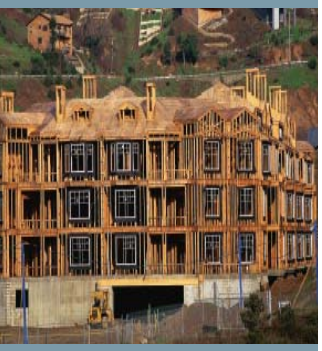


Space saving, convenient and reliable

In a world where tenant square footage is a premium in commercial building designs, the area for electrical metering is being drastically reduced. In addition, contractor labor costs for installation of sub-metering systems continues to increase. Still, building owners and property management companies must face the challenge of how to cost effectively provide tenant sub-metering in the constrained spaces.

To meet the sub-metering challenges of designers, contractors and property management companies, Siemens offers a proven cost-effective solution for “Embedded Metering and Monitoring.” This solution combines a fully integrated metering system factory installed into the Siemens “P” series panel boards and switchboards, which along with the required local or remote sub-billing software, provides a “Total” sub-metering system.

The Siemens sub-billing metering solution utilizes the metering and monitoring technology of ICI / PBSI integrated into the space saving panel boards from Siemens. When compared to the typical external wall mounted socket metering installations, considerable savings in space, installation costs, and data collection are realized with the Siemens Embedded Metering Solution.

Embedded sub-metering solutions

Answers for industry.

SIEMENS

Designer and contractor benefits include:

- Much smaller footprint versus the traditional socket meter combo units
- Factory pre-wired – less installation time
- Drastically less installation wiring
- No CT installation required in the field
- All equipment fits into the standard Siemens panel design
- Additional utilities like water, air and gas can be easily integrated into the system for a comprehensive monitoring system
- Hardwire and wireless communication options
- All components factory calibrated to meet revenue metering requirements
- Additional meters can be added in the field
- UL and CSA-us listed

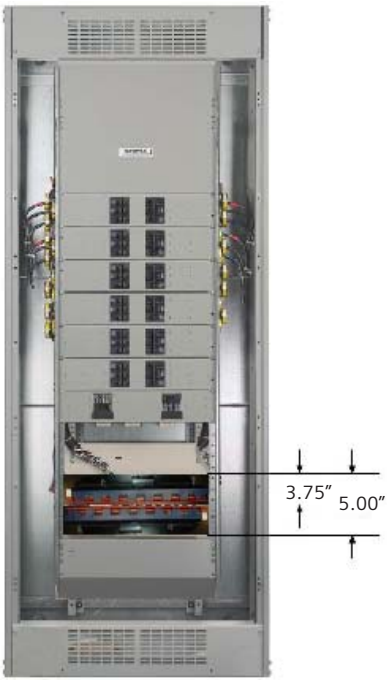
Property management company benefits include:

- Easy to use on-site billing management software for self-billing, or
- Remote web-based software and billing services (provided by PBSI) such as bill generation, data hosting, bill collections, etc., eliminate the liability of maintaining tenant consumption data
- No staff required to collect and process data or to print out and distribute the monthly bills
- Provides energy management data for tenant and common areas
- Enhances the ability to purchase bulk energy or negotiate energy rates
- Eliminates the guesswork of determining when or where energy is being used

Design overview:

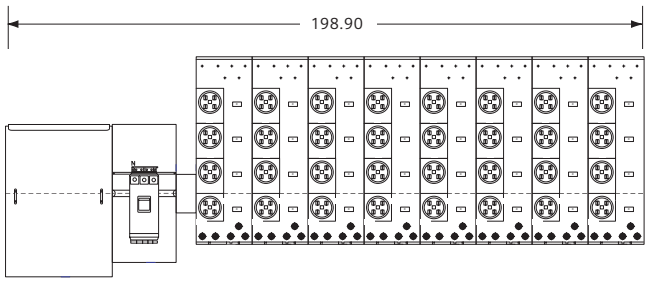
The typical embedded metering design consists of:

- Metering units with internal (P2 only) or external CT's mounted in an upper or lower unit space location
- One 15 amp 3-pole breaker to power the units and obtain a voltage reference
- Rail mounted CT's attached to the panel's internal frame work and all "prewired" to the metering unit
- Built-in communications



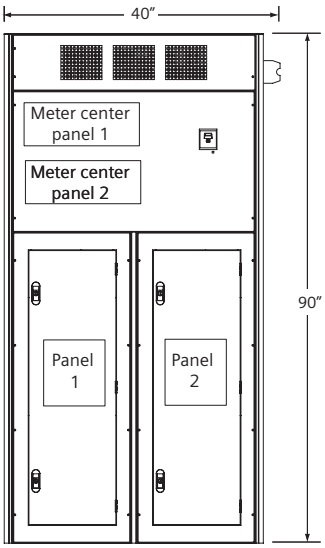
P5/4 with MP636-EXTC

Older style socket lineup

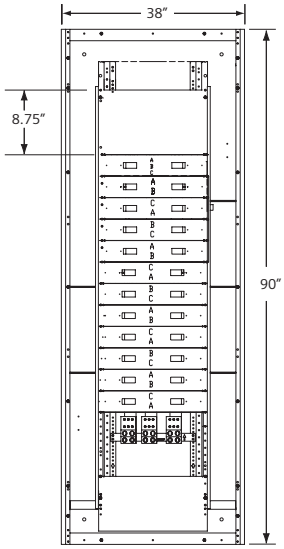


Typical wall mount meter combo line up

New space saving enbedded metering panels



IPS switchboard with (2) P3 panels 800 amp single mount main and MP636 meters with up to (48) metered circuits fed by bus tap.



P5 panel, MLO, with (3) MP363 and (23) 125 amp 1" breakers metered.

Metering units design

The Siemens embedded metering units are provided in two basic models, which offer a wide range of energy metering solutions.

The **MP636-INC** model is a unique one-piece design with the metering, logging, communications and revenue-grade current transformers (CT's) built into the unit. This model is designed specifically for field installation into a Siemens P2 panel board with CT holes on 1-inch centers. It supports 1.5 to 150 amp inputs. The MP636-INC is mounted in the wiring gutter space and 1-inch pole breakers such as Siemens BL, BQD, NGB and ED frames.

MP636-INC model close up view

The **MP636-EXTC** model also includes the metering, logging, and communications. This model has separately mounted revenue-grade CT's for current readings. This feature adds flexibility to the design. For example the "plug-in" external CT's allow the unit to meter various amperages with one meter, thus providing a solution to metering the branch feeders and the main from one device. The external CT's, up to 200 amps, are pre-mounted on a CT Rail that is attached to the panel's interior at the factory, eliminating the labor and errors associated with field installation! CT's larger than 200 amps are either supplied on a modified CT Rail or provided loose for field installation. Installation of the MP636-EXTC in the P4/P5 panels P4/P5 or switchboards requires 3.75" for one unit or 5.0" for two units stacked together.

MP636-EXTC model close up view

Wiring configurations

Each MP636 model supports up to sixteen (16) metered points in various wiring element configurations. These include:

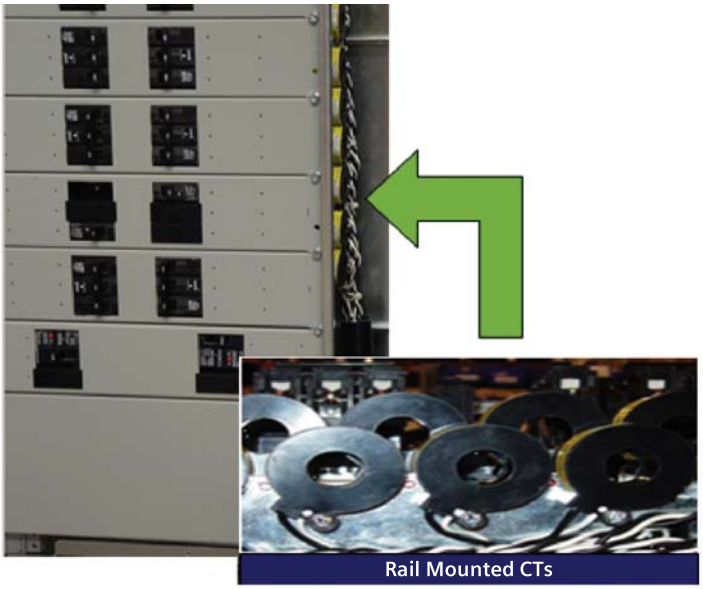
- One CT per meter – up to 16 meters
- Two CT's per meter – up to 8 meters
- Three CT's per meter – up to 5 meters

Additionally, one 15 amp 3-pole breaker for power and voltage reference will be required per panel. Power is also supplied, as a backup, through the communications cable of a hardwired system via an exclusive "System Power Share Technology." This provides full redundant control power.

CT and CT rail information

The revenue-grade CT's are solid core, self-shorting and rated for up to 200 amps for the integrated "rail" design. The CT Rails are installed on the panel interiors allowing for "split shipments," so the outer panels may be delivered before the interiors.

P5 with mounted CT Rail



Close up of CT Rail

Other amperage sizes are available. These can be mounted on a custom rail or provided loose for field installation. This field installation will be very minimal due to the unique CT lead design. All CT leads have an easy to install "plug" connector rather than loose wires. This plug connector design assures proper CT lead installation, eliminating field errors that commonly cause negative kW readings. The CT leads are also labeled to quickly match the lead to the meter plug connection. Note, the standard 200 amp CT size opening is 0.75" ID (3/O) max cable. If oversized cable or termination pack is used a larger 400 amp CT with 1.5" ID opening is required.

Meter consumption logging

The Siemens Embedded Sub-Metering Solution stores the meter data in multiple locations. This provides a secure and redundant method for data storage. The three key locations include:

- On-board the MP636 metering unit,
- At the local server supplied with the system, and
- At an off-site data warehouse if remote billing services from PBSI are used.

The MP636 units can be set to record consumption profiles on 1 minute, 5 minute, 15 minute, 30 minute and 1 hour intervals. The units will store data at the panel meter location for 480 days at the 1 hour interval profile. All on-board data is stored in "non-volatile" e-prom, approved for revenue application, and is "opto-isolated" from all other data outputs for revenue data integrity and security.

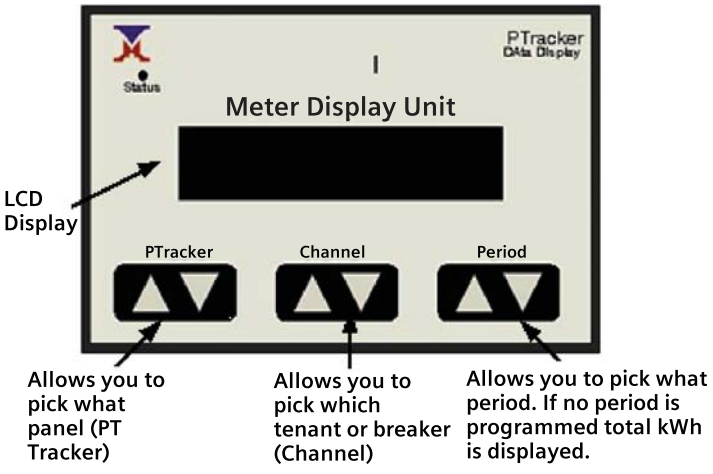
Data logging at the local and remote servers are a function of the available memory, and are basically considered "infinite." The local server is also provided with a small UPS for backup power.

Additional utilities

In many sub-metering solutions the need for other non-electrical utility monitoring is required. The metering of air, gas, water and steam is easily added to the solution by the use of pulse inputs being tied to the MP636 PTracker units. These allow the monitoring and logging of all the flow data for billing.

Remote meter display unit (MDU)

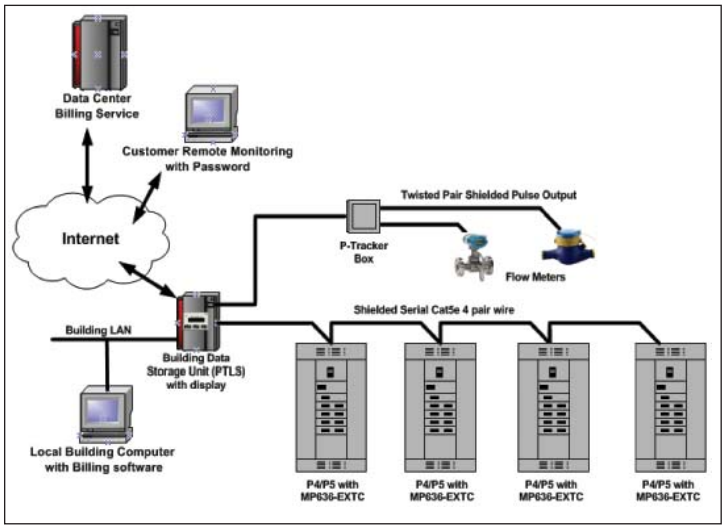
If required, the system can be supplied with a remote meter display (MDU) for locally displaying the energy readings for each tenant. One MDU can support up to 256 meters. The MDU provides a quick way to view the energy information at a location accessible by tenants, such as a lobby.



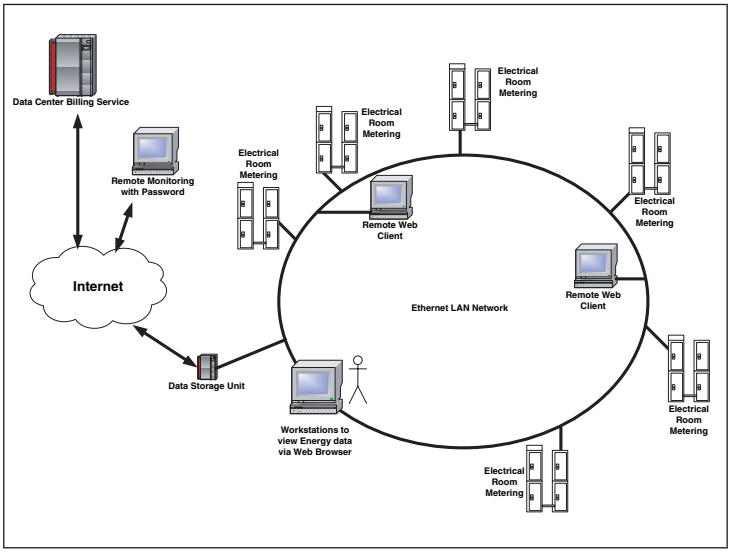
Communications

The Embedded Metering Solution is available with multiple communications options, including hardwired and wireless. The most common is the hardwire method. A Cat5e cable, with un-bounded four pair wires, is connected between the metering units. One twisted pair provides the communication link between the units and to the server, using RS-485 solution. A second pair provides a source of backup power through a remote UPS, providing a key advantage to this solution for maintaining recorded data in the event of power outages. The remaining wires are available as spares. This design is also not affected by any outside electromagnetic interference often found in wireless or PLC-based solutions.

The MP636 units come with multiple communication protocols. The most commonly used is Modbus RTU. Using Modbus, data points communicated include kWh, kVARh, KVAh, KVA per phase and total, KVAR per phase and total, kW per phase and total, Power Factor average and per phase, Current average and per phase, and Voltage (L-N) average and per phase.



Standard hardwire network with electrical and gas / water



LAN based network with remote monitoring connection

What you need to know about laying out the Siemens embedded sub-metering panels:

First, a 15 amp breaker must be added to all panels (2-pole for single phase and 3 pole for 3 phase systems). This breaker feeds the control power for the meter center and also provides the tap for reference voltage.

Second, increase the panel size to accommodate the metering units. For the MP636-INC model (available only for P2 panels with 1-inch breaker spacing), the P2 panel box must be at least 24 inches wide to accommodate wire bending. For the MP636-EXTC, the following additional panel length will be needed:

- One metering unit = 3.75 "
- Two metering units = 5.00 "
- Three metering units = 8.75"
- Four or more, contact Siemens PDS representative.

Last, make sure the number of breakers needed to be metered will be supported by the number of MP636 units you add.

P2 panels with MP636-INC internal CT units installed in gutters.
Note: box must be at least 24" wide to accommodate wire bending.

Embedded metering can also be integrated into the larger P4 and P5 panels, or IPS switchboards. The MP636 meters mount in the unit space the same as branch devices. Panels with more than 240 VAC require more unit space to mount the PT. It is recommended that P5 panels be used when branch devices are larger than 225 amp frame or when more than eight 225 amp frame devices are metered. This allows more wire bending space in the panel.

External metering solutions

If the panel interior cannot be provided with adequate space, or if other existing equipment needs to be metered, the MP636-EXTC (with external CT's) is available as an externally mounted solution. The meter unit is supplied in a separate enclosure, with CT's supplied for field installation.

Shown below is a typical Riser Box Design showing the MP636-EXTC with CT leads "plugged" in, the communications port on the side and control power breaker at the top.

MP636-EXTC meter in an external enclosure

The most popular way to integrate metering in these smaller panels is to mount the CT's in the panel at the load end of the branch breakers. The Meter center can then be close coupled to the panel in a separate enclosure (See external metering solution). These units can be pre-assembled at the factory. It is not recommended that larger than 125 amp frames be used in this type application. The panel width must be at least 24" wide to accommodate the CT's.

P2 panel with MP636-EXTC unit

Software and services

To complete the Embedded Sub Metering Solution, ICI Inc. offers their easy to use Tenant sub-billing software **UBS.Net**, for either local stand-alone or remote data management / tenant consumption billing.

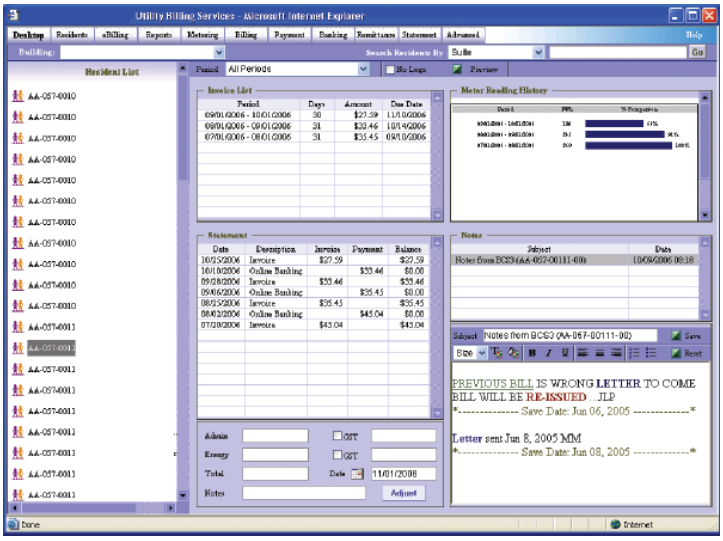
The sub-billing software provides the property management company the ability to collect and manage the facility's energy usage for both tenant and common areas and generate tenant consumption bills locally if desired. This can also include other utilities like water, air, steam and gas.

With 24x7 access to energy usage data either locally or over the web, a property management company can choose to have the data housed at their location or stored remotely at Priority Billing Solutions, Inc. (PBSI) data center warehouse location.

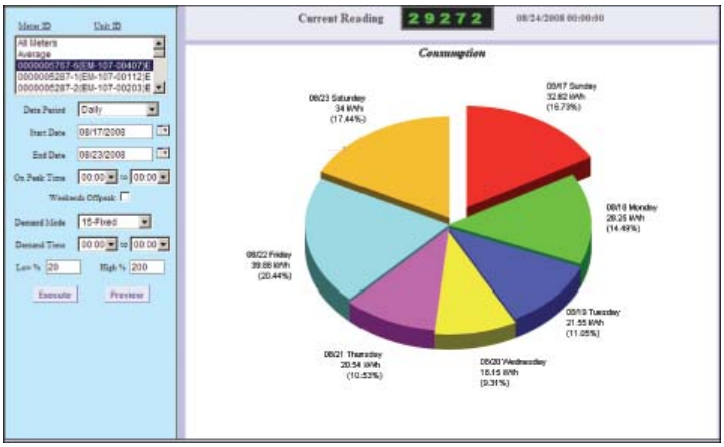
With the unique ability of the MP636 units to provide secure energy data for local or remote billing "and" Modbus RTU metering data, the MP636 units can support two monitoring systems!

This dual communications feature allows other power quality systems, like the Siemens WinPM.Net software or other SCADA/ BAS packages to use the metering data for other applications and solutions.

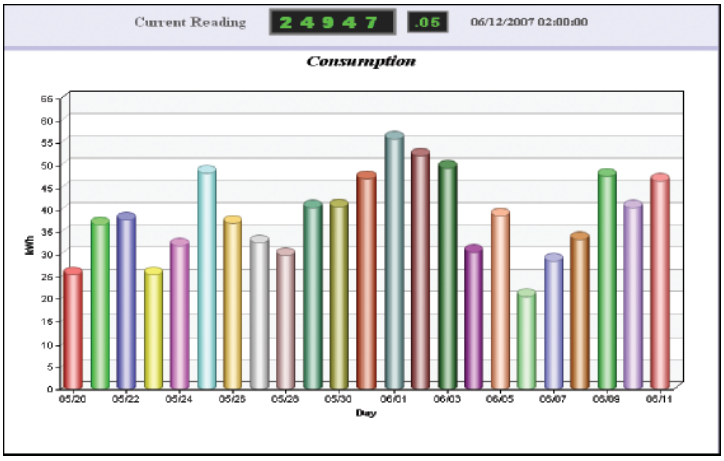
Common local or remote sub-billing screens



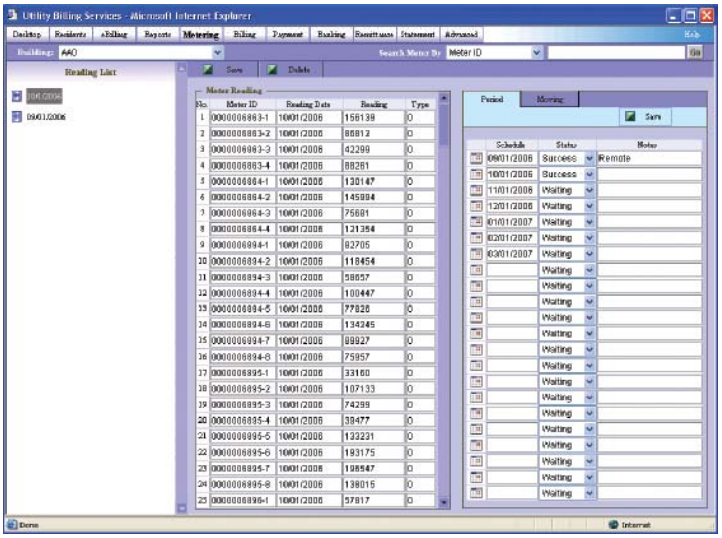
A detailed dashboard account of every data logger reading and alarms



Graphical pie chart views for easy comparison



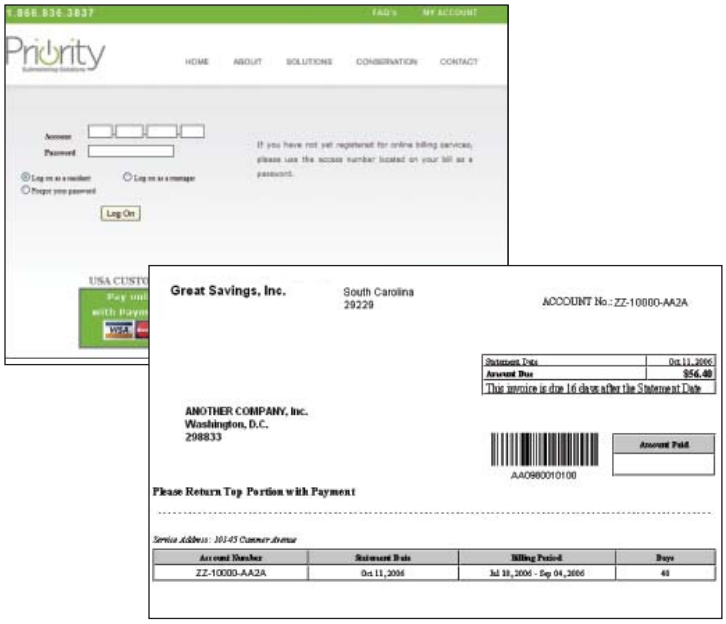
Graphical consumption views for easy comparison



Detailed tenant meter information with date and time stamping

To complete the "total" sub-billing offering, **Priority Billing Solutions, Inc. (PBSI)** can provide remote data housing, bill generation, and collections for the electricity, gas, water or any other metered commodities. The PBSI group can also provide:

- Data Acquisition and Reporting
- 24x7 Tenant web access
- 24x7 Property Management Web Access
- Extended Warranty
- Live Customer Support Interaction



PBSI payment access screen and example bill

The "Remote" billing services are an ICI offering provided by *Priority Billing Solution, Inc (PBSI)* and is not part of the Siemens offering. Please contact PBSI for complete details and pricing

Why provide the Siemens embedded sub-metering solution?

- Saves you money – A tenant billing system improves cash flow, allows immediate pass-on of electric rate increases and helps building owners control costs. Tenants are confident they are paying their fair share for energy use and are saving money through energy conservation.

- Fast, low-cost installation – The embedded Siemens solution provides a faster and lower cost installation compared to other external systems.

- Lower space requirements – The embedded panelboard con struction design requires no additional wall space to provide tenant metering. Conventional metering requires an external metering enclosure and possibly a current transformer transition cabinet.

- Reliable and accurate – Many Siemens / ICI systems are already in operation in large commercial and residential buildings around the country. Their accuracy exceeds utility industry and government standards like Epact 2005 for revenue-grade meters.

- LEED certification – Provides the energy monitoring and logging required to achieve additional LEED points.

- Automated billing – With automated billing services the responsibility to acquire the data, store the data and bill the tenants is removed from the property management company, thus saving manpower and time.

- Responsive service – With remote monitoring, continuous 24/7 monitoring can be done by the property management company or tenants. The service can also relay consumption changes to the owners for immediate investigation.

Embedded metering MP636 specifications

	MP636-INT	MP636-EXTC
Panel options:	Only P2	P2 and up series, IPS, SWBD
Meter size	16”L x 4”H x 3”W	
Unit space needed for P4 P5 / distribution switchboard	One MP636 = 3.25”, two MP636’s = 5.00”, three MP636’s = 8.75”	
Metering points	16 total available per MP636. (1 CT = 16, 2 CT’s = 8, 3 CT’s = 5)	
Current transformer inputs	Up to 150 amps	Up to 200 amps on CT rail, larger without CT rail
Voltages Frequency	93 – 347 VAC L-N 50 / 60 Hz	
Systems	1Ph / 2W, 1Ph / 3W, 2Ph / 3W, 3Ph / 4W	
Standards	ANSI C12.16 and C12.20 California weights and measure Measurement Canada UL CSA-us	
Accuracy	1.0%	
Pulse output Logging at meter Demand interval	10 watt-hour per pulse 480 days @ 1 hour intervals in non-volatile e-Prom that is “opto-isolated” Adjustable	
Operating temp.	27° F – 131° F (-30° C – 55° C)	
Metering data	kWh, kW per phase and total; kVA, KVAR, kVARh, kVAh, power factor per phase and average; current per phase and average; voltage (L-N) per phase and average.	
Communications	RS-232, RS-485, wireless, TCP/IP, RF 802.11/802.15, BPL, pulse output	
Protocols	Proprietary PTracker and Modbus RTU	
Current transformer style	Solid shorting solid core – optional split core	
Sealing and security	Factory calibrated and tested with unique serial number and ID	
Display	Optional display that supports up to 256 meters, mandatory for revenue in Canada	

Siemens Industry, Inc.
Building Technologies Division
5400 Triangle Parkway
Norcross, GA 30092
1-800-964-4114

info.us@siemens.com

www.usa.siemens.com/access