Maximum Voltage during 15 minute interval
4	Reactive Energy (KVARH)	Voltage at the end of the 15



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		minute interval
5	Maximum Voltage during minute interval-Phase A	15 N/A
6	Maximum Voltage during minute interval-Phase B	15 N/A
7	Maximum Voltage during minute interval-Phase C	15 N/A
8	Minimum Voltage during minute interval-Phase A	15 N/A
9	Minimum Voltage during minute interval-Phase C	15 N/A
10	Minimum Voltage during minute interval-Phase C	15 N/A
11	Voltage Now-Phase A	N/A
12	Voltage Now-Phase B	N/A
13	Voltage Now-Phase C	N/A
14-20	Spare-Future	N/A

Other Functions:

Commercial customers sometimes desire pulse outputs from the meter for use by their internal energy management system (EMS). The I201+c (residential) meter does not support these pulse outputs, as an option, the KV2c (commercial meter) can provide these output pulses.

Both the commercial and residential meters are capable of providing an array of options either through the purchase and use of a soft-key or addition of an option board. The following table summarizes those optional functions.

Function	Description	Residential Meter (I210+c)	Commercial Meter (KV2c)	Requires Meter Removal
Alternate Communications	Allows communication to the Trilliant AMI module	Implemented at BWP	Implemented at BWP	Installed
Four Quadrant Measurement	Individually measures: Active energy delivered Active energy received (for solar etc) Reactive leading (Capacitive loads) Reactive lagging (Inductive loads)	"N/A"	"B" Soft-key	No
Call in on outage	Calls in to report an outage-phone line and modem required	N/A	"C" Soft-key Requires modem card also	Yes



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DSP Sample Output	Supplies sample voltage and current outputs from the Digital Signal Processor.	N/A	"D" Soft-key	No
Event log	Logs internal meter events such as cautions, errors, reprogramming, password changes etc. Also logs outage and power quality events. Only the most recent 200 events are available.	"E" Soft-key	"E" Soft-key	No
Emergency Conservation Period	Along with remote disconnect, limits energy usage.	"F2" Soft-key	N/A	No
Instrument Transformer Correction	Correct for errors in instrument transformers need for specialized CT and VT rated installations	N/A	"I" Soft-key	No
Demand Limiting	Along with remote disconnect, limits energy demand (for temp service)	Implemented at BWP	N/A	No
KVA, Power Factor, KVAR.	Reactive and real power measurement	Implemented at BWP on some meters used in small commercial services.	Implemented at BWP	Installed
Transformer Loss Compensation	Used for special metering installations where the losses of the power transformer must be subtracted from the meter values	N/A	"L" Soft-key	No
Expanded Measures	Allows recording of per-phase or per-element measures along with total measurements	N/A	"M" Soft-key	No
Billing Demand	Special demand calculation for billing. BWP uses MDMS	"N Soft-key"	"N Soft-key"	No
Pulse Output	Provides pulses to customer EMS. Requires a special input/output (I/O) board	N/A	"P" Soft-key	Yes
Power Quality Measures	Instantaneous current and voltage measurements. Measures harmonics, distortion and other power quality parameters	N/A	"Q" Soft-key	No
Basic Recording	Records Load Profile data on four channels. Note BWP has the expanded option on commercial meters	Implemented at BWP	See Expanded recording	Installed
Self-Read	Force the meter to read at a specific time, generally midnight.	Implemented at BWP	Implemented at BWP	Installed
Time of Use	Has specific registers for measuring time of use energy. BWP performs this function at the MDMS	"T" Soft-key	"T" Soft-key	No
Fast Voltage	Measures voltage sags and swells as	Implemented	Implemented at	Installed



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Monitoring	part of the service quality. Up to 200 events	at BWP	BWP		
Pre-payment	Use with remote disconnect to implement pre-payment programs	"U2" key	Soft-	N/A	No
Waveform Capture	Captures the waveform of poor power quality events or subsequent communication sessions. Captures approximately 1.3 cycles each for 3 voltages and 3 currents	N/A		"W" Soft-key	No
Expanded Recording	20 channel of interval data recording	N/A		Implemented at BWP	Installed
Totalizing	Allows one meter to sum the inputs from other meters thus providing 1 total energy value	N/A		"Z" Soft-key	No

Form Differences:

Residential meters (I210+c) only support single phase and network (2 phase) meter form factors. The commercial meters additionally support three phase services. In three phase services the voltage service level may range from a nominal 120 volts to 480 volts, the commercial meters have "auto range" voltage capabilities and thus one meter can work on the complete spectrum of voltages, though different forms are used for Wye, Delta, Instrument rated (Current Transformers-CT and Voltage Transformers-VT) and self-contained services.

AMI Radio Differences:

The AMI radios used in both the commercial and residential meters are identical but the functions performed by the complete communication module (radio, meter interface hardware, firmware, etc.) are different. For commercial meters, the communication module must gather information from up to 20 data channels and other parts of the meter's memory (meter registers) as compared to the residential communication module that only gathers data from up to 4 data channels. These added measurement functions along with shorter recording intervals (5 minutes for commercial meters and 15 minutes for residential meters) result in the commercial meter transmitting three times more often and sending larger blocks of data than the residential communication module.

Summary of Main Differences:

In short, both the residential and commercial electric meters are designed to accurately measure energy, in general the commercial meter:

- Has more memory
- Sells at a higher cost
- Provides greater measurement functionality
- Can be used on three-phase services
- Allows for added functionality.