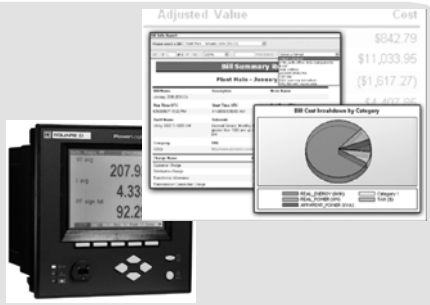
Section 4

Power Monitoring and Control



ION Meter and EEM screen cap, page 4-6

CM3000 and Advanced Reports Screen, page 4-10

16 Meter Enclosure, page 4-13

Sepam Series 80, page 4-24

AV4000 & 5000 Automatic Capacitor banks, page 4-30

Merlin Gerin
SQUARE D
Telemecanique

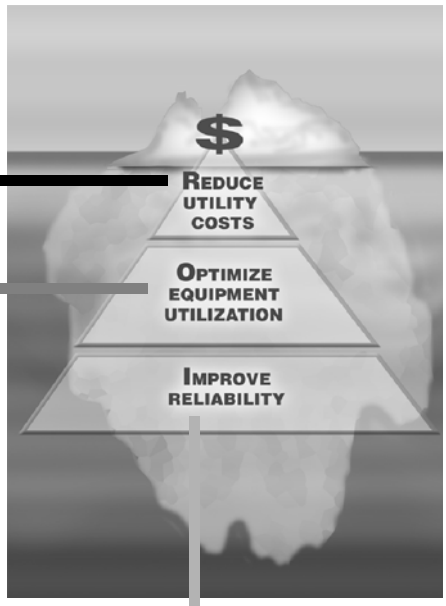
PowerLogic® Energy and Power Management Systems

Sepam Digital Protective Relays

ReactiVar® Power Factor Correction Capacitors

Schneider Electric

Icebergs. Typically, we think of them as huge peaks rising above the water. In reality, the majority of an iceberg is actually under the water, out of view. Utility savings at most facilities can be thought of in much the same way.



Think of your utility bills as being the peak, easy to see every month. By simply installing a PowerLogic energy and power management system, you can realize a 2–4% savings—but that's just the "tip of the iceberg" in terms of your potential savings.

The majority of savings, using a PowerLogic system, can be derived by looking beyond a utility bill—*or below the surface.* An additional 2–5% can be saved through better equipment utilization and avoiding unnecessary capital purchases.

Another 10% can be found in power system reliability. PowerLogic systems give you the power to achieve this kind of savings, resulting in a quick return on your investment.

Table 4.1:

Reduce Utility Costs	Optimize Equipment Utilization	Improve Reliability
Meter Application • Auto meter reading and energy monitoring • Revenue Metering • WAGES pulses • Tenant Sub-metering **Cost Allocation & Utility Billing** • Interval Benchmarking & Profiling • Allocate Energy Costs • Total Load Aggregation • Utility Bill Reconciliation **Utility Reduction Implementation & Services** • Total Energy Control Services • Power Factor Correction • Lighting Control • Load Shedding/Sequencing • Peak Shaving/Generator Control	**Facility Planning** • Identify Equipment Capacity • Determine Transformer Stress • Maximize Equipment Life **Improve Efficiency** • Balance Circuit Loading • Improve Power Factor • Balance Generator Efficiency & Usage • Optimize Chiller & Mechanical **Improve Maintenance Practices** • Equipment Monitoring: transformers, MCCs, switchgear, switchboards, circuit breaker status, protective equipment, capacitors, generators, panelboards, PDU, UPS, utility meter pulses	**System Monitoring & Analysis** • Transient Voltage • Disturbances • Power Quality & Harmonics **Power System Automation** • Auto Throw Over (ATO) Systems • Load preservation **Preventative Maintenance** • Emergency Power Supply System Documentation • Remote Alarm Notification **Advanced Diagnostics** • Sequence of Events • GPS Time Stamping • Root Cause Analysis **Power System Engineering & Consulting** • Safety & Code Compliance • Electrical Distribution System Assessment System Studies

At Square D/Schneider Electric, we pride ourselves on reliable products, innovative systems, expert engineering services, and our ability to provide single-source energy and power management solutions. It's not just a concept to us, it's a legacy and a promise—for companies that seek an edge in productivity. That's why leaders turn to Square D/Schneider Electric.

The New PowerLogic System

New!

As the key component of Schneider Electric's smart energy efficiency offering, the Square D® PowerLogic system now consists of the most complete energy and power management portfolio available.

Backed by experienced power system experts, and offering the most comprehensive range of technical support and engineering services, we are ready to handle your energy efficiency and reliability challenges. Our recent acquisition of Power Measurement has both doubled our resources and increased the breadth of needs that can be solved by leading-edge Square D PowerLogic solutions. Our total solution approach includes a range of products from simply configurable to highly flexible with ION® technology options for building and customizing solutions for your business.

The PowerLogic system acts like a layer of energy and power intelligence across all of your power equipment and piped utility assets, helping you meter and monitor all types of energy and, in turn, reduce energy costs, optimize equipment utilization and improve system reliability performance.

A tightly integrated network of software and meters can span a single facility or an entire multi-site enterprise. The system monitors key points from the circuit breaker and equipment throughout the power delivery chain, 24 hours a day, from generators and substations to service entrances, mains, feeders and individual branch circuits.

At the administrative level, PowerLogic acts as a web portal, delivering timely, relevant information to anyone that needs it, anywhere they are. Advanced analytic tools enable effective decisions, while coordinated control capabilities help you act on them. Together, this represents a fast and quantifiable return on investment.

The PowerLogic Advantage

Square D/Schneider Electric has decades of experience in delivering energy and power management solutions to thousands of customers, including most of the Fortune 500. We are a complete single-source provider that can fully integrate energy and power management with power distribution and automation solutions.

- PowerLogic is innovative technology featuring enterprise-level features such as energy modeling, web-enabled communications and the world's most advanced line of energy and power quality instrumentation.
- PowerLogic supports industry standards, including accuracy certifications, power quality compliance standards, and measurement and verification protocols.
- PowerLogic is scalable; take advantage of modular applications and hardware to add or upgrade components easily and affordably.
- PowerLogic fits perfectly with other business, automation, metering or billing systems.
- PowerLogic represents a low cost of installation and ownership; systems are cost-effective, feature-rich, easy to use, and supported by extensive services that ensure you get the most from your solution.

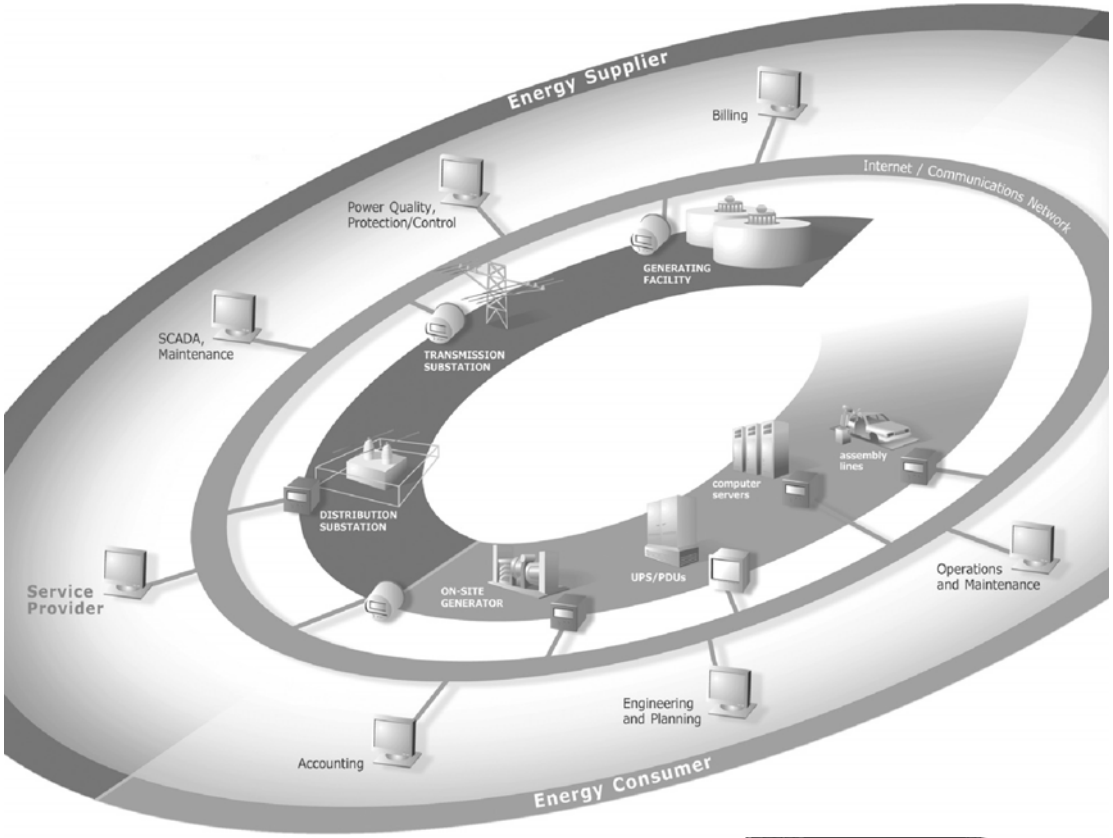
Reduce Energy Costs **O**ptimize Equipment **I**mprove System Reliability Your ***ROI*** Solution Partner

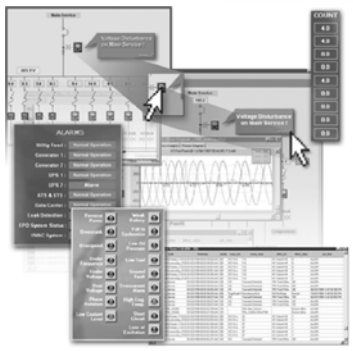
PowerLogic ION Enterprise Operations Software is an all-in-one package for operational power system monitoring, analysis and control that helps you reduce energy-related costs. It offers control capabilities, comprehensive power quality and reliability analysis and helps reduce energy related costs. The software is a suite of applications that allows you to collect, process, analyze, store, and share data across your entire enterprise. PowerLogic ION Enterprise software is designed to give you the information and analysis tools you need to make sound decisions. Its cutting-edge flexibility and compatibility allow you to extend your energy management system at your own pace, adding newer components as they become available, without interrupting or impacting existing functions. PowerLogic ION Enterprise collects data through serial, wireless, modem or Ethernet links and can manage a single site or, through the Internet, connect a global network of devices.

Interface to existing software systems and integrate third-party equipment, leveraging support for a variety of industry-standard protocols. ION Enterprise also enables you to access information from any desktop, locally or around the world, in the format you need. Control of your system is always within easy reach. Thanks to patented ION technology, you get out-of-the box usability, plus you can quickly add or rearrange functions with drag-and-drop icons and a few clicks of a mouse.

PowerLogic ION Enterprise Operations Software is ideal for energy suppliers and energy consumers and provides powerful tools for:

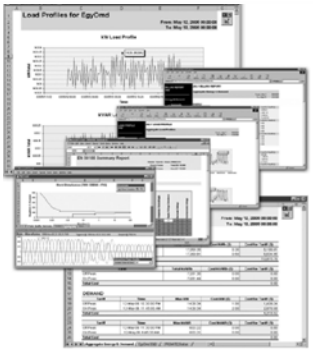
- Power quality and reliability analysis
- Load studies and circuit optimization
- Demand and power factor control
- Equipment monitoring and control
- Preventative maintenance
- Cost allocation and billing





Respond to notifications, click an indicator to retrieve the time, location, and nature of the event. Click again to study tolerance curves, waveforms, or a report.

Control loads, generation, and power quality mitigation equipment. Optimize switching with the latest status and base loading data.



Allocate costs, consolidate billing or negotiate contract volume pricing. Assure compliance with PQ standards and verify operational progress.

New!

ION Enterprise® Software Ordering Information/Meter Selection

Table 4.2: PowerLogic ION Enterprise Software Ordering Information

Description	Catalog No.	$ Price
Core Software Products▲		
ION Enterprise Base software	IONE56BASE	**719.00**
ION Enterprise Device license (For 100+ devices, please call the factory for volume pricing)	IONE56DL	**251.00**
ION Enterprise Client license	IONE56CL	**719.00**
OPC Server support for ION Enterprise	IONEOPCV1	**3055.00**
SQL Server 2005 bundle option (CD and 1-CPU license)	IONESQL2005	**2440.00**
SQL Server 2005 additional CPU license	IONESQL2005CPU	**1525.00**
Upgrades from PowerLogic ION Enterprise 5.5		
ION Enterprise Base Upgrade	IONE56UPGRADE	**359.00**
ION Enterprise Device upgrade	IONE56DLUPG	**125.00**
ION Enterprise Client license upgrade	IONE56CLUPG	**359.00**
Related Items		
ION Enterprise Replacement CD	IONE56REPCD	**215.00**
ION Enterprise 5.5 Software Documentation Binder	DOC-BINDERIE5	**143.00**
ION Enterprise 5.5 Administrator Guide	DOC-UGUIDE204	**71.00**
ION Enterprise 5.5 Client User Guide	DOC-UGUIDE205	**35.00**

▲ Every new system must be ordered with 1 IONE55-Base software and a minimum of 5 IONE55-DL device licenses.

Table 4.3: PowerLogic ION Power and Energy Meter Selection

Features■	ION8600			ION7650	ION7550	ION7350	ION7330	ION7300	ION6200
	A	B	C						
Inputs, outputs and control power									
3-phase / single-phase	•/•	•/•	•/•	•/•	•/•	•/•	•/•	•/•	•/•
Digital in and out / analog in and out	16 / 4	16 / 4	16 / 4	20 / 8	20 / 8	8 / 8	8 / 8	4 / 8	2 /
Power supply options	AC/DC	AC/DC	AC/DC	AC/DC	AC/DC	AC/DC	AC/DC	AC/DC	AC/DC
Power and energy measurements									
V, I, F, PF	•	•	•	•	•	•		•	
Power, demand	•	•	•	•	•	•	•	•	•
Energy / time-of-use (energy per shift)	•/•	•/•	•/•	•/•	•/•	•/•	•/•	•/•	•/
ANSI energy accuracy class (% of reading)	0.2	0.2	0.2	0.5	0.5	0.5	0.5		
Measurement Canada Approval	•			•	•	•	•		
Loss compensation	•	•	•	•	•				
Power quality analysis									
Compliance monitoring (e.g. EN50160)	•			•					
Flicker measurement	•			•					
Transient disturbance capture	•			•					
Sag and swell monitoring	•	•	•	•	•	•			
Harmonics measurement	63 rd	63 rd	31st	63 rd	63 rd	31st	15th	15th	THD
Uptime (number of 9's) calculation	•	•	•	•	•	•	•	•	
Waveform capture	•			•	•	•			
Data and event logging									
Trend / snapshot	•/•	•/•	•/•	•/•	•/•	•	•		
Min/max	•	•	•	•	•	•	•		
Events	•	•	•	•	•	•	•		
Timestamp resolution (seconds)	0.001	0.001	0.001	0.001	0.001	0.001	0.001		
GPS sync	•	•	•	•	•				
Setpoints, alarms and control									
Annunciation / call out on alarm	•/•	•/•	•/•	•/•	•/•	•/•	•		
Trigger logging	•	•	•	•	•	•	•		
Trigger relay or digital output control	•	•	•	•	•	•	•		
Special features									
Custom programming: arithmetic, boolean, object-oriented	•	•	•	•	•	•	•		
Downloadable firmware	•	•	•	•	•	•	•	•	•
Communications									
Ethernet port / web / email	•/•/•	•/•/•	•/•/•	•/•/•	•/•/•	•/•/•	•/•/•	•/•/	•/ /
Telephone modem port	•	•	•	•	•	•	•		
Infrared port	•	•	•	•	•	•	•	•	
RS485 / RS232 ports	•/•	•/•	•/•	•/•	•/•	•/	•/	•/	•/
Modbus / DNP / MV-90 protocols	•/•/•	•/•/•	•/•/•	•/•/•	•/•/•	•/•/•	•/•/•	•/ /	•/ /

■ Specifications represent maximum capabilities with all options installed. Some options are not available concurrently. This is not a complete feature list, please refer to detailed product specifications.

ION8600/7550/7650 Power and Energy Meters

The web-enabled PowerLogic ION8600 is used to monitor electric distribution networks, service entrances and substations. It enables businesses to manage complex energy supply contracts that include power quality guarantees. Low-range current accuracy makes it ideal for independent power producers and cogeneration applications that require the accurate bi-directional measurement of energy. It is well suited to load curtailment, equipment monitoring and control and energy pulsing and totalization applications. Integrate it with PowerLogic ION EEM enterprise energy management software, PowerLogic ION Enterprise operations software or other energy management and SCADA systems.

PowerLogic ION8600 Power and Energy Meter Features

Feature set C includes:

- 9S, 39S, 35S, 36S, 76S socket and switchboard cases
- True RMS 3-phase voltage, current, power and meets stringent ANSI revenue metering standards including ANSI C12.20 0.2 and Class 2, 10, & 20
- Power quality: sag/swell, individual, even, odd, total harmonics to the 31st and symmetrical components
- 2MB log/event memory, min/max for any parameter, historical logs up to 32 channels, timestamp resolution to 0.001 seconds and GPS time synchronization
- Transformer/line loss compensation and Instrument transformer correction
- Communications: Fiber, Ethernet, Serial, Modem, Internet and Ethernet to serial gateway and ION, DNP 3.0, Modbus RTU, Modbus TCP and MV-90 protocols
- Dial-out capability when memory is near full
- Multi-user, multi-level security with control and customized access to sensitive data for up to 16 users
- Data push capability through SMTP (email)
- 65 setpoints — math, logic, trig, log, linearization formulas
- Password protection and anti-tamper seal protection
- Built-in I/O: 4 KYZ digital outs and 3 form A digital ins, an optional external I/O expander provides additional I/O

Feature set B adds the following to feature set C:

- Harmonics - individual, total even, total odd up to the 63rd
- 4MB standard memory
- Historical logs up to 320 channels
- Modbus RTU Master on serial ports
- Cycle setpoint minimum response time

Feature set A adds the following to feature sets C and B:

- Waveform capture up to 256 samples/cycle, PQ compliance monitoring, flicker to EN50160, IEC 6100-4-7/4-15 (also configurable to IEEE 519-1992, IEEE159, SEMI) CBEMA/ITIC
- Transient detection to 65µs at 60Hz;
- Harmonics: magnitude, phase and inter-harmonics to the 40th
- 10MB standard memory
- Max 96 cycles of waveform logs and 800 channels of historical logs

Note: Please refer to powerlogic.com for the most complete and up-to-date list of feature availability. Some features are optional.

Table 4.4: Typical PowerLogic ION8600 Power and Energy Meter Ordering Configurations

Description	Catalog No.	$ Price
ION8600, feature set A, 9S socket base, 5A nominal current inputs, auxiliary power pigtail: 65-120Vac/80-160Vdc, 60 Hz, communications card with: 10baseT Ethernet — RS-232/485 — Optical, RS-485	S8600A0C0H6E0A0A	**6252.00**
ION8600, feature set B, 9S socket base, 5A nominal current inputs, auxiliary power pigtail 65-120Vac/80-160Vdc, 60 Hz, communications card with: 10base T Ethernet — Optical, RS-485	S8600B0C0H6E0A0A	**4700.00**
ION8600, feature set B, 9S socket base, 5A nominal current inputs, auxiliary power pigtail 65-120Vdc/80-160Vac, 60 Hz, communications card with: RS-232/485. RS-485, Optical port, standard I/O	S8600C0C0H6A0A0A	**2609.00**

PowerLogic ION7550 and ION7650 Power and Energy Meters

Used at key distribution points and sensitive loads, the web-enabled PowerLogic ION7550 and PowerLogic ION7650 meters combine a wealth of advanced features from power quality analysis capabilities, revenue accuracy and multiple communications options, through web compatibility, and control capabilities. Both are compatible with PowerLogic ION EEM enterprise energy management software, PowerLogic ION Enterprise operations software can be integrated with other energy management or building control systems through multiple communication channels and protocols.

The meters are ideal for compliance monitoring, disturbance analysis, cost allocation and billing, demand and power factor control and equipment monitoring and control. The meters have a high visibility, adjustable front panel display that can depict TOU, harmonics, event logs, phasers, and instantaneous power parameters. They meet stringent ANSI C12.20 0.2, Class 10 & 20 revenue metering standards.

PowerLogic ION7550 and ION7650 Power and Energy Meter Features

The PowerLogic ION7550 includes:

- 3.5" x 4.5" (87 x 112 mm) backlit LCD display
- True RMS 3-phase voltage, current, and power that meets stringent ANSI C12.20 0.2, Class 2, 10, & 20
- Power quality: sag/swell, harmonics - individual, even, odd, total to the 63rd, waveform capture at 256 samples/cycle
- 5MB log/event memory (10MB optional), waveform logging up to 96 cycles, up to 800 channels historical, min/max, timestamp resolution to 0.001 seconds, GPS time synchronization and historical trends through front panel
- Communications: fiber, Ethernet, serial, internal modem, optical port, and a gateway functionality, ION, DNP 3.0, Modbus RTU - master & slave, Modbus TCP and MV-90
- Dial-out capability when memory is near full
- Data push capability through SMTP (email)
- Multi-user, multi-level security with control and customized access to sensitive data for up to 16 users
- 65 configurable _ cycle setpoints for single, multi-condition and dial out on alarm and math, logic, trig, log, linearization formulas
- Password protection and anti-tamper seal protection enhance meter security
- Extensive standard I/O includes: 8 digital inputs, 4 digital outputs and 3 onboard relays

The ION7650 has all the features of the ION7550 and adds:

- Waveform capture up to 1024 samples/cycle
- Transient detection to 17µs at 60Hz
- Harmonics: magnitude, phase and inter-harmonics to the 40th
- Flicker to EN50160 and IEC 6100-4-7/4-15 (also configurable for IEEE 519-1992, IEEE159, SEMI), plus CBEMA/ITIC
- Symmetrical components

Note: Please refer to powerlogic.com for the most complete and up-to-date list of feature availability. Some features are optional.

Table 4.5: Typical PowerLogic ION7550/7650 Power and Energy Meter Ordering Configurations

Description	Catalog No.	$ Price
Typical PowerLogic ION7550 Power and Energy Meter Ordering Configurations		
Integrated display, with 512 samples/cycle, 5 MB logging memory, 5A inputs, standard power supply, standard comms. (1 RS232/RS485 port, 1 RS485, 1 Type 2 optical port) plus Ethernet, standard I/O	S7550A0C0B6E0A0A	**6318.00**
Integrated display, with 512 samples/cycle, 5 MB logging memory, 5A inputs, standard power supply, standard comms. (1 RS232/RS485 port, 1 RS485, 1 Type 2 optical port), standard I/O	S7550A0C0B6A0A0A	**5589.00**
Typical PowerLogic ION7650 Power and Energy Meter Ordering Configurations		
Integrated display, with 1024 samples/cycle, 10 MB logging memory, 5A inputs, standard power supply, standard comms. (1 RS232/RS485 port, 1 RS485, 1 Type 2 optical port) plus Ethernet, standard I/O, EN50160 compliance monitoring	S7650B1C0B6E0A0E	**9279.00**
Integrated display, with 512 samples/cycle, 5 MB logging memory, 5A inputs, standard power supply, standard comms. (1 RS232/RS485 port, 1 RS485, 1 Type 2 optical port) plus Ethernet, standard I/O	S7650A0C0B6E0A0A	**7869.00**

Used in diverse applications such as feeder monitoring and sub-metering, the PowerLogic ION7300 series meters are also suitable for high-accuracy power and energy metering, bill verification, cost allocation and billing, demand and power factor control, load studies, circuit optimization, equipment monitoring and control and preventative maintenance. They are ideal replacements for analog meters, with a multitude of power and energy measurements, analog and digital I/O, communication ports and industry-standard protocols. The ION7330 meter adds on-board data storage, emails of logged data and an optional modem. The ION7350 meter is further augmented by more sophisticated power quality analysis, alarms and a call-back-on-alarm feature. They are compatible with PowerLogic ION EEM enterprise energy management software, PowerLogic ION Enterprise operations software or can be integrated with other energy management or building control systems through multiple communication channels and protocols.

PowerLogic ION7350, ION7330 and ION7300 Power and Energy Meter Features

The PowerLogic ION7300 includes:

- Multiple form factors: transducer integrated and remote display models, GE S1 or ABB FT21 switchboard forms
- True RMS 3-phase voltage, current, and power that meets stringent ANSI C12.16, Class 10
- Power quality: harmonics - individual, even, odd, total to the 15th, maximum 32 samples/cycle
- Communications: 1 RS-485 port, 1 optional Ethernet port, 1 ANSI Type 2 infrared optical port, 1 PROFIBUS DP port (ION7300 only), onboard web server
- Supported protocols include : ION, Modbus RTU slave on serial, modem, I/R ports, Modbus TCP through Ethernet
- Extensive standard I/O includes: 4 analog inputs, 4 analog outputs, 4 digital relay outputs
- Minimum/maximum recording

The ION7330 adds the following features:

Time of use - multi-year scheduling, hourly activity profiles

- 4 digital inputs for status monitoring and pulse counting
- Communications: a second RS-485 port, internal modem, DNP 3.0 through serial, modem and I/R ports, EtherGate and ModemGate, data/alarms via e-mail and MV-90 on serial and Ethernet ports
- 12, one second setpoints for single, multi-condition alarms, plus math, logic, trig, log, and linearization formulas
- Non-volatile onboard memory capacity of 300kb, min/max logging, min/max logging, up to 32 channels of historical logs, timestamp resolution to 0.001 seconds

The ION7350 includes the following additional features:

- Power Quality: sag/swell, individual, even, odd, total harmonics up to 31st , maximum 64 samples/cycle
- Up to 96 channels of logs and up to 48 cycles of waveform logs
- Alarm notifications via e-mail

Table 4.6: Typical PowerLogic ION7350/7330/7300 Power and Energy Ordering Configurations

Description	Catalog No.	$ Price
Typical PowerLogic ION7350 Power and Energy Meter Ordering Configurations		
Integrated display with optical port, 5A inputs, standard power supply, standard comms, (two RS-485 ports) plus 10BaseT Ethernet	S7350A0B0B0E0A0A	**3567.00**
Integrated display with optical port, 5A inputs, standard power supply, standard comms, (two RS-485 ports)	S7350A0B0B0A0A0A	**2906.00**
Typical PowerLogic ION7330 Power and Energy Meter Ordering Configurations		
Integrated display with optical port, 5A inputs, standard power supply, standard comms, (two RS-485 ports) plus 10BaseT Ethernet	S7330A0B0B0E0A0A	**2800.00**
Integrated display with optical port, 5A inputs, standard power supply, standard comms, (two RS-485 ports)	S7330A0B0B0A0A0A	**2159.00**
Typical PowerLogic ION7300 Power and Energy Meter Ordering Configurations		
Integrated display with optical port, 5A inputs, standard power supply, standard comms, (one RS-485 port)	S7300A0B0B0A0A0A	**1436.00**

The modular PowerLogic ION6200 is a low-cost, ultra-compact meter that offers outstanding versatility and functionality. It is simple to use, and has a big, bright LED display. It offers four-quadrant power, demand, energy, power factor and frequency measurements, and is available in a variety of flexible configurations. It is available as a low-cost base model to which enhanced functionality can be added over the long term. The PowerLogic ION6200 is ideal for customers who need revenue-accurate and/or certified measurements and want easy integration with power distribution assemblies and building automation systems. A Megawatt version is available for applications requiring readings in megawatts and kilovolts. It is well suited for sub-metering, energy cost tracking load profiling, and substation panel metering and is an ideal replacement for analog meters. It can be used for stand-alone metering in custom panels, switchboards, switchgear, gensets, motor control centers and UPS systems.

The meter consists of a base unit with options card and a power supply pack, with a remote display being optional.

PowerLogic ION6200 Power and Energy Meter Features

- Only two inches deep, and fits a standard ANSI four-inch switchboard cutout, or as a TRAN model with no display and can be fastened to a flat surface with a 4" (10cm) ANSI bolt pattern or mounted to a DIN rail. A remote display module (RMD) can be ordered for the TRAN and mounted through an ANSI 4" (10cm) and DIN 96 cutout.
- LED display with twelve 3/4" (19mm) high digits that display all basic power parameters
- Pulse Outputs: optional kWh, kVARh and/or kVAh pulsing
- Via two Form A outputs
- Communications: optional RS-485 port with Modbus RTU and ION compatible
- 64 samples per cycle true RMS
- 3-phase voltage and current inputs

The standard ION6200 is available with the following parameters:

Voltage L-N average and per phase, Voltage L-L average and per phase, Current average and per phase

Option EP#1, includes the standard measurements and provides the following additional parameters:

I4, kW/mW total, kWh/mWh total, kW/mW peak, Current demand average and per phase, Current peak demand average and per phase, Power factor total

Optional Enhanced Package, includes the standard measurements and provides the following additional parameters:

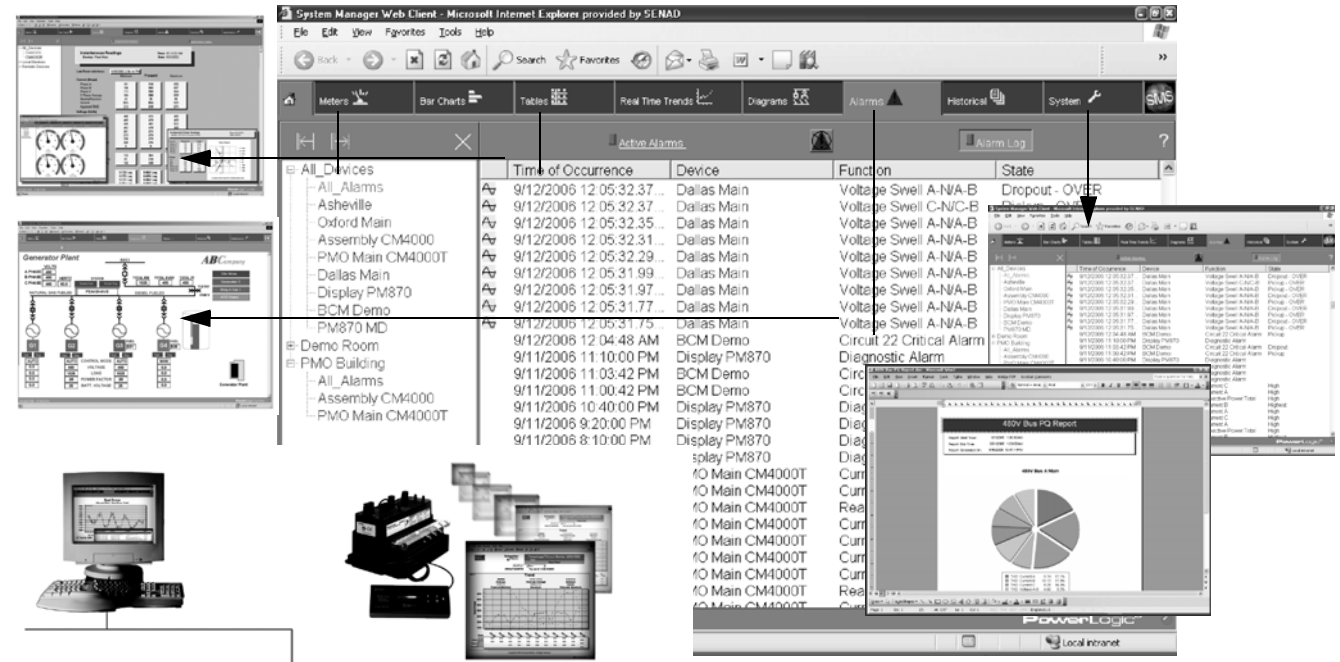
kW/mW per phase, kVAR/mVAR total and per phase, kVA/mVA total and per phase, kWh/mWh and del/rec per phase, kVARh/mVARh total and del/rec per phase, kVAh/mVAh total and per phase, kW/mW demand, kVAR/mVAR demand and peak, kVA/mVA demand and peak, Power Factor per phase, Voltage THD per phase, Current THD per phase

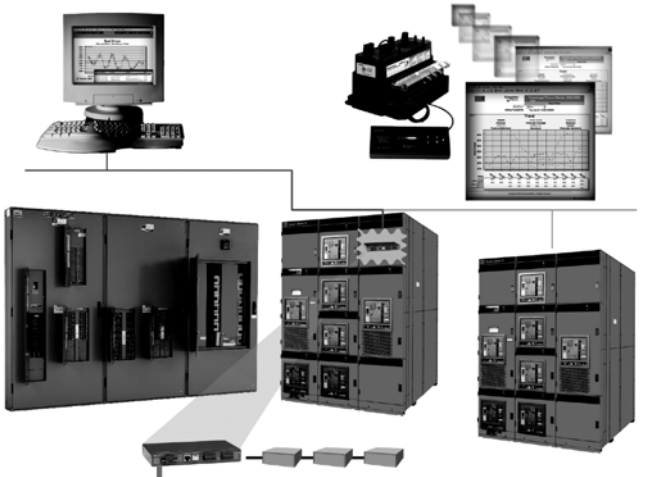
Please refer to powerlogic.com for the most complete and up-to-date list of feature availability. Some features are optional.

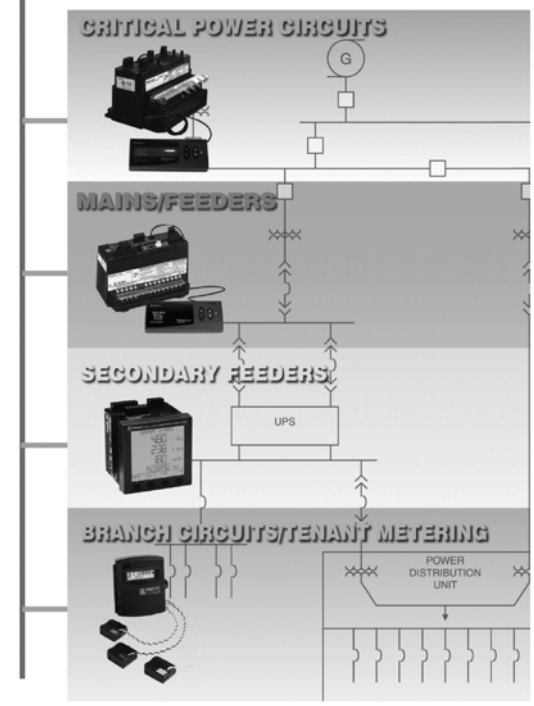
Table 4.7: Typical PowerLogic ION6200 Power and Energy Meter Ordering Configurations

Description	Catalog No.	$ Price
Integrated display, 10A inputs, standard 100-240 Vac power supply, RS485 port (Modbus RTU), Enhanced Package #2	S6200A0A0B0A0A0R	**943.00**
TRAN Model, with remote display, 10A inputs, standard 100-240 Vac power supply, RS485 port (Modbus RTU), Enhanced Package #2	S6200R1A0B0A0A0R	**977.00**
TRAN Model, (no display), 10A inputs, standard 100-240 Vac power supply, RS485 port (Modbus RTU), Enhanced Package #2	S6200T1A0B0A0A0R	**753.00**

PowerLogic System Manager Software is designed to help control the cost, quality and reliability of your electrical and piped utilities. With a PowerLogic system installed at your facility, you can identify where extra capacity exists, determine if and where the equipment is being overstressed and balance loads on your power equipment. By examining and changing the way you use power, you will save money. System Manager gives access to information so effective decisions can be made concerning utility cost allocation, capital equipment purchases and building improvements. Plus, System Manager is an essential tool for operations personnel to keep systems running before problems occur, using graphical data and early alarm notifications.







PowerLogic System Manager Software (SMS) is a full featured web-enabled product family. With built-in intuitive views, SMS ensures a consistent power and utility monitoring experience. Upon installation, the system contains over 50 real time tables, analog meters and barcharts, an alarm log with waveform links, pre-engineered power quality and utility cost reports, and more. You can also tailor SMS to meet your own needs with customized screens, trends and reports that are automatically incorporated into the tabbed navigational user interface.

- Distributed monitoring with automatic data collection from device onboard memory to eliminate nuisance data gaps.
- Open architecture with industry standard protocols.
- Supports a plethora of intelligent power equipment and monitoring devices.
- Modular add-ons for advanced graphics, reports, billing and customized functionality enhancements.
- Real time data and report sharing with secure access to information.
- Remote alarm notification to email, pagers and other mobile devices.
- Alarms show active status and alarm history with waveform analysis links to aid troubleshooting power quality system events.
- Interactive diagrams graphically mimic your system and can provide real time fault diagnostics indicating whether the direction of the last disturbance was upstream or downstream of the monitoring point.

Table 4.8: PowerLogic System Manager Software Ordering Information

Description	Catalog No.	$ Price
Core Software Products		
System Mgr. Device Limited (1 web-enabled client, 16 devices, up to 32 devices with SMSDL32U, Interactive Graphics)	SMSDL	**4150.00**
System Mgr. Standard Ed. (1 web-enabled client, MSDE or SQL Personal Edition with Interactive Graphics)	SMSSE	**12750.00**
System Mgr. Professional Edition (10 web-enabled clients, SQL Server, Advanced Reports, Interactive Graphics)	SMSPE	**19950.00**
Add On Modules		
SMS OPC Server Application	SMSOPC	**2980.00**
SQL Server 2005 End User License	SMSLIC	**1785.00**
Active Pager Module - Paging applications with conditional alarms assigned by shift	9789PAGE	**3820.00**
WAGES Module - Monitoring electrical and piped utilities available with engineered project	Available as Engineered Project	
SER Module - Sequence of Events software interface for GPS time synch available with engineered project	9789SER	**15000.00**
EPSS Test Report Module available with engineered project	9789EPSSTSTRPT	**4650.00**
Extension Products		
Enables Standalones (DL & SE) with Remote Web clients (5 pk licenses)	SMSWebXTR	**2575.00**
Extends SMSDL to 32 device limit	SMSDL32U	**2575.00**
Converts SMSDL to SMSSE	SMSDL2SE	**8755.00**

Table 4.9: PowerLogic Circuit Monitor and Power Meter Selection

Features▲	CM4000T	CM4250	CM3350	CM3250	PM870	PM850	PM820	PM750	PM710
Inputs, outputs and control power									
3-phase / single-phase	•/•	•/•	•/•	•/•	•/•	•/•	•/•	•/•	•
Digital in and out / analog in and out	24 / 4	24 / 4	9 / 0	9 / 0	18 / 8	18 / 8	18 / 8	3/	
Power supply options	AC/DC	AC/DC	AC/DC	AC/DC	AC/DC	AC/DC	AC/DC	AC/DC	AC/DC
Power and energy measurements									
V, I, F, PF	•	•	•	•	•	•	•	•	•
Power, demand	•	•	•	•	•	•	•	•	•
Energy / energy per shift (time-of-use)	•/•	•/•	•/•	•/•	•/•	•/•	•/•	•/	•/
Energy accuracy (%)	0.2	0.2	0.5	0.5	0.5	0.5	0.5	0.5	1.0
Standards compliance to ANSI / IEC	•/•	•/•	•/•	•/•	•/•	•/•	•/•	•/•	•/•
Power quality analysis									
Compliance monitoring (e.g. EN50160)	•	•	•	•	•	•			
Flicker measurement	•								
High-speed transient disturbance capture (200 ns)	•								
Transient disturbance capture	•	•	•		•				
Disturbance direction detection	•	•	•						
Sag/swell monitoring	•	•	•		•				
Harmonics measurement	•	•	•	•	•	•	•	•	•
Uptime (number of 9's) calculation	•	•	•	•					
Waveform capture	•	•	•	•	•	•			
Waveshape alarm	•	•							
Data and event logging									
Trend / billing	•/	•/	•/	•/	•/•	•/•	/•		
Minimum and maximum	•	•	•	•	•	•	•	•	•
Events / maintenance	•/•	•/•	•/	•/•	•/	•/	•/	•/	•/
Timestamp resolution (seconds)	0.001	0.001	0.001	0.001	1	1	1		
GPS sync	•	•	•	•					
Setpoints, alarms and control									
Annunciation / call out on alarm	•/•	•/•	•/•	•/•	•/	•/	•/	•/	
Trigger logging	•	•	•	•	•	•	•		
Trigger relay or digital ouput control	•	•	•	•	•	•	•		
Special features									
Custom programming: arithmetic, boolean	•	•							
Downloadable firmware	•	•	•	•	•	•	•	•	•
Communications									
Ethernet port / web / email	•/•/•	•/•/•	•/•/•	•/•/•					
Infrared port	•	•	•	•					
RS485 / RS232 ports	•/•	•/•	•/	•/	•/•	•/•	•/•	•/	•/
Modbus protocol	•	•	•	•	•	•	•	•	•

▲ Specifications represent maximum capabilities with all options installed. Some options are not available concurrently. This is not a complete feature list. Please refer to detailed product specifications.

Series 700 Power Meter

PowerLogic Series 700 Power Meter

The PowerLogic Power Meter 710 offers all of the measurement capabilities required to monitor an electrical installation in a single 96 x 96 mm unit extending only 50 mm behind the mounting surface (less than 2 inches).

With its large display, you can monitor all three phases and neutral at the same time. The anti-glare display features large 11 mm high characters and powerful backlighting for easy reading, even in extreme lighting conditions and viewing angles.

- Panel instrumentation (OEMs)
- Sub-billing and cost allocation
- Remote monitoring of an electrical installation
- Harmonic monitoring (THD)

Power and current demand, THD and min/max reading in basic version

A high-performance solution for trouble-free monitoring of your electrical installation.

Energy Class 1 as defined by IEC 62053 (or IEC 61036)

Suitable for sub-billing and cost-allocation applications.

Table 4.10:

Description	Catalog No.	$ Price
Series 700 Power Meters		
PM710 Power Meter with integrated display and comms	PM710	**710.00**
▲PM750 Power Meter with (2) digital input, (1) digital output	PM750	**950.00**

▲ Available 2nd Quarter, 2007

Series 800 Power Meter

PowerLogic Series 800 Power Meters

The PowerLogic PM800 series Power Meter is a high-performance power-monitoring unit able to provide advanced power measurement capabilities in a compact 96x96 mm unit. Its large, easy to read display allows you to monitor all three phases and neutral simultaneously. With its easy to use intuitive interface and self guiding menus, the large anti-glare and back lit display makes this meter the easiest yet to navigate and use. The modular design allows for flexibility with an easy upgrade path to grow the meter's capabilities with the addition of Communication and I/O Modules.

- Monitor current, voltage, power and energy simultaneously
- Trending/Forecasting Curves functionality (PM850/870)
- 128 samples/cycle-zero blind metering
- Waveform capture (PM850), configurable waveform capture (PM870)
- Onboard logging (80k in PM820, 800k in PM850/PM870)
- Detection of voltage sags and swells
- Individual harmonic measurements on current and voltage
- Available with 2 standard Digital I/O
- Field installable Digital and Analog I/O
- THD measurement
- Meets IEC 60687 and ANSI C12.20 Class 0.5S accuracy
- Programmable (logic and mathematical functions)
- Optional field installable ethernet communications card with standard and custom web pages

Table 4.11:

Description	Catalog No.	$ Price
Series 800 Power Meters		
PM820 Power Meter with integrated display, THD, Alarming, 80kb Logging	PM820	**2390.00**
PM850 Power Meter with integrated display, THD, Alarming, 800kb Logging, Waveform Capture	PM850	**3889.00**
PM820 Meter unit only without display	PM820U	**2050.00**
PM850 Meter unit only without display	PM850U	**3529.00**
PM870 Power Meter with integrated display, THD, Alarming, 800 kb Logging, configurable Waveform Capture, Sag/Swell Detection	PM870	**4799.00**
PM870 Meter unit only without display	PM870U	**4460.00**
Series 800 Power Meter Accessories		
PM800 Display for integrated meter unit	PM8D	**443.00**
Module, 2 digital outputs, 2 digital inputs	PM8M22	**635.00**
PM800 Module, 2 digital outputs (relays), 6 digital inputs	PM8M26	**635.00**
PM800 Module, 2 digital out, 2 digital in, 2 analog out, 2 analog in	PM8M2222	**856.00**
PM800 Mounting adapter for CM2000	PM8MA	**267.00**
PM8ECC Ethernet Communications Card; 10/1000mb ethernet port and 1 RS-485 masterport	PM8ECC	**1150.00**

Transparent Ready™
Web-enabled Power & Control

PM8ECC Ethernet Communications Card

PowerLogic Series 3000 Circuit Monitor

The PowerLogic Series 3000 Circuit Monitor is designed for industrial, commercial and OEM users and is the ideal monitoring device for electrical mains, branch feeders, as well as OEM applications, such as computer power. It provides instant access to real time web pages without installing or learning special software.

CM3000 can serve up instantaneous readings, energy usage cost, power quality and disturbance analysis or even customized web pages. Web-access summary data transparently from other devices connected downstream.

Transparent Ready™
Web-enabled Power & Control

- Comes with 8Mb of standard memory allowing for more data logging than any other meter in its class
- 128 samples/cycle allow for zero blind metering
- Sag/Swell disturbance monitoring(CM3350)
- 100 ms Event recording(CM3350)
- Harmonic Powerflows to the 40th harmonic
- Sequence of events recording using GPS synchronization
- Built-in Trending and Forecasting functionality allows you to forecast energy usage up to 4 days in advance
- Custom web pages with optional Ethernet Communications Card
- Field installable Digital I/O card
- Meets IEC 60687 and ANSI C12.20 Class 0.5S accuracy

Series 3000 Power Meter

Table 4.12:

Description	Catalog No.	$ Price
Series 3000 Circuit Monitors		
Instrumentation, On-board Data Logging Waveform Capture, Disturbance Waveform Capture, Configurable I/O, 0.15% Accuracy	CM3250	**3944.00**
Same as CM3250 plus Sag/Swell Disturbance Detection and 100 ms RMS Event Recording	CM3350	**5121.00**

NOTE: *See page 4-11 for Series 3000 Accessories*

PowerLogic Series 4000 Circuit Monitor

CM4000T with VFD Display

The award winning, Web-enabled PowerLogic Series 4000 Circuit Monitor (CM4250) is the most advanced permanently mounted circuit monitor in the industry today. Designed for critical power and large energy users who cannot afford to be shut down, the CM4250 provides the ability to monitor, troubleshoot and preempt power quality problems. Transients (disturbances lasting less than one cycle) are particularly difficult to detect, due to their short duration. The CM4000T detects and captures oscillatory and impulsive transients (up to 10,000V peak, line-to-line at 5 MHz per channel) as short as one microsecond in duration. The CM4000T automatically performs a high-speed transient waveform capture and a longer disturbance capture to show the conditions surrounding an event. The CM4000T maintains a complete historical record of the number of transients per phase, along with the magnitude, duration and time of occurrence of each. It also performs a stress calculation to determine the circuits that have received the greatest stress from transient overvoltages.

PCM4000

- Waveform capture with up to 512 samples/cycle
- Built-in Trending and Forecasting functionality allows you to forecast energy usage up to 4 days in advance
- Sag/Swell disturbance monitoring
- Two option card slots for field installable cards
- Optional field installable Ethernet communications card with standard and custom web pages
- Alarm Setpoint Learning feature allowing optimum threshold setting (patent pending)
- Multiple alarms including standard, digital, Boolean, high-speed, and disturbance alarms
- Waveshape alarm monitoring
- High speed transient voltage detection at 5 MHz per channel with field installable CVMT current/voltage module
- True RMS Metering through the 255th harmonic
- Also available in a rugged sealed case as a Portable Circuit Monitor
- Extended waveform capture (up to 110 seconds)
- Field installable Digital/Analog I/O cards and flexible I/O extender modules
- Harmonic powerflows up to the 40th harmonic
- Standard KYZ pulse output
- Standard 16 MB of non-volatile memory (field upgradeable to 32 MB)
- Integrated power quality standards including EN50160, IEC 61000-4-15 (Flicker)
- Sequence of events recording using GPS synchronization technology
- Oscillatory transient detection and recording
- Extended range current/voltage module(CVMXR) for higher inrush currents available, field installable
- UL Listed, CSA Approved, CE Marking, NOM Approved, FCC compliant

Transparent Ready™
Web-enabled Power & Control

ECC21

IOC44 I/O Card

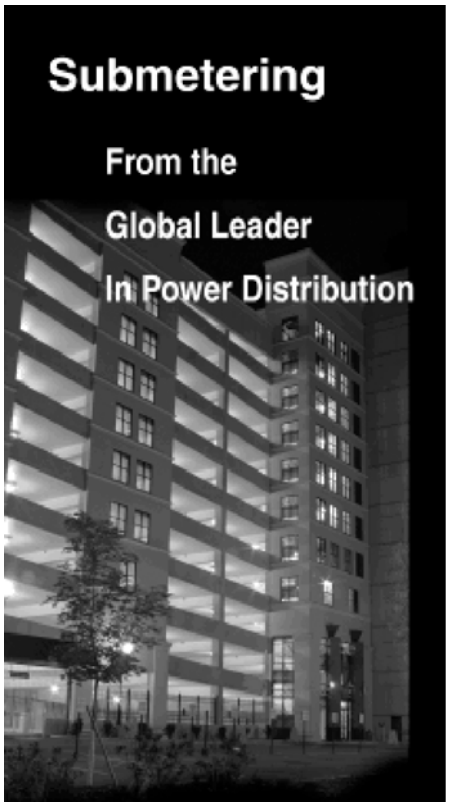
PowerLogic Series 4000 Circuit Monitor Optional Displays

- High visibility remote VF (vacuum fluorescence) display with I/R communications port
- Displays metering data, min/max values, alarms, inputs
- Remote LC (liquid crystal) display with backlighting also available
- Optional user configurable display screens

Table 4.13: Series 4000 Circuit Monitors

Description	Catalog No.	$ Price
Series 4000 Circuit Monitors		
Instrumentation, On-board Data Logging, Waveform Capture, Disturbance Recording, Configurable I/O, 0.04% Accuracy	CM4250	**6386.00**
Same as CM4000, Current Overrange of 100A up to 1 Second, 40A Continuous	CM4250XR	**7124.00**
Same as CM4000 plus Impulsive Transient Detection and Flicker (IEC 61000-4-15)	CM4000T	**8474.00**
Portable CM4000 Base Unit, Detachable Vacuum Fluorescent Display, Ride-though Module, Cable Set and Carrying Bag	PCM4000	**14205.00**
Portable CM4000 plus Impulsive Transient Detection and Flicker (IEC 61000-4-15)	PCM4000T	**17643.00**
Series 4000 Circuit Monitor Accessories		
Field installable I/O card with 3 relay outputs, 1 pulse output (KYZ) and 4 status inputs	IOC44♦	**796.00**
I/O Extender module with 4 DC status inputs, 2 DC digital outputs, 1 analog input and 1 analog output	IOX2411	**1253.00**
I/O Extender module with 4 status inputs and 4 analog inputs (4-20 mA)	IOX0404	**1650.00**
I/O Extender module with 8 status inputs	IOX08	**703.00**
I/O Extender module with no pre-installed I/O ▲	IOX	**459.00**
Ethernet Communications Card; 100 MB Fiber or 10/100 MB UTP Ethernet port and 1 RS-485 master port	ECC21♦	**1948.00**
Current/Voltage module	CVM	**1325.00**
Current/Voltage module with extended current range■	CVMXR	**2949.00**
Current/Voltage module with high speed transient detection■	CVMT	**5393.00**
4-line x 20 - character liquid crystal display with backlighting	CMDLC♦	**688.00**
4-line x 20 - character vacuum fluorescent display with I/R port and proximity sensor	CMDVF♦	**1207.00**
I/R communications interface for the vacuum fluorescent display	OCIVF♦	**604.00**
4 foot display cable	CAB4♦	**53.00**
12 foot display cable	CAB12♦	**89.00**
30 foot display cable	CAB30♦	**161.00**
Portable Circuit Monitor 5A CT 150/300/600A Range (Order 3 for complete set)	PLESNS36005	**856.00**
Portable Circuit Monitor 5A CT 500/1000/1500A Range (Order 3 for complete set)	PLESH163155	**1359.00**
Portable Circuit Monitor 5A CT 1000/2000/3000A Range (Order 3 for complete set)	PLESHP32335	**1886.00**
PowerLogic Satellite Time System, Circuit Monitor and SEPAM GPS Time Synchronization, 100 microsecond accuracy	STS3000	**5348.00**
Satellite Time Reference Module	STRM	**2827.00**
Smart Antenna Module	SAM	**2292.00**
Smart Antenna Module Interface Cable - 200 FT	SAIF200	**611.00**
Power Supply, 24DC/50W, DIN-mountable	PS080	**558.00**

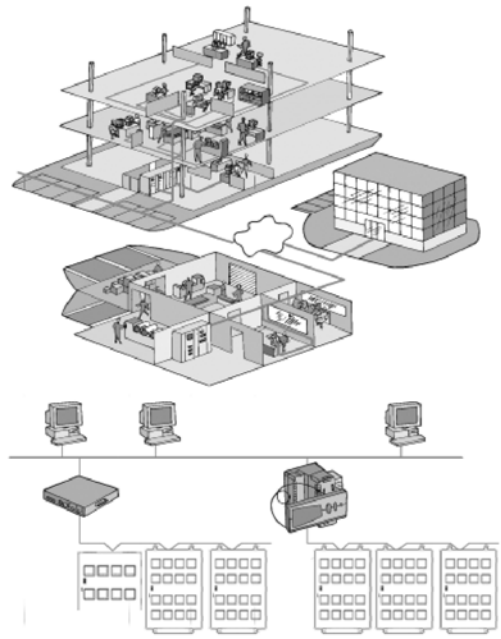
▲ Contact your nearest Square D/Schneider Electric sales office for additional I/O options.
■ CM4000 is field upgradeable to provide additional features of specified module.
♦ Also available for CM3000



PowerLogic Submetering

In today's increasingly competitive commercial property market, attracting and retaining high-quality, long-term tenants by offering exceptional value is the primary goal. Balancing these premium services and reliable infrastructure vs. the financial exposure to volatile utility costs is the challenge.

Minimizing energy costs requires information on how energy usage translates into money spent. PowerLogic energy sub-metering systems are specifically engineered to address the measurement, verification and billing needs of multi-tenant properties.

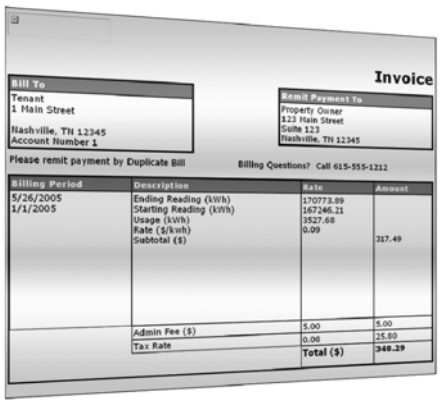


- Residential high-rise and low-rise
- Campuses
- Shopping centers
- Malls / food courts
- Offices
- Commercial buildings

PowerLogic energy management and metering systems are ideal for multi-tenant buildings providing:

- Metering & Verification tools to assure compliance to Energy Policy Act 2005
- Integrated approach from simple energy allocation requirements to high-end power quality
- Monitor energy usage and efficiency to accurately recover the costs while providing tenants with energy and a reliable infrastructure

Square D/Schneider Electric, a trusted equipment supplier for over 100 years, can be your single source for all your energy management needs — reliable metering systems, services, installation, operational costs, training and maintenance agreements.



Tenant Metering Software Solutions

PowerLogic Tenant Metering software allows you to allocate and recover the true cost of your facility's utilities. Intuitively designed even for the most novice computer user, PowerLogic Tenant Metering software is available in two different editions. PowerLogic Tenant Metering Commercial Edition Software (TMSCE) is designed to offer a broader range of functionality for more demanding commercial billing applications providing the flexibility necessary to manage a wide range of tenants, multiple locations and comprehensive utilities. Whereas, the existing Tenant Metering software (TMS), is the entry-level software more suited to residential applications delivering basic meter reading and tenant statements based on kWh consumption.

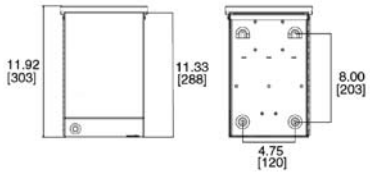
Table 4.14:

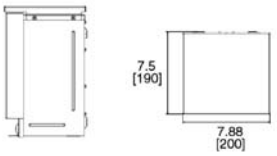
Description	Catalog No.	$ Price
Tenant Metering Software (TMS)	TMS	**2850.00**
Tenant Metering Commercial Edition	TMSCE	**5880.00**

Enterprise Energy Management

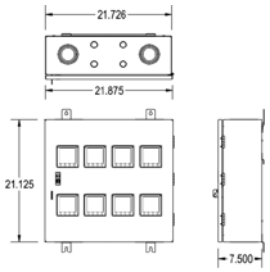
For comprehensive enterprise energy management, PowerLogic ION EEM is a solution that cleanses and warehouses data from power monitoring and control systems, building and process automation systems, utility information systems, weather services, spot-market energy pricing feeds and enterprise business applications. Personalized, browser-based dashboards and innovative visualization and modeling tools, then make the information available to whomever needs it, so you can accurately monitor, validate, predict and control energy-related expenses. For more details see ION EEM page 4-16.

High Density Metering
factory assembled enclosure
for multi-tenant properties

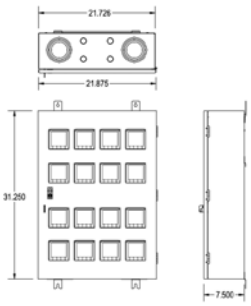




1-meter configuration



8 meter configuration



16 meter configuration

PowerLogic High Density Metering

PowerLogic High Density Metering (HDM) products are pre-wired, multi or single meter cabinets that offer a high quality, cost effective solution for submetering/billing, monitoring energy usage or energy cost allocation. They are ideal for new and retrofit construction in commercial, residential and industrial facilities and are easy to specify, purchase and install.

Features and Benefits

- **Simple Installation –** Mounting channels and surface mount flanges simplify installation for the 8 and 16-Meter Enclosures. Installation keyholes simplify installation for the 1 and 4-Meter Enclosures.
- **Accuracy –** ANSI C12.16. 1.0 and ANSI C12.20. 0.5 Accuracy Class compliant metering.
- **Flexibility –** Choose from 120/240 volt (12) single phase, 120/208 volt (12), 240 volt (12) three phase, 277/480 volt (48) three phase, 480 volt 3-wire (4T) three phase and 600 volt (4T) three phase.
- **Tamper Resistant –** lockable 1-Meter and 4-Meter Type 3R outdoor, or Type 1 indoor cabinets and lockable 8-Meter and 16-Meter indoor cabinets.
- **Space Saving –** A small footprint occupies a fraction of the space of traditional meter centers.
- **Accessibility –** Easy access to power, communication connection points and the shorting block.
- **Scalability –** Factory-installed wiring harness lets you easily add new meters to empty slots.
- **Industry Standard Communications –** Standard RS485 Modbus®, Ethernet Modbus® TCP option for 8 and 16-meter enclosures.
- **Compatibility –** Integrates with existing energy management systems and RTUs and advanced PowerLogic energy management software.

Table 4.15: High Density Metering Cabinet Ordering Information

Category	Meter Series	Voltage	Phasing	Enclosure Size	# Meters	Enclosure Rating	Description
HDM	PM210, PM750 ION6200	12, 48, 4T	1 or 3	1 or 4	0-4▲	Type 1 or Type 3R	High Density Power Meter Enclosure: 1 or 4
HDM	PM210 or PM750	12, 48	1 or 3	8 or 16	0-16▲	Type 1	High Density Power Meter Enclosure: 8 or 16

Example Catalog Number■

Category	Meter	Voltage	Phasing	Enclosure Size	# Meters	Outdoor Enclosure
HDM	PM210	48	3	4	3	R

Note: Complete part #: HDMPM2101211613

High Density Meter System includes:

- Enclosure
- Power Meters, installed▲
- Installation bulletin for Enclosure
- Wall hanging bracket (8 and 16 meter HDM)
- Installation bulletin for Meters

▲ Ordering Note: The last digit (second to last if Type 3R is specified) of each part number indicates the number of meters included in the enclosure. You may order any number of meters in the enclosure between zero and the maximum number of meters each cabinet will hold. Please indicate how many meters you need pre-installed when placing your order.

■ Example catalog number: HDMPM21048343R Description: High Density Metering Cabinet/PowerLogic Power Meter PM210 / 277/480 volt / 3-phase /4-meter cabinet / 3 meters installed▲, Type 3R (outdoor).

Table 4.16: Accessories and Options

Description	Catalog No.	$ Price
Auxiliary Wiring Harness for installation of additional meters (includes connectors and shorting terminal blocks)	HDMPMHKIT27	**221.00**
Cover plate for empty meter base	HDMCVRPLT	**5.90**
Water and Gas Meters	Consult factory for details	
50 Amp HDM Solid Core Current Transformer, 1.13" window size	HDMCT050S1	**35.00**
100 Amp HDM Solid Core Current Transformer, 1.13" window size	HDMCT100S1	**35.00**
125 Amp HDM Solid Core Current Transformer, 1.13" window size	HDMCT125S1	**35.00**
150 Amp HDM Solid Core Current Transformer, 1.13" window size	HDMCT150S1	**35.00**
200 Amp HDM Solid Core Current Transformer, 1.13" window size	HDMCT200S1	**52.00**
250 Amp HDM Solid Core Current Transformer, 1.13" window size	HDMCT250S1	**52.00**
400 Amp HDM Solid Core Current Transformer, 1.13" window size	HDMCT400S1	**52.00**

Energy Meter

PowerLogic Energy Meter

The Energy Meter is ideal for stand-alone and systems-based submetering applications. It is easy to install and provides exceptional metering accuracy. Available in Basic and Extended Range models. The Basic model is designed for metering of 120/240 and 208Y/120 volt services. The Extended Range model will meter 120/240 volt up to 480 volt Wye connected services. Extended Range meters come with pulse output and phase loss output not available on the Basic unit. Optional Modbus® RS-485 serial communications are provided with the Energy Meter Comms Board, EMCB. Optional kW demand is also provided by the EMCB.

Meter up to 3 individual services with one Energy Meter. The Energy Meter will allow the addition of up to 3 sets of parallel CTs for metering multiple electric loads. Additional sets of CTs can be ordered separately. Please refer to the multiple CT application notes in the Energy Meter instruction bulletin for the proper installation procedures.

Energy Meter

Table 4.17: Basic 120/240 Volt, 208 Volt Wye

Catalog No.	Description	$ Price
EMB1010	Basic 100A, .518"x1.28" ID, 1 CT	**426.00**
EMB1021	Basic 200A, 0.75" x 1.10" ID, 1 CT	**440.00**
EMB1032	Basic 300A, .90"x1.90" ID, 1 CT	**482.00**
EMB2010	Basic 100A, .518"x1.28" ID, 2 CTs	**438.00**
EMB2021	Basic 200A, 0.75" x 1.10" ID, 2 CTs	**464.00**
EMB2032	Basic 300A, .90"x1.90" ID, 2 CTs	**480.00**
EMB2043	Basic 400A, 2.45"x2.89" ID, 2 CTs	**505.00**
EMB2083	Basic 800A, 2.45"x2.89" ID, 2 CTs	**517.00**
EMB3010	Basic 100A, .518"x1.28" ID, 3 CTs	**750.00**
EMB3021	Basic 200A, 0.75" x 1.10" ID, 3 CTs	**766.00**
EMB3032	Basic 300A, .90"x1.90" ID, 3 CTs	**799.00**
EMB3043	Basic 400A, 2.45"x2.89" ID, 3 CTs	**825.00**
EMB3083	Basic 800A, 2.45"x2.89" ID, 3 CTs	**855.00**
EMB3084	Basic 800A, 2.45"x5.50" ID, 3 CTs	**903.00**
EMB3164	Basic 1600A, 2.45"x5.50" ID, 3 CTs	**903.00**

Table 4.18: Additional CT Sets

Catalog No.	Description	$ Price
EMCT010	100 A, .518" x 1.28" ID, 1 CT	**92.00**
EMCT021	200 A, 0.75" x 1.10" ID, 1 CT	**99.00**
EMCT032	300 A, .90" x 1.90" ID, 1 CT	**106.00**
EMCT043	400 A, 2.45" x 2.89" ID, 1 CT	**106.00**
EMCT083	800 A, 2.45" x 2.89" ID, 1 CT	**123.00**
EMCT084	800 A, 2.45" x 5.50" ID, 1 CT	**130.00**
EMCT164	1600 A, 2.45" x 5.50" ID, 1 CT	**130.00**

Note: CT quantity and amperage must match meter model. Total of combined loads must not exceed rating of meter. All additional CTs shipped with 6 ft. white and black color-coded wire leads.

Table 4.19: Extended Range 120-480 Volt Wye

Catalog No.	Description	$ Price
EME1010	Extended Range 100A, .518"x1.28" ID, 1 CT	**471.00**
EME1021	Extended Range 200A, 0.75" x 1.10" ID, 1 CT	**483.00**
EME1032	Extended Range 300A, .90"x1.90" ID, 1 CT	**518.00**
EME2010	Extended Range 100A,n.518"x1.28" ID, 2 CTs	**511.00**
EME2021	Extended Range 200A, 0.75" x 1.10" ID, 2 CTs	**536.00**
EME2032	Extended Range 300A, .90"x1.90" ID, 2 CTs	**550.00**
EME2043	Extended Range 400A, 2.45"x2.89" ID, 2 CTs	**567.00**
EME2083	Extended Range 800A, 2.45"x2.89" ID, 2 CTs	**585.00**
EME3010	Extended Range 100A, .518"x1.28" ID, 3 CTs	**811.00**
EME3021	Extended Range 200A, 0.75" x 1.10" ID, 3 CTs	**829.00**
EME3032	Extended Range 300A, .90"x1.90" ID, 3 CTs	**864.00**
EME3043	Extended Range 400A, 2.45"x2.89" ID, 3 CTs	**880.00**
EME3083	Extended Range 800A, 2.45"x2.89" ID, 3 CTs	**921.00**
EME3084	Extended Range 800A, 2.45"x5.50" ID, 3 CTs	**971.00**
EME3164	Extended Range 1600A, 2.45"x5.50" ID, 3 CTs	**971.00**

Table 4.20: Energy Meter Accessories

Catalog No.	Description	$ Price
EMCB	Energy Meter Communication Board▲	**267.00**
EMFP1	Energy Meter Fuse Pack, Set of 1	**47.00**
EMFP2	Energy Meter Fuse Pack, Set of 2	**94.00**
EMFP3	Energy Meter Fuse Pack, Set of 3	**142.00**
EMBOND	Energy Meter Bonding Kit	**117.00**

▲ Energy Meter communication board (EMCB) can be used with all models of the Energy Meter. Order one EMCB for each Energy Meter where either kW demand and/or communication is specified.

PowerLogic Enercept® Meter

Enercept Meter

The Enercept Meter is the ideal solution for submetering electric loads where space is at a premium. The compact design consists of three interconnected split-core CTs with the metering and communication electronics built into the CT housing. Simply snap on the CTs, connect the voltage inputs, the communication lines, and installation is complete. Both versions can be connected to either three-phase or single-phase circuits.

Enercept meters employ the Modbus® RTU 2-wire communication protocol, and can utilize the same communication network and PowerLogic System Manager™ software as other PowerLogic devices. Data from the Enercept meters can be presented in tabular or graphical format, used for alarming and historical logging and trending, and to produce reports.

Optional Enercept Display Interface acts as a stand-alone operator interface supporting up to 32 meters (63 with a repeater). In addition, the EDI can act as a network adapter allowing Enercept meters to be incorporated into a 4-wire network. The Enercept Network Adapter (ENA) is designed to act as a network adapter, allowing the Enercept meters to be integrated into a PowerLogic 4-wire network. The ENA converts the signals from the 4-wire network to the 2-wire network, as well as changing the parity between the two networks.

Table 4.21: Enercept Meter

Catalog No.	Description	$ Price
3020B012■	Basic 100A, 1.25" x 1.51" ID	**776.00**
3020B032■	Basic 300A, 1.25" x 1.51" ID	**800.00**
3020B043■	Basic 400A, 2.45" x 2.89" ID	**823.00**
3020B083■	Basic 800A, 2.45" x 2.89" ID	**847.00**
3020B084■	Basic 800A, 2.45" x 5.50" ID	**869.00**
3020B164■	Basic 1600A, 2.45" x 5.50" ID	**893.00**
3020B244■	Basic 2400A, 2.45" x 5.50" ID	**916.00**
3020E012	Enhanced 100A, 1.25" x 1.51" ID	**1035.00**
3020E032	Enhanced 300A, 1.25" x 1.51" ID	**1066.00**
3020E043	Enhanced 400A, 2.45" x 2.89" ID	**1097.00**
3020E083	Enhanced 800A, 2.45" x 2.89" ID	**1128.00**
3020E084	Enhanced 800A, 2.45" x 5.50" ID	**1159.00**
3020E164	Enhanced 1600A, 2.45" x 5.50" ID	**1190.00**
3020E244	Enhanced 2400A, 2.45" x 5.50" ID	**1221.00**

Table 4.22: Accessories

Catalog No.	Description	$ Price
ENA485	Enercept Network Adapter	**471.00**
EDI32	Enercept Display Interface	**1338.00**
2W485C	2-Wire 232-485 Conv	**78.00**
EMBK-3	Enercept Mounting Brackets (Set of 3)	**75. 00**
PS24	24Vdc Power Supply (for use with EDI or ENA)	**157.00**

Table 4.23: Enercept Metering Quantities

Basic■	Enhanced•
kWh, energy usage kW, real power	kWh, kW per phase and total, min kW, max kW, kWd, kVAR, kVA, PF per phase and total voltage- V, L-L, L-N per phase and avg. Current - A, per phase and average

PowerLogic Split Core Current Transformers-Instrument Grade 5 Amp Split-Core Current Transformers

SA Split-Core Current Transformers

The 3090 SCCT series of split-core current transformers provide secondary amperage proportional to the primary (sensed) current. For use with Circuit Monitors, Power Meters, data loggers, chart recorders and other instruments the 3090 SCCT series provides a cost-effective means to transform electrical service amperages to a 0-5A level compatible with monitoring equipment.

Table 4.24:

Catalog No.	Description	$ Price
3090SCCT022	Split Core CT - 200A (sz.2): 1.25" x 1.51	**120.00**
3090SCCT032	Split Core CT - 300A (sz.2): 1.25" x 1.51	**120.00**
3090SCCT043	Split Core CT - 400A (sz.3): 2.45" x 2.89	**129.00**
3090SCCT063	Split Core CT - 600A (sz.3): 2.45" x 2.89	**129.00**
3090SCCT083	Split Core CT - 800A (sz.3): 2.45" x 2.89	**129.00**
3090SCCT124	Split Core CT - 1200A (sz.4): 2.45" x 5.50	**160.00**
3090SCCT164	Split Core CT - 1600A (sz.4): 2.45" x 5.50	**165.00**
3090SCCT204■	Split Core CT - 2000A (sz.4): 2.45" x 5.50	**165.00**

■ See Handout / Instruction Bulletin for derating properties

Note: Max. Voltage without additional insulation 600Vac. Do not apply 600V Class current transformers to circuits having a phase-to-phase voltage greater than 600V, unless adequate additional insulation is applied between the primary conductor and the current transformers. Square D assumes no responsibility for damage of equipment or personal injury caused by transformers operated on circuits above their published ratings.

BCM42

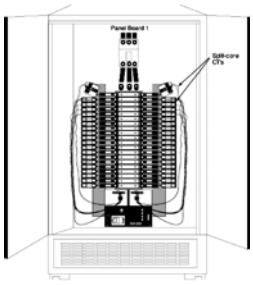
PowerLogic Branch Current Monitor

The branch current monitoring system provides a cost-effective solution for electrical load management making it ideally suited for applications where load capacity requirements are dynamic, such as power distribution units (PDUs) for the data center industry or in any location where monitoring individual electrical loads is critical.

The Branch Current Monitor reports the current level of each of the breakers of a panelboard to provide timely circuit loading information. In addition, as the circuit load approaches one of two user set levels, an alarm can be generated back to the monitoring software such as PowerLogic System Manager Software.

Four models of the Branch Current Monitor are available. The BCM42 consists of rail mounted solid-core CTs intended for mounting inside new panelboards or complete panel retrofits. The BCM42SR is designed to fit into a column width panel design. The BCMSC model is made up of split-core CTs that are an ideal solution for retrofit applications in existing panelboards. The BCMSC _ _ H is a 100 Amp version of the split core design.

- Up to 32 BCMs can be daisy chained on one Modbus RS485 string for easy networking capability.
- One BCM42 provides current levels on each circuit of a 42 circuit NQOD panelboard.
- Split-core CTs are perfect for quick installation on critical load applications that can't be powered down.
- Provides Modbus registers for current limit alarms to help prevent overload breaker trips.
- Integrates to an optional network display for local indication.

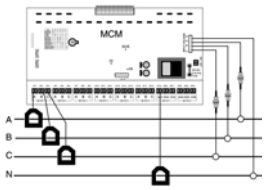


Typical BCMSC
panelboard installation

Table 4.25:

Catalog No.	Description	$ Price
BCM42	Branch Circuit Monitor 42 circuits, 3/4" center line CT spacing, 10-50 Amp range, configurable	2350.00
BCM42C1	Branch Circuit Monitor 42 circuits, 1" center line CT spacing, 10-50 Amp range, configurable	2350.00
BCM42SR	Branch Circuit Monitor, single row, 3/4" on center CTs	2950.00
BCM42SRC1	Branch Circuit Monitor, single row, 1" on center CTs	2950.00
BCMSC12	Branch Circuit Monitor, split core, 12 CTs	1975.00
BCMSC18	Branch Circuit Monitor, split core, 18 CTs	1975.00
BCMSC24	Branch Circuit Monitor, split core, 24 CTs	2350.00
BCMSC30	Branch Circuit Monitor, split core, 30 CTs	2750.00
BCMSC42	Branch Circuit Monitor, split core, 42 CTs	3250.00
BCMSC12H	Branch Circuit Monitor, 100A split core, 12 CTs	2225.00
BCMSC24H	Branch Circuit Monitor, 100A split core, 24 CTs	3300.00
BCMSC42H	Branch Circuit Monitor, 100 split core, 42 CTs	4950.00

Note: CT hole size accommodates up to #6 THHN insulated conductors



3-phase, 4-wire
(with neutral current wiring)

PowerLogic Multi-Circuit Meter

The MCM8364 is an OEM style multi-circuit meter based on the same functionality as the PowerLogic Enclosed Multi-Circuit Meter. Designed for OEM style placement in electrical distribution equipment the MCM8364 is configurable to meter 1 or 3 phases of up to eight individual loads, six loads if neutral monitoring is required. The MCM will monitor up to 10,000 amps per service using standard 5 Amp CTs. All of the metered circuits must share a common voltage source. The MCM8364 is a great solution for monitoring critical power distribution equipment and provides 24 different electrical metering quantities plus an additional nine Modbus register alarms.

With one RS-485 connection, the multi-circuit meter provides Modbus RTU communications output that communicates to each individual metered circuit. Up to 30 multi-circuit meters can be addressed on the same Modbus network. The multi-circuit meter can provide warnings to the central monitoring computer via its Modbus output using the MNode software provided or can be integrated into PowerLogic SMS software. The MCM also works with the submeter display as shown below.

Electrical Data:

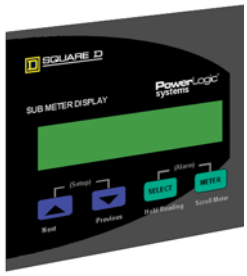
Energy Consumption (kWHr), Real Power (kW), Reactive Power (kVAR), Apparent Power (kVA), Power Factor Total, Voltage, L-L, avg. of 3 phases, Voltage, L-N, avg. of 3 phases, Current, average of 3 phases, Real Power (kW) phase A, B, & C, Power Factor, phase A, B,&C, Line to Line Voltage, phase A-B, B-C, A-C, Line to Neutral Voltage, phase A-N, B-N, C-N, Current, phase A, B, & C, Frequency (measured from phase A) (Hz).

Modbus Alarms:

Over Voltage, Under Voltage, Over Current, Under Current, Over kVA, Under kVA, Phase Loss A, Phase Loss B, Phase Loss C

Table 4.26:

Catalog No.	Description	$ Price
MCM8364	Multi-Circuit Meter 8364	1863.00



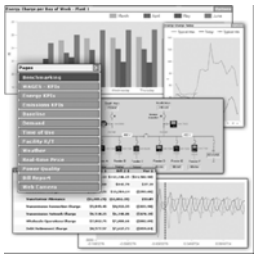
Submeter Display

PowerLogic Submeter Display

The PowerLogic Submeter Display (SMD) is a comprehensive electrical submetering display that provides a view of electrical parameters from multiple metering products with one networked LCD. In addition to viewing system data on the display itself, you can also view data on a remote PC via a network connection. Touch pad buttons provide a convenient way to view downstream devices on the power-monitoring network. The display is RS-485 Modbus RTU compatible. It has additional RS-485 and RS-232 Modbus ports for networking to additional displays or to a master PC. The submeter display is compatible with the following metering devices: BCM, MCM, & Enercept® meters.

Table 4.27:

Catalog No.	Description	$ Price
SMD	Submeter display mounted in enclosure	725.00
SMD OEM	OEM style submeter display, no enclosure	595.00



Personalized dashboards help management and operations personnel monitor all aspects of energy use and respond to opportunities or threats.

PowerLogic ION EEM is a complete enterprise energy management solution that unites business and energy strategies across your entire enterprise by unifying and extending the benefits of your existing energy-related data resources. Stakeholders from management to operations will be empowered by actionable energy intelligence to reveal opportunities, isolate problems and drive cost and risk reduction strategies.

PowerLogic ION EEM automatically acquires data from power monitoring and control systems, building and process automation systems, utility information systems, weather services, spot-market energy pricing feeds, and enterprise business applications, cleanses and warehouses it. Personalized, browser-based dashboards and innovative visualization and modeling tools then make the information available to whomever needs it, so you can accurately monitor, validate, predict and control energy-related expenses.

From operational cost reductions to procurement support through cost allocation, benchmarking and budgeting, key performance indicators and advanced analytics, PowerLogic ION EEM helps you manage energy in financial terms. It also helps you gain unique insight into the impacts of power quality on your business and all energy assets. From the service entrance to the boardroom, PowerLogic ION EEM software allows energy to be managed as a variable cost.

Produce aggregate billing, load profile, cost allocation, power quality, forecasting or budget reports to help inform stakeholders and track results against goals.

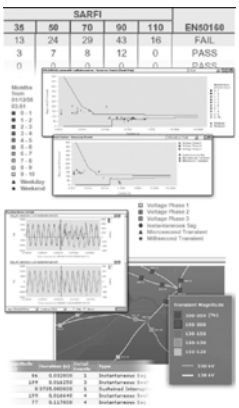
Key features

- True enterprise-level software architecture: data quality assurance, data warehouse, web framework
- Web portal: personalized dashboards, key performance indicators, charts, trends, real-time conditions
- Reporting: rich and customized content, support for complex data and graphics, scheduled distribution
- Trending: advanced visualization, dimensional analysis, prediction, statistical rollups
- Modeling: regression analysis, normalization, correlation, integration of all relevant drivers and contextual data
- Billing: built-in rate engine and rate wizard
- Power quality analysis: wide-area event monitoring, classification, filtering, correlation
- Alarms and events: triggering on complex conditions, notification, logging
- Integration: meters and other devices, weather and pricing feeds, other enterprise applications (e.g. BAC, ERP)

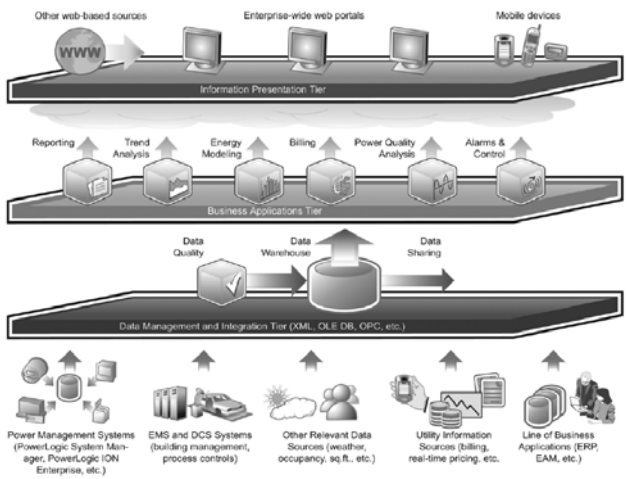
Use advanced billing functions to support energy procurement and manage load or generation assets in response to curtailment or pricing signals.

Typical applications

- Manage all utilities (electricity, gas, water, etc.) and emissions through a single, unified interface
- Benchmark facility performance across an entire enterprise to identify energy inefficiencies
- Measure and verify savings from energy conservation projects or performance contracts
- Reduce operational costs, improve processes, and prolong asset life
- Meet corporate environmental stewardship goals or mandated impact targets
- Manage demand control schemes, load shedding, peak shaving, base loading or on-site generation
- Enable participation in real-time pricing and load curtailment programs
- Optimize procurement by forecasting and budgeting for energy needs and comparing utility rates
- Identify utility billing errors and validate contract compliance
- Allocate and recover utilities costs from tenants, departments, processes, etc.
- Maximize the use of existing infrastructure capacity and avoid overbuilding
- Identify and reduce risks to uptime



Monitor power quality risk factors, benchmark performance, determine impacts, validate contract compliance, isolate problem sources, and confirm your return-on-investment.



Data presentment tier

Web portal delivers enterprise-wide access through personalized dashboards, reports, detailed analytics, and integration of views from third-party systems. Information and alerts via cell phone, PDA, pager and more.

Business applications tier

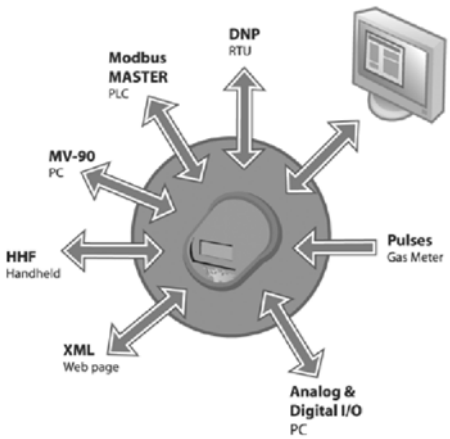
Standard and optional modules tailor functionality to specific needs. Advanced analytics and reporting on every driver and relationship affecting energy cost and reliability.

Data management tier

Integration of data from many sources: power monitoring and control systems (PowerLogic or third party), utility metering systems (water, air, gas etc.), Internet weather, real-time energy pricing feeds, manual input, energy assets (power distribution and reliability equipment, generators), line-of-business systems (BAC, DCS, ERP, EAM, accounting). Data quality module assures complete and reliable data from all inputs.

For price and ordering information, contact your local PowerLogic Sales Specialist or PowerLogic Inside Sales at 1-866-466-7627.

With the flexibility of ION technology, multiple form factors, extensive I/O, and an unmatched feature set, the PowerLogic ION8600 is a powerful device in substation automation, SCADA, and billing applications.



Multi-port, (serial, optical, internal modem, Ethernet) plus multi-protocol communications (Modbus RTU, Master, Slave, DNP 3.0, Modbus TCP) and a unique gateway capability provide industry leading integration capability

PowerLogic Solutions for Utilities

Square D® PowerLogic delivers complete, cutting-edge web-enabled solutions for many of the utility industry's most demanding metering, billing and information management challenges. For many years, regulated utilities, ESCOs and deregulated energy providers have utilized our proven, scalable meters and software to obtain the accurate, real-time information they need to meet their organization's business goals.

Cost-effective PowerLogic systems enable energy providers to:

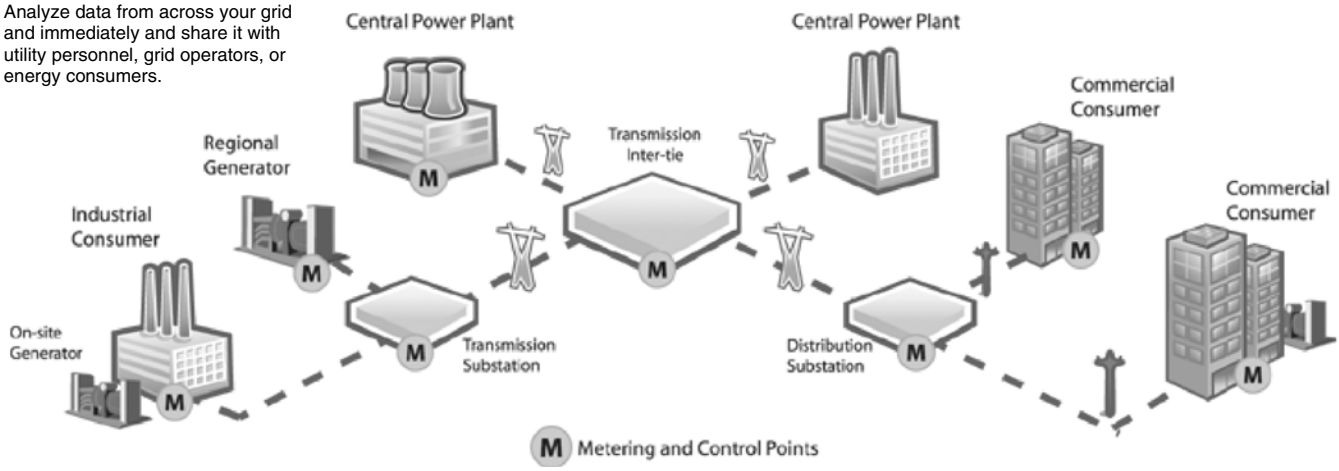
- Maximize competitiveness, increase reliability, streamline operations, and improve service
- Manage wholesale energy transactions across wide geographical areas
- Provide value-added services that enhance customer relationships
- Improve revenue metering, billing accuracy and ensure and report on regulatory compliance
- Provide key personnel with energy information to make analytical and strategic business decisions, optimize distribution assets, and profit from free market opportunities

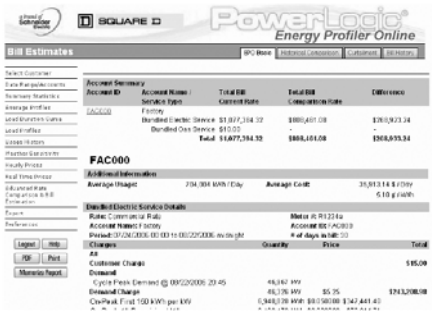
PowerLogic's advanced revenue meters are high quality, flexible and scalable devices that offer a combination of capabilities unmatched in the industry. Whether integrated with third-party systems or combined with compatible PowerLogic software, Square D can help utilities address:

- **Transmission grid and revenue metering**
  PowerLogic provides high-accuracy meter information for grid-wide billing applications and offers MV-90 support and integration into SCADA.
- **Substation monitoring**
  A PowerLogic solution provides the tools to protect valuable equipment from faults, disturbances, and overloading.
- **Power quality analysis**
  Waveform recording, transient detection, sag/swell, symmetrical components and many more additional capabilities are available when combined with PowerLogic ION Enterprise software.
- **Service entrance metering**
  The PowerLogic ION8600 billing meter can be used to manage electricity contracts for energy suppliers and consumers, plus web reporting, sub-metering services, load management and much more.
- **Demand response and load curtailment**
  PowerLogic meters and software can also be used as part of a demand response/load curtailment system.

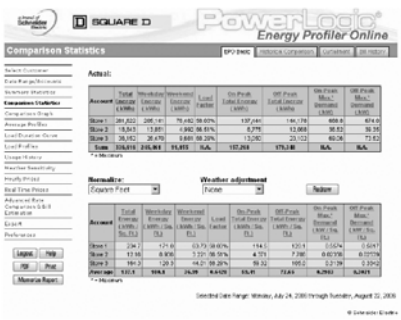
Square D PowerLogic utility solutions resist obsolescence and are engineered to provide fast payback and easy scalability so you can add metering points and communications channels as your organization evolves.

Analyze data from across your grid and immediately and share it with utility personnel, grid operators, or energy consumers.

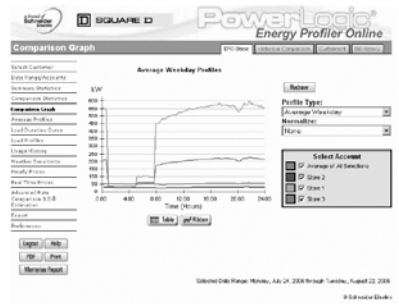




Bill estimates provide valuable information for budgeting and forecasting



Comparison statistics display



Typical comparison graph showing time of usage

PowerLogic Energy Profiler Online (EPO) is a web-hosted service that is the industry's foremost load data visualization and analysis application. This flexible, easy to use system turns customer usage data into actionable information, freely accessible to all customers and internal users. For commercial and industrial energy customers, managing energy costs is the primary objective, but they can't control what they can't measure. EPO enables energy customers to take control of their costs by providing the information they need to understand how their organization uses energy. They can then take steps to reduce costs by implementing conservation measures, investing in more efficient equipment, or participating in new pricing or load curtailment programs.

For the utility, EPO provides an intuitive, easy-to-maintain tool for better understanding customer usage patterns and meeting customers' growing need for information. It also provides a convenient platform from which to administer real-time pricing (RTP) or load curtailment programs. EPO's instinctive online functionality gives first-time users an extremely short learning curve, while its powerful configuration options address the needs of more sophisticated users. The service is available to users at their convenience, 24/7, and regular updates ensure that customers get the most current information.

Key features:

- Data access and analysis
- Automated reporting
- Estimated bills and rate comparisons
- Demand response and curtailment programs
- RTP programs
- Alarming
- Administration tool

Applications:

- Energy load analysis
- Energy budgeting and bill forecasting
- Demand response and load curtailment program management
- Real-time pricing program management
- EPO's Real-Time Pricing module lets users see interval data for accounts with future pricing information, and multiply that data against a price stream.

For price & ordering information, contact your local PowerLogic Sales Specialist or PowerLogic Inside Sales at 1-866-466-7627.

PowerLogic Instrument Transformer Services

Current transformer reclassification and verification applications

Accuracy is vital to revenue metering, as large amounts of energy and money flow between market participants on the power grid. The industry has well established standards in place so that accurate billing occurs at key interconnection points on the grid. But there's a blind spot in legacy testing procedures. Current transformers and potential transformers are tested in a lab prior to installation — but never in the field. The metering industry must ask, "Why do we not check and verify the accuracy of CTs after they have been installed in the field?"

Our answer: verify CTs live.

The CT Verification service allows a utility to:

- Verify performance of metering class CTs
- Check the end-to-end accuracy of metering systems at key interconnection points on the grid
- Ensure metering system complies with industry standard accuracy requirements
- Verifies CTs while the system is live, to avoid system interruptions

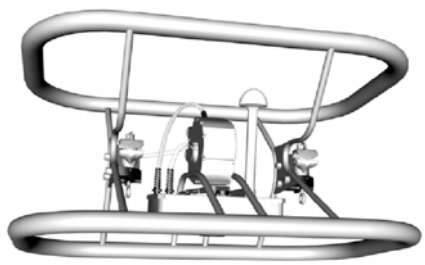
Interconnections on the power grid require high accuracy revenue metering systems that include instrument transformers. Industry standards mandate that meters are periodically verified - this meter is the cash register for all transactions. The PowerLogic Current Transformer Verification service lets the utility test CTs while the high or medium voltage system is still operational. Obtain verification that the metering system is in fact meeting industry standards for accuracy without causing interruption to the system.

Current transformer reclassification and verification services are ideal for:

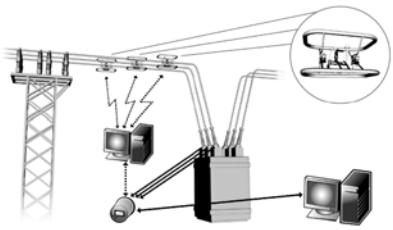
- Transmission utilities
- Distribution utilities
- Generation plants
- Independent system operators

This CT Verification service lets customers use existing infrastructure with confidence and documented accuracy, and helps customers assess the need to upgrade their metering system.

For price and ordering information, contact your local PowerLogic Sales Specialist or PowerLogic Inside Sales at 1-866-466-7627.



Primary Sensor



ITS application

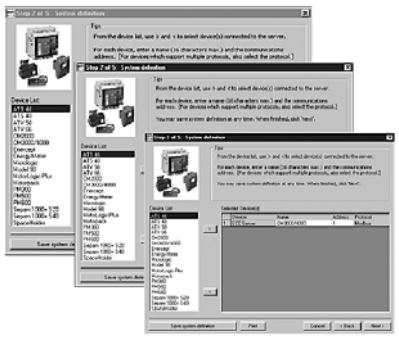
Transparent Ready™
Web-enabled Power & Control

EGX100 Ethernet Gateway

EGX100 lets the Administrator assign access to setup pages by user groups

Built in tabs provide easy DIN rail mounting solution.

EGX400 Ethernet Gateway offers you a "window" into your power equipment



Communications for high-speed access to critical information

From a single building to a multi-site enterprise, PowerLogic Web-Enabled Network Components provide fast, reliable serial line to Ethernet connectivity in the most demanding applications:

- Energy management
- Power distribution
- Building automation
- Factory automation

PowerLogic Ethernet Gateways are available in two models-EGX100 and EGX400 - providing direct connection to Ethernet-Modbus®/TCP networks to make energy and power monitoring information available over local and wide area networks.

- The EGX100 provides low-cost, reliable, Ethernet to serial-line connectivity in a compact, DIN-rail mounted package. Enabled by Power over Ethernet (PoE IEEE 802.3af), the EGX100 simplifies installation by eliminating the need for power supplies plus provides a Web-based interface for configuration and diagnostics.
- The EGX400 has two serial ports providing Ethernet access to 64 serial devices (more with repeaters) and includes the ability to e-mail historical data plus provide browser-based access to real-time and historical interval data logging/trending information allowing electrical distribution systems to be better managed by utilizing Ethernet and Internet technologies.

Advantages

- Easy to setup—No special software required. Configuration via Microsoft Internet Explorer or Hyperterminal.
- Easy to troubleshoot—Detailed diagnostics for communication ports through a Web interface.
- Easy to maintain—Field upgradable firmware lets you add new features while reducing costly downtime.
- Secure-Customizable, password-protected access to configuration.
- Cost-effective, high-speed communications—Use existing LAN infrastructure to reduce communications wiring and network management costs.
- Open platform provides broad connectivity—Modbus TCP/IP over Ethernet allows transparent access via intranet/internet. Each gateway supports up to 32 Modbus or PowerLogic protocol devices.
- Subnet initiated communications—The gateway supports a slave mode for connecting a serial-line based system to Ethernet. For example, a building management system with a Modbus serial interface can route to 16 remote Modbus TCP/IP interfaces supporting up to 128 serial-line devices.
- Extended temperature range— -25 to 70°C enables operation in harsh environments.

Table 4.28:

Type	EGX100	EGX400
	$ Price	
	950.00	2460.00
Control Power		
24Vdc Power Supply	x	x
Power Over Ethernet	x	
Protocols		
Ethernet: HTTP, FTP, Modbus TCP/IP, SMTP, SNMP (MIB2), SNTP, TCP, UDP, ICMP, ARP		
Serial: Modbus RTU, Modbus ASCII (EGX100 only), JBUS, PowerLogic (SY/MAX)		
Ports		
Serial: RS485		1
Serial: RS232/485 configurable	1	1
Ethernet UTP (10/100)	1	1
Fiber (100Mb)		1
Integral web server		
Web page generation tool	x	x
Maintenance/diagnostics	x	x
Gateway administration setup	x	x
Comprehensive meter reading		x
Interval logging/trends		32 devices
User defined custom pages		x
Historical Data Logging		
Interval data		x
File transfer on scheduled basis		email
Export to Excel via web query		x
Manual FTP		x

PowerLogic Web Page Generator

The PowerLogic Web Page Generator (WPG) creates and downloads application specific web pages to PowerLogic Ethernet gateways (EGX100 / EGX400, ECC21) with minimal user intervention. The user simply identifies the serial devices connected to the Ethernet gateway in this wizard-based software utility. The utility takes care of the rest. This utility is available for download from www.powerlogic.com.

Consulting & Analysis

Power System Engineering

Square D's Power Systems Engineering team offers a wide range of engineering services to improve the safety, efficiency and reliability of your power distribution system. The team is comprised of registered, professional engineers, safety trained and equipped, to perform a variety of engineering functions, such as power system design, testing, troubleshooting, and analysis.

Arc Flash Analysis

Square D offers on-site services to perform arc flash analysis for a facility, complex, office, or campus. An Arc flash analysis is used to determine …

- Flash Protection Boundary
- Incident Energy Value
- Hazard/Risk Category
- Appropriate Personal Protective Equipment (PPE)
- Low cost arc flash reduction methods

Features of Square D's arc flash analysis offerings include…

- Time current coordination analysis showing both existing and recommended over-current device settings
- Short-circuit study to ensure adequacy of equipment
- Onsite verification and documentation of equipment
- Arc flash labels (populated with the results of the arc flash analysis)
- Arc flash label affixation
- NFPA 70E—Safe Workplace Practices Training provided by OSHA authorized outreach instructors
- Recommendations and solutions to reduce potential arc flash hazards

Power System Studies

The Square D Power System Engineering Team provides expertise for a variety of electrical power system studies. Some of the more common system studies include…

- Short-circuit analysis
- Time-current coordination
- Motor starting/voltage drop
- Motor starting/torque-speed
- Arc flash analysis
- Safe motor re-energization
- Harmonic analysis
- Transient analysis
- Power factor correction analysis
- Other system specific analysis

Power System Assessment

Square D offers engineering services to address a variety of power system needs …

- Basic codes and standards compliance
- Protective coordination assessment
- Maintenance program review
- Recommendations for power system optimization
- Power quality troubleshooting and analysis
- Power factor and harmonics analysis
- Electrical safety hazards
- Short-circuit withstand overview
- Single-line documentation of power system
- Power monitoring recommendations
- Loading measurements

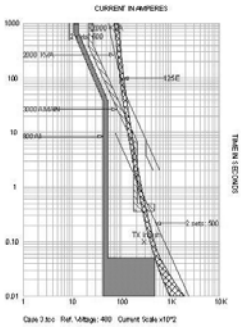
Power Quality Studies

Square D offers onsite power quality engineering studies and solutions to eliminate process disruptions, power system shutdowns, and equipment damage due to electrical power system disturbances. A power quality study is used to..

- Determine compliance with the IEEE 519-Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems guidelines
- Identify most cost-effective solution to power quality problems
- Solve process disruptions due to power disturbances
- Reduce economic effects of poor power quality
- Identify disturbances originating on electric utility system and improvements to reduce the number and severity

Load Studies

Square D offers onsite services to perform loading studies for your electrical distribution system. Load studies are used to...



- Evaluate power management and loading levels of electrical circuits
- Determine adequacy of circuit to serve sensitive loads
- Record power measurements on key circuits, including loading, power factor, voltage and current parameters

Power System Design

Square D offers engineering services to address a variety of power system needs …

- New equipment installation
- Existing equipment modification
- Ground Fault Schemes for multiple source distribution systems
- High Resistance Grounding (HRG) Conversion
- Automatic Transfer Control Schemes & Generator Operations

Square D professional engineers - safety trained and equipped - will listen to your concerns and goals, define the problem or enhancement, and engineer the solution that best satisfies your needs.

For additional information on power system engineering services and pricing, contact your nearest Square D/Schneider Electric service district.

Total Energy Control

With a comprehensive energy strategy, escalating energy prices don't have to be a roadblock to industrial growth. As part of Square D / Schneider Electric's Energy Edge portfolio that targets improving energy efficiency, Total Energy Control is a consultative service consisting of our Professional Engineers and Certified Energy Managers who work with you to ensure the success of your energy strategy. With the development of an Energy Action Plan tailored for your site, we evaluate your total energy picture addressing:

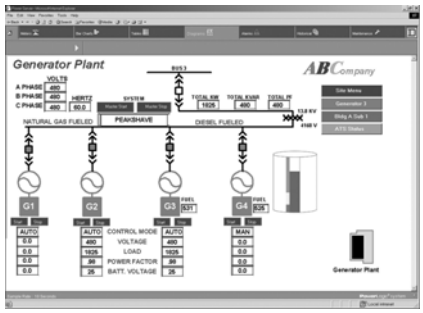
- ***Utility Analysis*** - Evaluating both the commodity supply side and the demand side areas of the operation
- ***Supply Management*** –Forecasting and making adjustments to reflect current conditions
- ***Demand Side Usage*** – Profiling facility loads and consumption patterns
- ***Opportunity Identification / Prioritization*** - Projects that make sense today and those that should be considered in the future as energy prices change
- ***Project Implementation*** - Client can choose which projects to implement or Square D can provide turn-key implementation
- ***On-Going Accountability*** - Accountable along with you for the ongoing success of your energy plan

We're confident that together, we will reduce the total cost of energy at your facility. Take the logical next step in energy efficiency with the most trusted name in the power industry for over 100 years.

Power System Automation

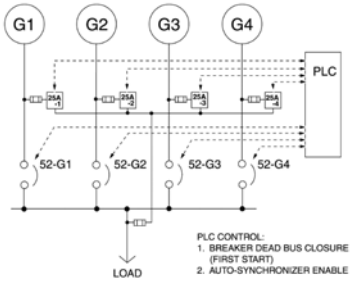
Avoid high energy cost associated with peak demands

- Reduce loading requirements to match generator supply
- Shed non-essential loads while maintaining critical processes and lighting requirements
- Retrofit existing generator equipment for peak shaving
- Generate revenue possibilities, export power to the utility during peak periods
- Verify generator performance and ATS status
- Record Sequence of Events to 1 ms for root cause analysis
- Automate existing equipment to seek the utility source, control breakers, and keep the electrical system operational



PowerLogic Engineers provide graphic solutions for realtime monitoring of power systems.

PowerLogic Engineers specialize in the design and setup of Emergency Power Supply Systems (EPSS).



PowerLogic Engineers design power control systems that meet your operational requirements.

Table 4.29:

Utility Cost Reduction	Power System Reliability
LOAD CONTROL SYSTEMS Load shedding and sequencing	EMERGENCY POWER SUPPLY SYSTEMS (EPSS) Automatic Generator testing and report generation
GENERATOR CONTROL Peak shaving Import/export • Load following (utility base loading) • Generator base loading	ATO (Automatic Throw Over) SYSTEMS Utility to Utility • Main-Tie-Main • Main-Main • Open and closed transition Utility to Generator • Basic ATS control with breakers • Momentary Closed Transition • Extended Closed Transition (ramped load control) • Maintained Parallel Operation (Import/Export Control)
ENERGY BILLING & COST ALLOACTION	LOAD PRESERVATION SYSTEMS High speed load shed Pre-armed load shed schemes
LIGHTING CONTROLS	SEQUENCE OF EVENTS RECORDING (SER) GPS Time synchronization of events

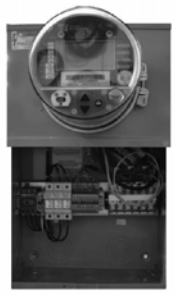
For additional information, contact your nearest Square D / Schneider Electric service district.

System Integration

Power Management Services provides a complete range of design and operational services including specifying, developing, installing, commissioning, supporting and training users of power monitoring and control systems and remote power switching systems. Engineers maintain expertise in many areas such as communications, personal computers, protective relaying, automatic control systems and programmable controllers.

- System Design and Bill of Material Recommendations
- Power Monitoring and Control
- WAGES (Water, Air, Gas, Electric, Steam)
- Enterprise web-based monitoring
- Specification development, drawings, documentation
- Enclosure panel design and build
- Metering Connection Verification/Testing
- Power distribution automation
- On-Site Installation Assistance, Component Configuration & Startup
- Turn-key project management
- Third Party Device and communication interfaces
- Configured Workstations, User Software Interfaces
- Interactive Graphic Design to mimic facility layout, one-lines, equipment status
- Custom Software, Reports & Applications – Billing and Paging

For additional information, contact your nearest Square D / Schneider Electric service district.



Factory Assembled Enclosures

PMO Engineering Services provides a variety of factory assembled enclosures designed for a wide range of power monitoring and control applications. Professional workmanship and layout offer speed and flexibility during installation. Factory tested, pre-wired enclosures with well marked terminals help avoid wiring errors and needless troubleshooting during installation.

- Assemblies include meters & devices wired to terminal blocks, disconnects and shorting blocks
- Tailored to any system voltage :
  - — 120/208V, 277/480V & 347/600V Wye
  - — 240V, 480V & 600V Delta
  - — Utilization of PT's required for higher voltage levels
- Wall mountable and easy to install using concealed holes in the back of the enclosure.
- Complete with necessary documentation and mounting hardware for quick and easy installation
- Carbon steel construction, with industry standard ANSI 61 gray powder coat finish
- Equipped with concealed hinged door, and universal pad-lockable latch.
- Custom engraved nameplates available for all units.

Table 4.30: Industrial Enclosure Types 12, & 4, UL & CUL 508A Listed

Available Meter Types	Digital Inputs	Digital Outputs	Analog Inputs	Analog Outputs
PM 210 & 710	N/A	N/A	N/A	N/A
PM 820, 850 & 870	Up to 11 / Meter	Up to 7 / Meter	Up to 2 / Meter	Up to 2 / Meter
CM 3250 & 3350	Up to 4 / Meter	Up to 5 / Meter	N/A	N/A
CM 4250 & 4000T	Up to 8 / Meter	Up to 7 / Meter	Up to 1 / Meter	Up to 1 / Meter
ION 6200	N/A	Up to 2 / Meter	N/A	N/A
ION 7300, 7330 & 7350	Up to 4 / Meter	Up to 4 / Meter	Up to 4 / Meter	Up to 4 / Meter
ION 7550 & 7650	Up to 16 / Meter	Up to 7 / Meter	Up to 4 / Meter	Up to 4 / Meter

- Supports Single or Multiple Voltage Sources for Indoor (Type 12) & Outdoor (Type 4) applications
- Available with 1 - 4 meters per panel. Serial & Ethernet Communications are options for all units
- EGX & ION RTU Communication Enclosures with 1-4 devices per panel also available

Commercial Enclosure Type 1, UL & CUL 508A Listed

- Available for the following meter types: PM210, PM710, PM820, and ION6200
- Supports Single Voltage Source only for Indoor (Type 1) applications.
- Available with 1 - 12 meters per panel. Serial Communications are standard for all units.
- No Digital or Analog I/O is available for this option.

Industrial/Utility Socket Enclosure Type 3R, UL & CUL 508A Listed

- Available for ION8600 only, with up to 3 Digital Inputs and 4 Digital Outputs
- Supports Single Voltage Source only for Indoor & Outdoor (Type 3R) applications.
- Units are Ring Type with removable cover.
- Available with 1 meter per panel. Serial & Ethernet Communications options available.
- Supports Form 9S, 35S, 36S, 39S and 76S configurations.
- Options available for remote mounted CTs
- Options available for integrated, bar type CTs
- Optional Test Switch.

Additional engineered to order products are available for a wide variety of custom applications.

- Touch Screen, PC & Server Cabinets
- Generator Control Panels
- PLC Controls & I/O Status Panels
- Retrofit Mechanical Meter Draw Out Cradles with PM and ION Digital Meters
- Communication & Gateway Panels
- Switchgear Automatic Transfer Control Panels
- Water, Air, Gas & Steam (WAGES) Panels

For additional information and pricing please contact your local PowerLogic sales specialist or PowerLogic Inside Sales Support at 1-866-466-7627. Enclosure pricing and literature available for download on our website at www.powerlogic.com/products/enclosures.

To better serve you please have the following information on hand when calling.

- Enclosure type (Indoor or Outdoor) and Environment details (Corrosive or Non-Corrosive)
- Power System Voltage Level and Type (Wye, Delta, or Single Phase)
- Meter Type and Quantity or Device Type and Quantity per enclosure
- Digital & Analog Input and Output requirements
- Ethernet and Serial Communication Requirements

Technical Support

There are several ways to receive top quality support on PowerLogic and ION® products:

Priority Support: Excellent Service, Free Software Upgrades, Training Discounts & More!

- Latest PowerLogic and ION software upgrades to ensure up-to-date systems
- Direct access to expertise for quick issue resolution
- More efficient PowerLogic and ION system utilization
- Higher reliability
- Improved productivity and personal efficiency on the job

Premium Support: Priority + Proactive System Checks + Sr. Technician Assigned to your site

Choose Premium Support when you need to . . .

- Enhance your PowerLogic or ION system's operation with single-sourced pro-active problem identification, solutions recommendations and change management skills
- Partner with technical experts who help coordinate support, provide hands-on assistance, and share knowledge and know-how with you
- Obtain personalized services tailored to your business environment and objectives
- Take advantage of remote software upgrade capabilities
- Anticipate and communicate necessary change

Remote eServices for PowerLogic and ION

Let expert Square D technicians ensure high-quality performance in your PowerLogic or ION system by performing remote, online services through our secure WEB EX Portal. Services include …

- Installations, upgrades, & software patches
- System device setup & configuration along with alarming & historical trending
- Graphical Screen Development
- Remote, Online System Maintenance
  - — Software Updates - Patches & Upgrades
  - — PC Checks - Hard Disk Space, Network & DB Configurations, Viruses, etc.
  - — PowerLogic or ION Software Checks - Communications, Data Logging, & Task Execution
  - — E-mailing system scorecard & maintenance recommendations
- One-on-one training on system software features
- Power Quality (PQ) & Energy Usage Analysis

For additional information and pricing, contact:
Tech Support Contract Services
295 Tech Park Drive, Suite 100, LaVergne, TN 37086
Phone: 615-287-3332
Fax 615-287-3404

Email: pmo.support@us.schneider-electric.com

Power Management University

Our training centers offer a variety of training courses designed to improve your total energy management skills. Our instructor led courses are 70% hands-on, with each student having their own lab workstation. We have two main training centers located in Nashville, TN and Victoria, BC and offer training at a variety of Square D sites across the US and Canada. For more information about how and where we can meet your training needs please call 1-615-287-3304.

Table 4.31:

Course	Course No.	$ Tuition
PowerLogic Systems		
Correspondence Courses		
PowerLogic Fundamentals	3000PLUC120CR	**350.00**
PowerLogic System Installation & Troubleshooting	3000PLUC100CR	**750.00**
Core Classes		
Comprehensive PowerLogic Systems	3000PLUC200	**2150.00**
Comprehensive PowerLogic Systems Bundle (Includes 3000PLUC120CR)	3000PLUC205	**2450.00**
PowerLogic System Installation & Troubleshooting	3000PLUC100	**1950.00**
SMS Administrator	3000PLUC300	**2150.00**
Target Application Courses		
Critical Power and Power Quality	3000PLUC140	**1400.00**
Energy Management with Advanced Reporting	3000PLUC230	**1400.00**
Regional SMS Overview	3000PLUC190	**1200.00**
Regional SMS Overview Bundle (Includes 3000PLUC120CR)	3000PLUC195	**1500.00**
Customer Site Training	3000PLUCSite	By Quote
System Manager Customer Site Training	3000PLUCSITE	By Quote
ION Systems		
Core Classes		
ION Enterprise Fundamentals	3000PMUFUND	**2150.00**
ION Enterprise Programmer	3000PMUPROG	**2150.00**
ION Enterprise Administrator	3000PMUADMIN	**2150.00**
ION Enterprise Overview	3000PMUCION	**1200.00**
ION Program Overview	3000PMUCPROG	**1600.00**
Customer Site Training	3000PMUSITE	By Quote
ION Enterprise Refresher	3000PMUREFRESH	**1800.00**
ION Enterprise Customer Site Training	3000PMUSITE	By Quote

Series 80
Advanced Display
(A Suffix)

Series 40 or 20
Advanced Display
(A Suffix)

Series 80 Pro
Display
(P Suffix)

80, 40, and 20 Series

The Sepam family of digital protection units, Series 20, 40 and 80, is the newest generation of Sepam relay, a time tested product with a 20-year worldwide history. Modular relay design allows quick and easy future upgrades to communications, digital I/O, analog output or temperature acquisition. The 64x128 bit, graphic LCD display and keypad permit basic relay setting of Series 20 and 40 without a PC. Comprehensive self-testing provides assurance of readiness to protect. The Sepam family also has exceptional withstand to environmental electromagnetic disturbances. An optional 128 x 240 LCD display can show one-line or electrical vectors.

Table 4.32: Quick Select Guide

		Feeder or main (Substation)	Transformer	Motor	Generator	Bus	Capacitor Bank
Criteria	**Selection**						
Network structure	Radial (51, 51N, 46)	S23	T23	M20	G40	B80	C86
	Long feeders (67N)	S41		M41			
	Closed loop (67N, 67)	S42					
	Parallel mains [transf] [sources] (67N, 67)	S42	T42		G82		
	Sync-check required (25)(67N, 67)	S82	T82		G82	B80	
Grounding system	Solid or low/high impedance (51N)	S23	T23	M20	G40		
	Ungrounded or compensated (67N/NC)	S41	T42	M41	G82		
Protection	Basic Feeder [Transf][Motor]	S23	T23	M20	G40		
	Voltage/frequency (27/59/81)	S40	T40	M41	G40	B21	
	ROCOF (81R)	S84				B22	
	Advanced Fdr/Main[Transf] [Motor][Gen]	S41	T82	M81	G82	B83	
	Thermal overload (49)- cable	S81					
	Thermal O/L (49)- capacitor bank						C86
	Differential (87T)		T87				
	Machine differential (87M)			M87	G87		
	Machine-transformer unit differential			M88	G88		
Metering	I	S23	T23	M20			
	V, f					B21	
	I, V, f, P, E	S40	T40	M41	G40	B80	
	I, V, V, f, P, E					B83	
	I, I, V, F, P, E		T87	M87	G87		
	THD-I, THD-V	S80	T81	M81	G82	B80	
Temperature	<8 RTDs of same type		T23	M20	G40		
	> 8 RTDs (< 16) or 2 types of RTDs		T40	M41	G40		
I/Os	< 10 I / 8 O	S23	T23	M20	G40	B21	
	> 10 I / 8 O and < 42 I / 23 O	S80	T81	M81	G82	B80	
Program logic customization	Control matrix	S23	T23	M20	G40	B21	
	Logic equation editor	S40	T40	M41	G40	B80	
	Ladder-logic software	S80	T81	M81	G82	B80	
Modbus communication	1 Modbus port	S23	T23	M20	G40	B21	
	2 Modbus ports	S80	T81	M81	G82	B80	

Note: Units in table depict least complex device types compliant with criterion.

Sepam Series 80 Relay Features

- Standard footprint for enhanced protection of Mains/Feeders, Transformer, Motor, Generator, Capacitor, Bus Applications
- Differential protection of transformer or machine transformer units
- Differential protection of motors and generators
- Protection for mains and ties and important feeders including pre-programmed transfer schemes
- Increased metering capabilities I, V, E, P, PF, THD, vector diagram
- Expanded logic equation capabilities (an option for Logipam PLC ladder logic)
- Setting software with graphical assistance, opt mimic-based display
- Battery backup for historical and fault waveform data retention, wide range DC control power
- Two rear communication interfaces
- Includes all Series 20 and Series 40 features

Sepam Series 40 Relay Features

- Compact standard footprint (< 4"deep) for enhanced protection of Mains/Feeders, Transformer, Motor, Generator Applications
- Directional overcurrent protection for dual mains and ties and closed loop feeders
- Current and voltage inputs I, V, E, P, PF
- Setting software with Boolean logic equation assistance
- CT/VT and Trip Circuit supervision
- Sixteen seconds of fault recording, last 5 trip reports, and last 200 time-tagged alarms
- Rear communication port for interface to optional Modbus® communications modules
- Includes all Series 20 features

Sepam Series 20 Relay Features

- Backlit LCD graphic bitmap display
- Compact standard footprint (< 4"deep) for basic protection of Mains/Feeders, Transformer, Motor, Bus (Voltage) Applications
- 16 inverse time overcurrent characteristic curves
- Setting software with offline file creation and download to relay
- Two 86 cycle records of fault recording, last trip fault values, and last 64 time-tagged alarms retained
- Provides trip diagnostic information for analysis of faults
- Self-test diagnostic ensures correct operation of relay and integrity of protection
- Wide range of control power inputs
- Display operation minimal training required for operation.
- Application specific design for Main/Feeder, Transformer, Motor, Bus (Voltage) zones
- Zone selective interlocking (ZSI) improved protection coordination
- Rear communication port for interface to optional Modbus communications modules, plus dual port module, opt protocols DNP3 and IEC60870-5-103, and also F/O
- Modular architecture
- Breaker diagnostics

Table 4.33: Series 80 Applications

Protection	Application ANSI Code	S80	S81	S82	S84	T81	T82	T87	M81	M87	M88	G82	G87	G88	B80	B83	C86
Phase overcurrent▲	50/51	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Ground fault / Sensitive ground fault▲	50N/51N 50G/51G	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Breaker failure	50BF	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Negative sequence / unbalance	46	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Thermal overload for cables	49RMS		2	2	2												
Thermal overload for machines▲	49RMS					2	2	2	2	2	2	2	2	2			
Thermal overload for capacitors	49RMS																2
Capacitor bank unbalance	51C																8
Restricted ground fault	64REF					2	2	2				2		2			
Two-winding transformer differential	87T							1			1			1			
Machine differential	87M									1			1				
Directional phase overcurrent▲	67			2	2		2	2				2	2	2			
Directional ground fault▲	67N/67NC		2	2	2	2	2	2	2	2	2	2	2	2			
Directional active overpower	32P		2	2	2	2	2	2	2	2	2	2	2	2			
Directional reactive overpower	32Q								1	1	1	1	1	1			
Directional active underpower	37P				2							2					
Phase undercurrent	37								1	1	1						
Excessive starting time, locked rotor	48/51LR								1	1	1						
Starts per hour	66								1	1	1						
Field loss (underimpedance)	40								1	1	1	1	1	1			
Pole slip	78PS								1	1	1	1	1	1			
Overspeed (2 set points)■	12								▼	▼	▼	▼	▼	▼			
Underspeed (2 set points)■	14								▼	▼	▼	▼	▼	▼			
Voltage-restrained overcurrent	50V/51V											2	2	2			
Underimpedance	21B											1	1	1			
Inadvertent energization	50/27											1	1	1			
Third harmonic undervoltage/100% stator ground fault	27TN/64G2/64G											2	2	2			
Overfluxing (V / Hz)	24							2				2	2	2			
Positive sequence undervoltage	27D	2	2	2	4	2	2	2	2	2	2	2	2	2	4	4	4
Remanent undervoltage	27R	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Undervoltage (L-L or L-N)	27	4	4	4	2	4	4	4	4	4	4	4	4	4	2	2	2
Overvoltage (L-L or L-N)	59	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Neutral voltage displacement	59N	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Negative sequence overvoltage	47	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Overfrequency	81H	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Underfrequency	81L	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Rate of change of frequency	81R				2												
Recloser (4 cycles)■	79	▼	▼	▼	▼												
Thermostat / Buchholz■	26/63					▼	▼	▼	▼		▼	▼		▼			
Temperature monitoring (16 RTDs)♦	38/49T					▼	▼	▼	▼	▼	▼	▼	▼	▼			▼
Synchronism-check★	25	▼	▼	▼	▼	▼	▼	▼				▼	▼	▼	▼	▼	

Table 4.34: Series 40/20 Applications

Protection	Application ANSI Code	S23	S40	S41	S42	T23	T40	T42	M20	M41	G40	B21	B22
Phase overcurrent▲	50/51	4	4	4	4	4	4	4	4	4	4		
Voltage-restrained overcurrent	50V/51V										1		
Ground fault / Sensitive ground fault▲	50N/51N 50G/51G	4	4	4	4	4	4	4	4	4	4		
Breaker failure	50BF	1	1	1	1	1	1	1		1	1		
Negative sequence / unbalance	46	1	2	2	2	1	2	2	1	2	2		
Directional phase overcurrent▲	67				2			2					
Directional ground fault▲	67N/67NC			2	2			2		2			
Directional active overpower	32P			1	1					1	1		
Directional reactive overpower	32Q/40									1	1		
Thermal overload▲	49RMS					2	2	2	2	2	2		
Phase undercurrent	37								1	1			
Excessive starting time, locked rotor	48/51LR/14								1	1			
Starts per hour	66								1	1			
Positive sequence undervoltage	27D/47											2	2
Positive sequence undervoltage	27D									2			
Remanent undervoltage	27R									1		1	1
Phase-to-phase undervoltage	27											2	2
Phase-to-neutral undervoltage	27S											1	1
Undervoltage♦	27/27S		2	2	2		2	2		2	2		
Overvoltage♦	59		2	2	2		2	2		2	2	2	2
Neutral voltage displacement	59N		2	2	2		2	2		2	2	2	2
Negative sequence overvoltage	47		1	1	1		1	1		1	1		
Overfrequency	81H		2	2	2		2	2		2	2	1	1
Underfrequency	81L		4	4	4		4	4		4	4	2	2
Rate of change of frequency	81R												1
Recloser (4 cycles)	79	▼	▼	▼	▼								
Temperature monitoring (8 or 16 RTDs)	38/49T					▼	▼	▼	▼	▼	▼		
Thermostat / Buchholz	26/63					▼	▼	▼					

Note: Numerals in table indicate number of protection setpoints

▲ Protection functions with 2 groups of settings
■ Requires MES120 I/O module
♦ Requires MET1482 RTD Input module
★ Requires MCS025 synch check module
▼ Option

Table 4.35: List Price by Catalog Number

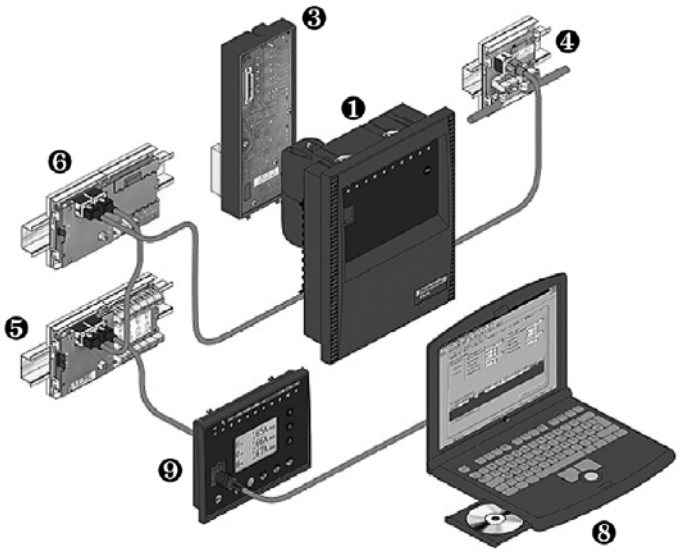
Model	Application	Catalog No.	$ Price	Model	Application	Catalog No.	$ Price
Series 80	S80 - Substation/feeder [current & voltage]	SQ1S80A▲	**3870.00**	Series 40	S40 - Substation/feeder [current & voltage]	SQ1S40A	**3023.00**
	S81 - Substation/feeder [directional grd O/C]	SQ1S81A	**4060.00**		S41 - Substation/feeder [directional grd O/C]	SQ1S41A	**3439.00**
	S82 - Substation/feeder [directional ph & grd O/C]	SQ1S82A	**4180.00**		S42 - Substation/feeder [directional ph & grd O/C]	SQ1S42A	**3870.00**
	S84 - Substation/main [separation/ load shed]	SQ1S84A	**4780.00**		T40 - Transformer [current & voltage]	SQ1T40A	**3272.00**
	T81 - Transformer [current & voltage]	SQ1T81A	**4130.00**		T42 - Transformer [Dir. Ph & Grd O/C]	SQ1T42A	**4118.00**
	T82 - Transformer [Dir. Ph & Grd O/C]	SQ1T82A	**4430.00**		M41 - Motor [Dir. Grd O/C]	SQ1M41A	**3594.00**
	T87 - Transformer [Diff.-2 wdg)	SQ1T87A	**4880.00**		G40 - Generator [Dir. Real & Reac Power, Volt-Restr O/C]	SQ1G40A	**3920.00**
	M81- Motor [Dir. Grd O/C]	SQ1M81A	**3540.00**				
	M87- Motor [Mach. Diff.]	SQ1M87A	**3850.00**	Series 20	S23 - Substation/feeder [breaker failure]	SQ1S23A	**1794.00**
	M88 - Motor [Transf. Diff.]	SQ1M88A	**4140.00**		T23 - Transformer [breaker failure]	SQ1T23A	**1957.00**
	G82 - Generator [Dir. Watt & Var, Volt-Restr O/C]	SQ1G82A	**4170.00**		M20 - Motor	SQ1M20A	**2319.00**
	G87 - Generator [Mach diff]	SQ1G87A	**4520.00**		B21 - Bus (Voltage/Freq)	SQ1B21A	**2264.00**
	G88 - Generator [Transf diff]	SQ1G88A	**5522.00**		B22 - Loss of Mains (Voltage/Freq/ROCOF)	SQ1B22A	**2576.00**
	B80 - Bus [Main+1ph volt]	SQ1B80A	**4050.00**				
	B83 - Bus [Tie +3ph volt]	SQ1B83A	**4250.00**				
	C86 - Capacitor [4 step 2xWye banks]	SQ1C86A	**4125.00**				

▲ Replace "A" suffix with "P" to select the "Pro" version mimic display. (add $450 to list price)

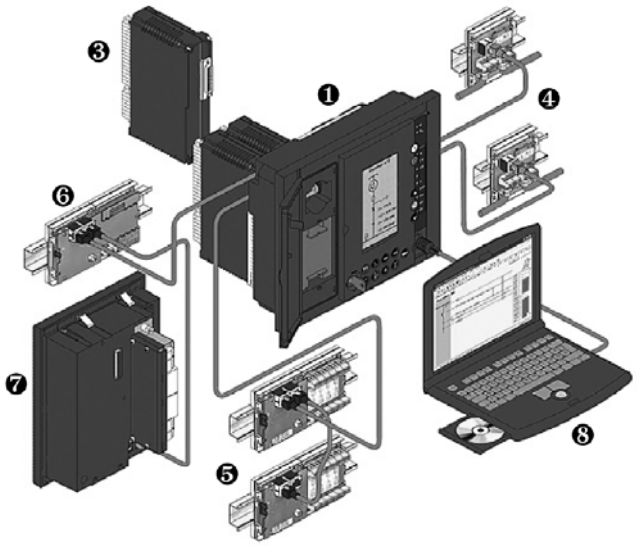
Table 4.36: Series 80+40+20 Accessory List

Accessory Type	Series 80	Series 40/20	Catalog No.	Description	$ Price
Digital I/O Module	x		MES120	14 inputs + 6 outputs / 24-250Vdc	**770.00**
	x		MES120G	14 inputs + 6 outputs / 220-250Vdc/hi p.u.	**770.00**
	x		MES120H	14 inputs + 6 outputs / 110-125 Vdc/hi p.u.	**770.00**
		x	MES114	10 Input / 4 output module	**616.00**
		x	MES114E	10 inputs + 4 outputs 110/125V	**595.00**
		x	MES114F	10 inputs + 4 outputs 220/250V	**785.00**
Communication I/F■ Module	x	x	ACE959	RS485 4-wire Interface Module (requires. ext. 24VDC control pwr)	**398.00**
	x	x	ACE9492	RS485 2-wire Interface Module (requires. ext. 24VDC control pwr)	**398.00**
	x	x	ACE937	Fiber optic Interface Module	**578.00**
	x	x	ACE969TP	(2)RS485 2wire I/F	**578.00**
	x	x	ACE969FO	(1) RS485 2wire + (1) F/O I/F	**771.00**
Analog I/O module	x		MCS025	Synch check module (includes cable CCA785)	**1410.00**
	x	x	MET1482	8 temperature sensor input module	**695.00**
	x	x	MSA141	Analog output module	**637.00**
	x	x	DSM303	Remote advanced MMI (requires cable CCA77x see below)	**719.00**
	x		SFT080	Logipam plc logic software	**750.00**
	x		AMT840	Assembly plate for surface mounting of MCS module	**131.00**
Analog I/O Cables	x	x	CCA770	2ft cable from remote display to base unit	**36.20**
	x	x	CCA772	2m cable from remote display to base unit	**51.00**
	x	x	CCA774	4m cable from remote display to base unit	**78.00**
Ground Sensor CTs (mV out)	x	x	CSH30	Interposing window CT for Residual current input	**116.00**
	x	x	CSH120	Ground Sensor CT - 120 mm window	**235.00**
	x	x	CSH200	Ground Sensor CT - 200 mm window	**378.00**
	x	x	ACE990	Aux. CT for Ground Sensor CT Ratio Adjustment (for retrofit)	**709.00**
Configure software♦	x	x	SFT2841KIT	Setting/operating software kit (including SFT2826 osc s/w+CCA783 cable)	**543.00**
Selected spares★	x	x	2640KIT	Terminal blocks for MES modules	**205.00**
	x	x	CCA634	1 or 5 A CT Current Connector	**191.00**
	x	x	CCT640	Voltage Connector	**398.00**
	x	x	CCA612	Cable for communication module to relay connection	**67.00**
	x	x	CCA783	Cable for pc to relay connection	**67.00**
	x		CCA785	MCS025 cable	**55.00**
		x	CCA670	LPCT Current Connector	**430.00**
	x		CCA671	LPCT Current Connector	**415.00**

■ Includes CCA612 cable to relay rear port
♦ One s/w kit required per Series 80 order and recommended per Series 40/20 order
★ To be ordered as spare or replacement



Series 20 and Series 40



Series 80

❶ Base Unit▼
❷ Parameter and protection settings saved on removable memory cartridge (Series 80 only)
❸ 42 logic inputs and 23 relay outputs, with 3 optional modules. (Series 80): 10 logic inputs and 8 relay outputs with optional module (Series 20/40)
❹ Connection to communication networks
❺ Temperature sensors
❻ Low-level analog output
❼ Synchro-check module (Series 80 only)
❽ Software tools
❾ Remote display▼

▼*Remote Display for use with "Basic" Base Units -- contact local sales office*

Table 4.37: Selection Example

Follow these steps:			Example:			
Selection Sequence		Type Part	QTY	Catalog No.	Description	$ Price
[1]	Select from Table 4.35 per system, features Table 4.32 & 4.33/4.34	Relay unit	1	SP1T87A	T87- Transformer [Diff.-2 wdg)	**4880.00**
[2]	Spare by application	Memory module	0	MMS020xxx	Spare memory module	**0.00**
[3]	Select from Table 4.36 (as required)	Digital I/O	1	MES120	14 inputs + 6 outputs / 24-250Vdc	**770.00**
[4]	Select from Table 4.36 (as required)	Communication module	1	ACE959	RS485 4-wire Interface Module I	**398.00**
[5]	Select from Table 4.36 (as required)	RTD Input	1	MET1482	8 temperature sensor input module	**695.00**
[6]	Select from Table 4.36 (as required)	Analog output	0	MSA141	Analog output module (1 channel)	**0.00**
[7]	Select from Table 4.36 (as required)	Sync check (25) module	1	MCS025	Synch check module (includes cable CCA785)	**1410.00**
[8]	Select from Table 4.36 (as required)	Config S/W	1	SFT2841KIT	Setting / operating software kit	**543.00**
[9]	Select from Table 4.36 (as required)	Cable for RTD I/F Modulle	1	CCA772	2m cable from remote display to base unit	**51.00**

Low Voltage Fixed Capacitors

Fixed Capacitors are best suited for use on electrical systems with no voltage or current harmonics.

ReactiVar® fixed low voltage capacitors are ideally suited for power factor correction applications where the load does not change or where the capacitor is switched with the load, such as the load side of a motor starter. ReactiVar fixed capacitors are best suited for applications where there are no harmonic currents or voltages present.
For Fixed Capacitors suitable for use in harmonic-rich environments, contact your nearest Square D/Schneider Electric sales office.

Features:

- **Environmentally Safe:** Reactivar capacitors are constructed with a dry type metalized Polypropylene capacitor element with no liquid dielectrics. There is no risk of fluid leakage or environmental pollution and no need for a drip pan.
- **Multiple Protection System:** The patented protection system incorporates an internal protection device which negates the need for external fuses. Capacitor elements are encased in a non-flammable vermiculite filler as an added safety feature.
- **Low Loss, Long Life:** The design features less than 0.5W/kVAR losses, including discharge resistors.
- **Attractive finish:** Capacitor units feature a textured powder paint finish, ASA 49 gray. Units are constructed of 18 gauge steel and are suitable for floor or wall mounting.

Application Note: Capacitors are a low impedance path for the harmonic currents produced by variable frequency drives, motor soft starters, welders, computers, PLCs, robotics and other electronic equipment. These harmonic currents can be drawn into the capacitor causing it to overheat, shortening its life. Furthermore, the resonant circuit formed by shunt capacitors coupled with system inductances (motors and transformers) can amplify harmonic currents and voltages in the electrical network. This amplification can cause nuisance fuse operation and/or damage to electrical equipment including capacitors and other electronic devices. If power factor correction in the presence of harmonics is required, please contact your nearest Square D/Schneider Electric sales office for assistance.

Table 4.38: Unfused 208 and 240 Volt 3 Phase/60 Hz

kVAR Rating		Unfused INDOOR NEMA Type 1/12▲			Unfused OUTDOOR NEMA Type 3R▲			Rated Current (Amperes)		Recommended Wire Size	Recommended Minimum Size Protection Rating▼			
											Fuse		Circuit Breaker Trip	
@ 240 V	@208 V	Catalog No.■	$ Price	Encl.♦	Catalog No.■	$ Price	Encl.♦	@240 V	@208 V	(Qty X AWG)	@240 V	@208 V	@240 V	@208 V
2.5	1.88	PFCD2002	**612.00**	1	PFCD2002R	**643.00**	1R	6	6	14	10	10	15	15
3.5	2.63	PFCD2003	**639.00**	1	PFCD2003R	**671.00**	1R	9	8	14	15	15	15	15
4	3.00	PFCD2004	**666.00**	1	PFCD2004R	**699.00**	1R	10	9	14	20	15	15	15
5	3.75	PFCD2005	**731.00**	1	PFCD2005R	**767.00**	1R	13	11	12	20	20	20	20
6	4.50	PFCD2006	**791.00**	1	PFCD2006R	**830.00**	1R	15	13	12	25	25	25	20
7.5	5.63	PFCD2007	**851.00**	1	PFCD2007R	**893.00**	1R	19	16	10	30	30	30	25
10	7.50	PFCD2010	**1025.00**	1	PFCD2010R	**1076.00**	1R	25	21	8	40	35	40	35
12.5	9.38	PFCD2012	**1218.00**	1	PFCD2012R	**1279.00**	1R	31	27	8	50	45	45	40
15	11.25	PFCD2015	**1411.00**	1	PFCD2015R	**1481.00**	1R	37	32	8	60	60	60	50
17.5	13.13	PFCD2017	**1584.00**	2	PFCD2017R	**1662.00**	2R	43	37	6	70	60	70	60
20	15.00	PFCD2020	**1755.00**	2	PFCD2020R	**1843.00**	2R	49	42	6	80	70	80	70
22.5	16.88	PFCD2022	**1923.00**	2	PFCD2022R	**2049.00**	2R	55	47	4	90	80	90	70
25	18.75	PFCD2025	**2067.00**	3	PFCD2025R	**2170.00**	3R	61	53	4	100	90	90	80
27.5	20.63	PFCD2027	**2715.00**	3	PFCD2027R	**2851.00**	3R	67	58	3	125	00	100	90
30	22.50	PFCD2030	**3363.00**	3	PFCD2030R	**3531.00**	3R	73	63	3	125	125	125	00
35	26.25	PFCD2035	**3680.00**	4	PFCD2035R	**3865.00**	4R	85	73	2	150	125	150	125
40	30.00	PFCD2040	**4162.00**	5	PFCD2040R	**4370.00**	5R	97	84	1/0	175	150	150	125
45	33.75	PFCD2045	**5072.00**	7	PFCD2045R	**5422.00**	7R	109	94	1/0	200	175	175	150
50	37.50	PFCD2050	**6167.00**	7	PFCD2050R	**6475.00**	7R	121	105	2/0	200	175	200	175
60	45.00	PFCD2060	**6656.00**	7	PFCD2060R	**6989.00**	7R	145	126	3/0	250	200	225	200
70	52.50	PFCD2070	**6999.00**	8	PFCD2070R	**7349.00**	8R	169	146	4/0	300	250	300	225
75	56.25	PFCD2075	**7229.00**	10	PFCD2075R	**7591.00**	10R	181	157	250 kcmil	300	300	300	250

Table 4.39: Unfused 480 Volt★ 3 Phase/60 Hz

kVAR Rating	Unfused INDOOR NEMA Type 1/12			Unfused OUTDOOR NEMA Type 3R▲			Rated Current	Recommended Wire Size	Recommended Minimum Size Protection Rating▼	
									Fuse	Circuit Breaker Trip
@480 V	Catalog No.■	$ Price	Encl.♦	Catalog No.■	$ Price	Encl.♦	@480 V	(Qty X AWG)	@480 V	@480 V
2.5	PFCD4002	**558.00**	1	PFCD4002R	**586.00**	1R	3	14	5	15
4	PFCD4004	**580.00**	1	PFCD4004R	**609.00**	1R	5	14	10	15
5	PFCD4005	**595.00**	1	PFCD4005R	**625.00**	1R	6	14	10	15
6	PFCD4006	**619.00▲**	1	PFCD4006R	**650.00**	1R	7.2	14	15	15
7.5	PFCD4007	**642.00**	1	PFCD4007R	**674.00**	1R	9	14	15	15
10	PFCD4010	**718.00**	1	PFCD4010R	**755.00**	1R	12	12	20	20
12.5	PFCD4012	**810.00**	1	PFCD4012R	**851.00**	1R	15	10	25	25
15	PFCD4015	**886.00**	1	PFCD4015R	**930.00**	1R	18	10	30	30
17.5	PFCD4017	**937.00▲**	1	PFCD4017R	**983.00**	1R	21	10	35	35
20	PFCD4020	**986.00**	1	PFCD4020R	**1036.00**	1R	24	8	40	40
22.5	PFCD4022	**1033.00▲**	1	PFCD4022R	**1085.00**	1R	27	8	45	45
25	PFCD4025	**1103.00**	2	PFCD4025R	**1158.00**	2R	30	8	50	45
27.5	PFCD4027	**1169.00▲**	2	PFCD4027R	**1228.00**	2R	33	8	60	50
30	PFCD4030	**1234.00**	2	PFCD4030R	**1296.00**	2R	36	8	60	55
35	PFCD4035	**1401.00**	3	PFCD4035R	**1472.00**	3R	42	6	70	65
40	PFCD4040	**1572.00**	3	PFCD4040R	**1651.00**	3R	48	6	80	75
45	PFCD4045	**1679.00▲**	4	PFCD4045R	**1763.00**	4R	54	4	90	85
50	PFCD4050	**1784.00**	4	PFCD4050R	**1873.00**	4R	60	4	100	90
60	PFCD4060	**2650.00**	5	PFCD4060R	**2782.00**	5R	72	3	125	125
70	PFCD4070	**2853.00▲**	5	PFCD4070R	**2996.00**	5R	84	2	150	150
75	PFCD4075	**2956.00**	5	PFCD4075R	**3104.00**	5R	90	1	150	150
80	PFCD4080	**3130.00▲**	6	PFCD4080R	**3286.00**	6R	96	1/0	175	150
90	PFCD4090	**3478.00▲**	6	PFCD4090R	**3651.00**	6R	108	1/0	200	175
100	PFCD4100	**3825.00**	6	PFCD4100R	**4017.00**	6R	120	2/0	200	200
125	PFCD4125	**4765.00▲**	9	PFCD4125R	**5003.00**	9R	150	4/0	250	225
150	PFCD4150	**5704.00▲**	9	PFCD4150R	**5990.00**	9R	180	250 kcmil	300	300
175	PFCD4175	**6374.00▲**	11	PFCD4175R	**6692.00**	11R	210	300 kcmil	350	350
200	PFCD4200	**7043.00▲**	11	PFCD4200R	**7395.00**	11R	240	(2) 2/0	400	400
225	PFCD4225	**7833.00▲**	12	PFCD4225R	**8224.00**	12R	270	(3) 3/0	500	450
250	PFCD4250	**8622.00▲**	13	PFCD4250R	**9052.00**	13R	300	(2) 4/0	500	450
275	PFCD4275	**9410.00▲**	13	PFCD4275R	**9881.00**	13R	330	(2) 4/0	550	500
300	PFCD4300	**10199.00▲**	13	PFCD4300R	**10709.00**	13R	360	(2) 250 kcmil	600	550

▲ Order only. Typical delivery is 1 to 2 weeks.
■ Wall mounting brackets available for units up to 40 kVAR. Order catalog # PFCDBR1 **($50.00).**
♦ For dimensions, see 4-29.
★ For 600 V equipment, change first digit in catalog number from 4 to 6 (e.g. PFCD6004) and use the same price as above 480 V equipment. See page 4-33 for Medium Voltage Fixed Banks.
▼ Consult local Electrical Codes for proper sizing of molded case circuit breaker frame and disconnect switch rating and cabling.

LV Fixed Fused Capacitors with Blown Fuse Indicators

In addition to the comprehensive Multiple Protection System designed into the New ReactiVar® fixed, low voltage capacitors, fused units feature a fast acting current limiting fuse in each phase. Blown fuse indicators are included as standard on both indoor (NEMA Type 1/12) and outdoor (NEMA Type 3R) enclosures. While fuses are not required to protect the capacitor elements, external over current protection may be required by the local electrical code for protection of the conductors feeding the capacitors. Consult your local electrical code for installation instructions.

Table 4.40: 3 Fuses with Blown Fuse Indicators 208 and 240 Volt 3 Phase/60 Hz

kVAR Rating		Fused INDOOR NEMA Type 1/12▲			Fused OUTDOOR NEMA Type 3R▲			Rated Current (Amperes)		Recommended Wire Size■	Recommended Minimum Size Protection Rating■			
											Fuse		Breaker Trip	
@ 240 V	@208 V	Catalog No.♦	$ Price	Encl.★	Catalog No.♦	$ Price	Encl.★	@240 V	@208 V	(Qty. X AWG)	@240 V	@208 V	@240 V	@208 V
2.5	1.88	PFCD2002F	**893.00**	1	PFCD2002RF	**938.00**	1R	6	6	14	10	10	15	15
3.5	2.63	PFCD2003F	**920.00**	1	PFCD2003RF	**967.00**	1R	9	8	14	15	15	15	15
4	3.00	PFCD2004F	**947.00**	1	PFCD2004RF	**995.00**	1R	10	9	14	20	15	15	15
5	3.75	PFCD2005F	**1012.00**	1	PFCD2005RF	**1063.00**	1R	13	11	12	20	20	20	20
6	4.50	PFCD2006F	**1072.00**	1	PFCD2006RF	**1126.00**	1R	15	13	12	25	25	25	20
7.5	5.63	PFCD2007F	**1132.00**	1	PFCD2007RF	**1189.00**	1R	19	16	10	30	30	30	25
10	7.50	PFCD2010F	**1306.00**	1	PFCD2010RF	**1371.00**	1R	25	21	8	40	35	40	35
12.5	9.38	PFCD2012F	**1500.00**	1	PFCD2012RF	**1574.00**	1R	31	27	8	50	45	45	40
15	11.25	PFCD2015F	**1692.00**	1	PFCD2015RF	**1777.00**	1R	37	32	8	60	60	60	50
17.5	13.13	PFCD2017F	**1865.00**	2	PFCD2017RF	**1958.00**	2R	43	37	6	70	60	70	60
20	15.00	PFCD2020F	**2037.00**	2	PFCD2020RF	**2138.00**	2R	49	42	6	80	70	80	70
22.5	16.88	PFCD2022F	**2202.00**	2	PFCD2022RF	**2312.00**	2R	55	47	4	90	80	90	70
25	18.75	PFCD2025F	**2346.00**	3	PFCD2025RF	**2463.00**	3R	61	53	4	100	90	90	80
27.5	20.63	PFCD2027F	**3134.00**	3	PFCD2027RF	**3290.00**	3R	67	58	3	125	100	100	90
30	22.50	PFCD2030F	**3922.00**	3	PFCD2030RF	**4117.00**	3R	73	63	3	125	125	125	100
35	26.25	PFCD2035F	**4239.00**	4	PFCD2035RF	**4452.00**	4R	85	73	2	150	125	150	125
40	30.00	PFCD2040F	**4721.00**	5	PFCD2040RF	**4957.00**	5R	97	84	1/0	175	150	150	125
45	33.75	PFCD2045F	**5724.00**	7	PFCD2045RF	**6009.00**	7R	109	94	1/0	200	175	175	150
50	37.50	PFCD2050F	**6725.00**	7	PFCD2050RF	**7062.00**	7R	121	105	2/0	200	175	200	175
60	45.00	PFCD2060F	**7215.00**	7	PFCD2060RF	**7576.00**	7R	145	126	3/0	250	200	225	200
70	52.50	PFCD2070F	**7837.00**	8	PFCD2070RF	**8229.00**	8R	169	146	4/0	300	250	300	225
75	56.25	PFCD2075F	**8068.00**	10	PFCD2075RF	**8471.00**	10R	181	157	250 kcmil	300	300	300	250

Table 4.41: 3 Fuses with Blown Fuse Indicators 480 Volt▼ 3 Phase/60 Hz

kVAR Rating	Fused INDOOR NEMA Type 1/12			Fused OUTDOOR NEMA Type 3R▲			Rated Current	Recommended Wire Size■	Recommended Minimum Size Protection Rating■	
									Fuse	Breaker Trip
@480 V	Catalog No.♦	$ Price	Encl.★	Catalog No.♦	$ Price	Encl.★	@480 V	(Qty. X AWG)	@480 V	@480 V
2.5	PFCD4002F	**745.00**	1	PFCD4002RF	**782.00**	1R	3.0	14	5	15
4	PFCD4004F	**768.00**	1	PFCD4004RF	**806.00**	1R	4.8	14	10	15
5	PFCD4005F	**783.00**	1	PFCD4005RF	**823.00**	1R	6.0	14	10	15
6	PFCD4006F	**806.00▲**	1	PFCD4006RF	**847.00**	1R	7.2	14	15	15
7.5	PFCD4007F	**829.00**	1	PFCD4007RF	**871.00**	1R	9.0	14	15	15
10	PFCD4010F	**907.00**	1	PFCD4010RF	**952.**	1R	12.0	12	20	20
12.5	PFCD4012F	**998.00**	1	PFCD4012RF	**1047.00**	1R	15.0	10	25	25
15	PFCD4015F	**1074.00**	1	PFCD4015RF	**1128.00**	1R	18.0	10	30	30
17.5	PFCD4017F	**1125.00▲**	1	PFCD4017RF	**1181.00**	1R	21.0	10	35	35
20	PFCD4020F	**1175.00**	1	PFCD4020RF	**1234.00**	1R	24.0	8	40	40
22.5	PFCD4022F	**1221.▲**	1	PFCD4022RF	**1282.00**	1R	27.0	8	45	45
25	PFCD4025F	**1291.00**	2	PFCD4025RF	**1355.00**	2R	30.0	8	50	45
27.5	PFCD4027F	**1356.00▲**	2	PFCD4027RF	**1424.00**	2R	33.0	8	60	50
30	PFCD4030F	**1421.00**	2	PFCD4030RF	**1492.00**	2R	36.0	8	60	55
35	PFCD4035F	**1589.00**	3	PFCD4035RF	**1668.00**	3R	42.0	6	70	65
40	PFCD4040F	**1761.00**	3	PFCD4040RF	**1849.00**	3R	48.0	6	80	75
45	PFCD4045F	**1914.00▲**	4	PFCD4045RF	**2009.00**	4R	54.0	4	90	85
50	PFCD4050F	**2066.00**	4	PFCD4050RF	**2169.00**	4R	60.0	4	100	90
60	PFCD4060F	**2931.00**	5	PFCD4060RF	**3078.00**	5R	72.0	3	125	125
70	PFCD4070F	**3323.00▲**	5	PFCD4070RF	**3489.00**	5R	84.0	2	150	150
75	PFCD4075F	**3519.00**	5	PFCD4075RF	**3695.00**	5R	90.0	1	150	150
80	PFCD4080F	**3693.00▲**	6	PFCD4080RF	**3877.00**	6R	96.0	1/0	175	150
90	PFCD4090F	**4041.00▲**	6	PFCD4090RF	**4242.00**	6R	108.0	1/0	200	175
100	PFCD4100F	**4388.00**	6	PFCD4100RF	**4608.00**	6R	120.0	2/0	200	200
125	PFCD4125F	**5328.00▲**	9	PFCD4125RF	**5594.00**	9R	150.0	4/0	250	225
150	PFCD4150F	**6267.00▲**	9	PFCD4150RF	**6581.00**	9R	180.0	250 kcmil	300	300
175	PFCD4175F	**6937.00▲**	11	PFCD4175RF	**7283.00**	11R	210.0	300 kcmil	350	350
200	PFCD4200F	**7606.00▲**	11	PFCD4200RF	**7986.00**	11R	240.0	(2) 2/0	400	400
225	PFCD4225F	**8466.00▲**	12	PFCD4225RF	**8889.00**	12R	270.0	(3) 3/0	500	450
250	PFCD4250F	**9325.00▲**	13	PFCD4250RF	**9791.00**	13R	300.0	(2) 4/0	500	450
275	PFCD4275F	**10184.00▲**	13	PFCD4275RF	**10694.00**	13R	330.0	(2) 4/0	550	500
300	PFCD4300F	**11043.00▲**	13	PFCD4300RF	**11596.00**	13R	360.0	(2) 250 kcmil	600	550

▲ Order only. Typical delivery is 1 to 2 weeks.

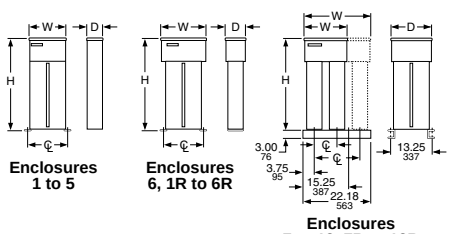
■ Consult local Electrical Codes for proper sizing of molded case circuit breaker frame and disconnect switch rating and cabling.

♦ Wall mounting brackets available for units up to 30/40 kVAR @208/240 V, 100kVAR@480/600 V, brackets sold in pairs. Order catalog #PFCDBR1 **($50.00)**

★ See below for dimensions.

▼ For 600 V equipment, change first digit from 4 to 6 (e.g. PFCD6004F) and use the same price as above

△ 480 V equipment. See page 4-33 for Medium Voltage Fixed Banks.



Enclosures 1 to 5

Enclosures 6, 1R to 6R

Enclosures 7 to 13, 7R to 13R

Table 4.42: Type 1 Enclosure Dimensions□

Encl.	Height (H)		Width (W)		Depth (D)	
	IN	mm	IN	mm	IN	mm
1	16.12	409.45	11.75	298.45	4.81	122.17
2	18.87	479.30	11.75	298.45	4.81	122.17
3	20.06	509.52	11.75	298.45	4.81	122.17
4	22.81	579.37	11.75	298.45	4.81	122.17
5	26.75	679.45	11.75	298.45	4.81	122.17
6	34.00	863.60	19.08	484.63	6.20	157.48
7	22.75	577.85	14.85	377.19	14.78	375.41
8	25.50	647.70	14.85	377.19	14.78	375.41
9	28.88	733.55	14.85	377.19	14.78	375.41
10	29.50	749.30	14.85	377.19	14.78	375.41
11	34.00	863.60	14.85	377.19	14.78	375.41
12	28.88	733.55	21.78	553.21	14.78	375.41
13	34.00	863.60	21.78	553.21	14.78	375.41

Table 4.43: Type 3R Enclosure Dimensions□

Encl.	Height (H)		Width (W)		Depth (D)	
	IN	mm	IN	mm	IN	mm
1R	16.12	409.45	19.08	484.63	6.20	157.48
2R	18.87	479.30	19.08	484.63	6.20	157.48
3R	20.06	509.52	19.08	484.63	6.20	157.48
4R	22.81	579.37	19.08	484.63	6.20	157.48
5R	26.75	679.45	19.08	484.63	6.20	157.48
6R	34.00	863.60	19.08	484.63	6.20	157.48
7R	22.75	577.85	14.85	377.19	14.78	375.41
8R	25.50	647.70	14.85	377.19	14.78	375.41
9R	28.88	733.55	14.85	377.19	14.78	375.41
10R	29.50	749.30	14.85	377.19	14.78	375.41
11R	34.00	863.60	14.85	377.19	14.78	375.41
12R	28.88	733.55	21.78	553.21	14.78	375.41
13R	34.00	863.60	21.78	553.21	14.78	375.41

□ Dimensions provided are approximate only. Do not use for construction purposes. For actual dimensions contact your nearest Square D/Schneider Electric sales office.

The AV4000 and AV5000 are suitable for use where harmonic generating loads are less than 15% of the total connected load.

LV Standard Automatic Capacitor Banks with Main Lugs or Main Breakers

Automatic low voltage capacitor banks are ideally suited for power factor correction at the main service entrance, in applications where plant loading is constantly changing. A microprocessor-based reactive power controller measures plant power factor via a single CT located on the bus/cable at the main service entrance terminal compartment, and switches capacitor stages in and out of service to track a user-selected target power factor. CT sold separately. **Refer to CT Selection Guide on 4-34.** The AV4000 and AV5000 Automatic Capacitor Banks are designed for use in networks that contain little or no current or voltage harmonics.

Features:

Advanced Safety Features: The modularized compact design consists of a microprocessor-based controller with capacitor switching modules fitted into a cubicle arrangement for top entry. All power and control wiring is dead front construction. Capacitor modules consist of 3 phase dry metalized polypropylene elements. Each element has a nonreplaceable 100,000 AIR fuse and pressure sensitive interrupter. Capacitor modules feature a pre-charge circuit to reduce switching transients to 20% of that seen with standard capacitor banks. Internal discharge resistors reduce capacitor voltage to 50 Volts or less within 60 seconds. Dead front fuse holders on AV4000 & AV5000 have integral blown fuse indicators, standard. Cubicles are constructed with a locking door as standard and are furnished in a textured powder paint finish, color ASA 49 gray.

State-of-the-art Microprocessor-based Control Module: The solid state control module boasts the following:

- Automatic C/K ratio selection
- Automatic CT polarity retrieval
- Automatic phase rotation polarity retrieval
- Integral display of target/actual PF, number of steps energized, and more
- Simple, menu-driven programming
- Stage release at voltage dropout
- Alarm relay
- Manual operation with automatic return
- Alarms

Table 4.44: AV5000 Series 3 Phase/60 Hz Main Lugs or Main Circuit Breaker – CT sold separately. See page 4-34.■

kVAR Rating	Steps (Qty x kVAR)	Main Lugs♦ – NEMA Type 1★			Standard Lugs Provided (Qty x AWG)	Main Circuit Breaker♦ – NEMA Type 1★			Standard Lugs Provided (Qty x AWG)	Circuit Breaker▼ (BV only) Frame/Sensor	Nominal Current 60 Hz☆ (Amps)
		Catalog No.△	$ Price	Encl.□		Catalog No.△	$ Price	Encl.□			
240 Volt▲											
50	4 x 12.5	AV005025AV1F6N	**15001.00**	2		—	—	—		—	120.3
75	3 x 25	AV007525AV2F6N	**18392.00**	2		BV007525AV2F8N	**24535.00**	2		1200/600	180.4
100	4 x 25	AV010025AV2F6N	**21783.00**	2	2 x 500 MCM	BV010025AV2F8N	**27925.00**	2	4 x 500 MCM	1200/600	240.6
125	2 x 12.5, 4 x 25	AV012525BV1F6N	**25173.00**	2		BV012525AV1F8N	**31593.00**	3		1200/800	300.7
150	6 x 25	AV015025AV2F6N	**28564.00**	2		BV015025AV2F8N	**38607.00**	3		1200/1000	360.8
175	1 x 25, 3 x 50	AV017525CV2F6N	**31955.00**	2		BV017525CV2F8N	**41997.00**	3		1200/1000	421.0
200	2 x 25, 3 x 50	AV020025BV2F8N	**38968.00**	3		BV020025BV2F8N	**45388.00**	3		1200/1000	481.1
225	1 x 25, 4 x 50	AV022525CV2F8N	**42358.00**	3		BV022525CV2F8N	**51353.00**	3		1200/1000	541.3
250	5 x 50	AV025025AV5F8N	**45749.00**	3	4 x 500 MCM	BV025025AV5F8N	**54743.00**	3	4 x 500 MCM	1200/1000	601.4
275	1 x 25, 5 x 50	AV027525CV2F8N	**49140.00**	3		BV027525CV2F8N	**58134.00**	3		1200/1000	661.5
300	6 x 50	AV030025AV5F8N	**52530.00**	3		BV030025AV5F8N	**61525.00**	3		1200/1000	721.7
480 Volt◊											
50	2 x 25	AV005045AV2F6N	**12422.00**	2		BV005045AV2F8N	**13317.00**	2		1200/600	60.1
75	1 x 25, 1 x 50	AV007545CV2F6N	**13744.00**	2		BV007545CV2F8N	**14639.00**	2		1200/600	90.2
100	2 x 25, 1 x 50	AV010045BV2F6N	**15813.00**	2	2 x 500 MCM	BV010045BV2F8N	**16743.00**	2	4 x 500 MCM	1200/600	120.3
125	1 x 25, 2 x 50	AV012545CV2F6N	**17133.00**	2		BV012545CV2F8N	**18063.00**	2		1200/600	150.4
150	3 x 50	AV015045AV5F6N	**18454.00**	2		BV015045AV5F8N	**24596.00**	2		1200/600	180.4
175	1 x 25, 3 x 50	AV017545CV2F6N	**20523.00**	2		BV017545CV2F8N	**26699.00**	2		1200/600	210.5
200	4 x 50	AV020045AV5F6N	**21845.00**	2		BV020045AV5F8N	**28020.00**	2		1200/600	240.6
225	1 x 25, 4 x 50	AV022545CV2F6N	**23914.00**	2		BV022545CV2F8N	**30090.00**	2		1200/600	270.6
250	5 x 50	AV025045AV5F6N	**25234.00**	2	2 x 500 MCM	BV025045AV5F8N	**31410.00**	2	4 x 500 MCM	1200/600	300.7
275	1 x 25, 5 x 50	AV027545CV2F6N	**27303.00**	2		BV027545CV2F8N	**37104.00**	3		1200/600	330.8
300	6 x 50	AV030045AV5F6N	**28624.00**	2		BV030045AV5F8N	**38668.00**	3		1200/800	360.8
350	1 x 50, 3 x 100	AV035045CV5F6N	**32015.00**	2		BV035045CV5F8N	**42057.00**	3		1200/1000	421.0
400	2 x 50, 3 x 100	AV040045BV5F8N	**39028.00**	3		BV040045BV5F8N	**45720.00**	3		1200/1000	481.1
450	1 x 50, 4 x 100	AV045045CV5F8N	**42418.00**	3		BV045045CV5F8N	**51385.00**	3		1200/1000	541.3
500	2 x 50, 4 x 100	AV050045BV5F8N	**45808.00**	3	4 x 500 MCM	BV050045BV5F8N	**54802.00**	3	4 x 500 MCM	1200/1000	601.4
550	1 x 50, 5 x 100	AV055045CV5F8N	**49199.00**	3		BV055045CV5F8N	**58193.00**	3		1200/1000	661.5
600	6 x 100	AV060045AV8F8N	**52588.00**	3		BV060045AV8F8N	**61583.00**	3		1200/1000	721.7

AV4000 Series The AV4000 Series performs similarly to the AV5000 series and is more suitable for applications requiring less kVAR (200 kVAR max., 480 V, main lugs, top entry only).

Table 4.45: AV4000 Series 480 Volt◊ 3 Phase/60 Hz

Main Lugs Only – CT sold separately. See page 4-34.■

kVAR Rating @ 480 V	Steps (Qty x kVAR)	Main Lugs♦ – NEMA Type 1			Standard Lugs Provided (Qty x AWG)	Nominal Current 60 Hz☆ (Amps)
		Catalog No.△	$ Price	Encl.□		
50	2 x 25	AV005044AV2F6N	**11038.00**	1		48.1
75	1 x 25, 1 x 50	AV007544CV2F6N	**12403.00**	1	2 x 500 MCM	72.2
100	2 x 25, 1 x 50	AV010044BV2F6N	**14276.00**	1		96.2
125	1 x 25, 2 x 50	AV012544CV2F6N	**15641.00**	1		120.3
150	2 x 25, 2 x 50	AV015044BV2F6N	**17513.00**	1		144.3
175	1 x 25, 3 x 50	AV017544CV2F6N	**18880.00**	1	2 x 500 MCM	168.4
200	4 x 50	AV020044AV5F6N	**20246.00**	1		192.5

The Power Factor Table Calculator, available on www.SquareD.com under Free Software and Online Tools, can be used to determine the capacitor kVAR required to improve PF of a single load or entire power system.

- ▲ For 208 Volt applications, the effective kVAR rating at 208 Volts is 0.75 times the kVAR rating at 240 Volts. See page 4-33 for Medium Voltage Systems.
- ■ A Single remote Current Transformer must be located on the bus/cable at the main service entrance terminal compartment. CT sold separately. **Refer to CT Selection Guide on page 4-33.**
- ♦ Order Only. Typical Delivery—4 to 6 weeks. Contact local sales office for committed delivery.
- ★ NEMA Type 3R and 12 enclosures available, please contact your nearest Square D/Schneider Electric sales office for pricing.
- ▼ All trip modules are equipped with dial pick-up settings.
- △ Top entry is standard. For bottom entry, consult your nearest Square D/Schneider Electric sales office.
- □ For dimensions, see page .
- ◊ For 600 V equipment, additional sizes, ratings or options, please consult your nearest Square D/Schneider Electric sales office.
- ☆ Nominal 60 Hz capacitor current draw based on indicated kVAR and voltage ratings. Consult all applicable electric codes for proper sizing of cables and upstream disconnect.

Low Voltage Anti-Resonant and Filtering Automatic Capacitor Banks with Main Lugs and Breaker

The AV6000 is suitable for use where less than 50% of the total connected load is harmonic generating.

The AV7000 is suitable where harmonic generating loads exceed 50% of the total connected load.

ReactiVar® AV6000 anti-resonant and AV7000 harmonic filtering automatic switched capacitor banks are specifically designed for networks containing harmonic energies which would otherwise damage standard fixed or automatic capacitor banks.

The problem: Harmonics are a natural by-product of non-linear loads such as variable frequency drives, motor soft starters, welders, uninterruptable power supplies, robotics, PLCs and other electronic devices. Harmonics introduce higher-than-60 Hz currents and voltages into the electrical distribution system. Capacitors are a low impedance path for these higher frequency components and thus will absorb these harmonic energies. Combinations of capacitors and system inductances (motors and transformers) can form series and parallel tuned circuits which can resonate at certain frequencies. The harmonics produced by non-linear loads can excite a standard capacitor bank into resonance. The resonance can magnify currents and voltages, causing system wide damage and equipment failure. This problem is growing in prevalence.

The solution: Anti-Resonant Automatic Switched Capacitor Banks

The AV6000 anti-resonance capacitor bank's primary function is power factor correction. Iron core reactors are added in series with the capacitor modules. The 3 phase reactors are custom designed and manufactured at our factory under tight tolerance specifically for the AV6000. The reactors tune the bank below the first dominant harmonic (usually the 5th, or 300 Hz). Below the tuning point, the system appears capacitive and thus corrects power factor. Above the tuning point, the system appears Inductive and thus resonance is minimized. The AV6000 design has the added advantage of removing up to 50% of the 5th harmonic to reduce overall voltage distortion.

Harmonic Filtering Automatic Switched Capacitor Banks

The need for an AV7000 is usually determined by a power quality specialist. Although the AV7000 looks identical to the AV6000, its primary function is harmonic mitigation, with power factor correction being a secondary benefit. The distinction between an AV6000 and an AV7000 is the tuning point. By definition, if the tuning point of the capacitor/reactor combination is within ±10% of the target harmonic it is intended to absorb, it is referred to as a filter. If the tuning point is outside the ±10% limit, it is referred to as an anti-resonant system. As the tuning point of the system approaches the target harmonic, its effectiveness at absorbing increases. Hence, the need to classify its functionality. The PQc group should always be consulted prior to recommending it to customers.

Application Notes

- A single remote Current Transformer must be located on the bus/cable at the main service entrance terminal compartment. **CT sold separately. Refer to CT Selection Guide on 4-34.**
- It is imperative to ensure that no other capacitors (fixed or automatic) are connected to the same network as the AV6000 or AV7000 capacitor banks. The components within these banks are carefully chosen to avoid network resonance between the substation transformer and the capacitor elements. Additional capacitors on the network will alter the characteristics of the AV6000, possibly leading to network resonance. The application of this product may warrant special consideration, please supply end customer telephone number and contact name when placing order.

Application Assistance

The Square D Power Quality Correction Group provides engineering assistance for the application of capacitors in harmonic rich environments. Specialists at Square D can assess the likelihood of application problems and arrange for more detailed study if required. Solutions can include computer modeling and system simulation. Depending on the network, the solution may include de-tuned banks (AV6000) or fully filtered banks (AV7000). Our application engineers can make all the arrangements for system studies, custom engineering, installation and commissioning, as required by the application.

Features

- **Modularized construction:** Units are free standing, modularized "MCC style" in ASA 49 gray. Sections are ganged together as required with a maximum 300 kVAR per section at 480 V. Key operated latching is standard. Units are NEMA Type 1 standard, with NEMA Type 3R available upon request (NEMA Type 12 is not available). Top entry, main lugs or main breaker is standard. Bottom entry is optional.
- **Robust design:** Capacitor modules are designed with higher than standard voltage and current ratings to provide long life on systems with high harmonic energies. Reactors are designed to operate at 115°C rise over a maximum 40°C ambient.
- **Advanced Safety Features:** In addition to the standard safety features designed into the AV4000/5000 systems, the Reactors in the AV6000 have an embedded thermistor temperature detector. The stage will shut down and annunciate if the reactor should overheat, usually a result of excessive harmonic energies.

Table 4.46: AV6000 Series▲ 480 Volt▲ 3 Phase/60 Hz Main Lugs or Main Circuit Breaker – CT sold separately. See page 4-34.■

kVAR Rating @ 480 V	Steps (Qty x kVAR)	Main Lugs♦ – NEMA Type 1			Standard Lugs Provided (Qty x AWG)	Main Circuit Breaker♦ – NEMA Type 1			Standard Lugs Provided (Qty x AWG)	Circuit Breaker△ (BV only) Frame/Sensor	Nominal Current 60 Hz★ (Amps)
		Catalog No.▼	$ Price	Encl. □		Catalog No.▼	$ Price	Encl. □			
100	2 x 50	AV010046AV2F6N	**24467.00**	4	2 x 500 MCM	BV010046AV2F8N	**25444.00**	4	4 x 500 MCM	1200/600	132
150	3 x 50	AV015046AV5F6N	**31900.00**	4	2 x 500 MCM	BV015046AV5F8N	**38591.00**	4	4 x 500 MCM	1200/600	198
200	4 x 50	AV020046AV5F6N	**39331.00**	4	2 x 500 MCM	BV020046AV5F8N	**46060.00**	4	4 x 500 MCM	1200/600	264
250	1 x 50, 2 x 100	AV025046CV5F6N	**41882.00**	4	2 x 500 MCM	BV025046CV5F8N	**53849.00**	5	4 x 500 MCM	1200/1000	328
300	2 x 50, 2 x 100	AV030046BV5F6N	**49314.00**	4	2 x 500 MCM	BV030046BV5F8N	**61280.00**	5	4 x 500 MCM	1200/1000	394
350	1 x 50, 3 x 100	AV035046CV5F8N	**59280.00**	5	4 x 500 MCM	BV035046CV5F8N	**69046.00**	5	4 x 500 MCM	1200/1000	460
400	4 x 100	AV040046AV8F8N	**64270.00**	5	4 x 500 MCM	BV040046AV8F8N	**74068.00**	5	4 x 500 MCM	1200/1000	524
450	1 x 50, 4 x 100	AV045046CV5F8N	**71702.00**	5	4 x 500 MCM	BV045046CV5F8N	**81499.00**	5	4 x 500 MCM	1200/1000	590
500	5 x 100	AV050046AV8F8N	**76692.00**	5	4 x 500 MCM	BV050046AV8F8N	**86490.00**	5	4 x 500 MCM	1200/1000	655
550	1 x 50, 5 x 100	AV055046CV5F8N	**84125.00**	5	4 x 500 MCM	BV055046CV5FAN	**103007.00**	6	6 x 500 MCM	1600/1600	721
600	6 x 100	AV060046AV8F8N	**89116.00**	5	4 x 500 MCM	BV060046AV8FAN	**107999.00**	6	6 x 500 MCM	1600/1600	786
650	1 x 50, 6 x 100	AV065046CV5F8N	**100978.00**	6	4 x 500 MCM	BV065046CV5FAN	**114133.00**	6	6 x 500 MCM	1600/1600	852
700	7 x 100	AV070046AV8F8N	**105939.00**	6	4 x 500 MCM	BV070046AV8FAN	**119125.00**	6	6 x 500 MCM	1600/1600	917
750	1 x 50, 7 x 100	AV075046CV5F8N	**113371.00**	6	4 x 500 MCM	BV075046CV5FAN	**126557.00**	6	6 x 500 MCM	1600/1600	983
800	8 x 100	AV080046AV8F8N	**118364.00**	6	4 x 500 MCM	BV080046AV8FAN	**131550.00**	6	6 x 500 MCM	1600/1600	1048
850	1 x 50, 8 x 100	AV085046CV5F8N	**125795.00**	6	4 x 500 MCM	BV085046CV5FAN	**151047.00**	7	6 x 500 MCM	2000/2000	1114
900	9 x 100	AV090046AV8F8N	**130788.00**	6	4 x 500 MCM	BV090046AV8FAN	**156040.00**	7	6 x 500 MCM	2000/2000	1179

▲ For 600 V equipment, AV7000 series, additional sizes, ratings or options, please consult your nearest Square D/Schneider Electric sales office. See page 4-33 for Medium Voltage Systems.
■ A Single remote Current Transformer must be located on the bus/cable at the main service entrance terminal compartment. **CT sold separately. Refer to CT Selection Guide on page 4-34.**
♦ Order Only. Typical Delivery—6 to 8 weeks. Contact local sales office for committed delivery.
★ Nominal 60 Hz capacitor current draw based on indicated kVAR and voltage ratings. Consult all applicable electric codes for proper sizing of cables and upstream disconnect.
▼ Top entry is standard. For bottom entry, consult your nearest Square D/Schneider Electric sales office.
△ All trip modules are equipped with dial pick-up settings.
□ For dimensions, see page 4-34.

LV Transient Free Reactive Compensation Capacitor Banks

Square D ReactiVar® Transient Free Reactive Compensation (TFRC) anti-resonant (AT6000)Systems are ideally suited for use on electrical systems where connected equipment is extremely sensitive to variations in the supply voltage.

The problem: Capacitor systems featuring electromechanical contactors generate voltage transients on the electrical network when switching capacitor stages on/off, even when current limiting or tuning reactors are employed. Transients can impair the operation of sensitive equipment, including programmable logic controllers, variable speed drives, computers and UPS systems. In sensitive networks such as hospitals, data processing centers, airports and many manufacturing environments, any transient, however slight, may not be acceptable.

The solution: Transient free reactive compensation systems utilize electronic switching elements to energize capacitor stages. Switching occurs when the capacitor residual voltage matches the network voltage. The result is reactive compensation without generating voltage transients. The Anti-Resonant design allows for installation in harmonic rich environments which are typical with electronic loads.

Application Notes

1. A remote current transformer for each unit must be located on the bus/cable at the main service entrance terminal compartment—installed on the "A" phase. **CTs are sold separately. To order, refer to CT Selection Guide on page 34.**
2. It is imperative to ensure that no other capacitors (fixed or automatic) are connected to the same network as the AT6000 TFRC System
3. Additional capacitors on the network can lead to network resonance. Applying capacitors to a network containing harmonic producing loads warrants special consideration. It is highly recommended that you contact the Square D Power Quality Correction Group for application assistance. When calling for assistance, please have the following information available:

- 12 months of utility billing information
- A single line diagram of the network showing the nature of loads (e.g. 150 hp FVNR starters; 200 hp VFD; etc.)
- Transformer(s) kVA rating and percent impedance (%Z)
- Primary & secondary voltages
- Location of utility metering
- Size, type and location of any existing capacitors

Application Assistance

The Square D Power Quality Correction Group provides engineering assistance for the application of capacitors in harmonic rich environments. Specialists at Square D can assess the likelihood of application problems and arrange for more detailed study if required. Solutions can include computer modeling and system simulation. Our application engineers can make all the arrangements for system studies, custom engineering, installation and commissioning, as required by the application.

Table 4.47: Standard Features and Available Options

	AT6000
Silver flashed copper bus	X
Copper power and control wiring	X
Solid state capacitor switching modules	X
Heavy duty capacitor elements	X
Iron core tuning reactors	X
Forced air ventilation	X
Varlogic™ N12 Controller	X
Varlogic NRC12 Controller	O
Split core CTs for incoming service	▲
CT shorting blocks	X
Incoming section with main lugs	X
Incoming section with main circuit breaker	O
Top entry	X
Bottom entry	O
Type 1 enclosure (ASA 61 grey)	X
Type 3R (ASA 49 grey)	O
Other voltages or frequencies	O

Note: X=Standard feature

Note: O=Available option–contact your nearest Square D/Schneider Electric sales office for pricing

▲ Required, but must be ordered separately.

Table 4.48: AT6000 Series△ 480 Volt■, 3 Phase, 60 Hz Main Lugs or Main Circuit Breaker—CTs sold separately. See page 4-34 □

KVAR Rating■ @480 V	Steps (Qty x kVAR)	Main Lugs NEMA Type 1♦			Main Circuit Breaker NEMA Type 1♦			Standard Lugs Provided■ (Qty x kcmil)	Recommended Minimum Size Protection Rating★ @480 V		Recommended Minimum Cable Ampacity★ 135% Rated Current
		Catalog No.▼	$ Price	Encl.	Catalog No.▼	$ Price	Encl.		Fuse	Breaker/Trip	
300	2x150	AT030046AABF8N	**58058.00**	8	BT030046AABF8N	**66183.00**	8	4x500	600	800/600	535
375	1x75, 2x150	AT037546CAAF8N	**72409.00**	8	BT037546CAAF8N	**79892.00**	8	4x500	800	800/800	668
450	3x150	AT045046AABF8N	**81744.00**	8	BT045046AABF8N	**88022.00**	8	4x500	900	1200/900	802
600	4x150	AT060046AABFAN	**101601.00**	9	BT060046AABFAN	**116639.00**	9	6x500	1200	1200/1200	1069
750	5x150	AT075046AABFAN	**122441.00**	9	BT075046AABFAN	**134152.00**	9	6x500	1500	1600/1500	1337
900	6x150	AT090046AABFAN	**141252.00**	9	BT090046AABFAN	**158676.00**	9	6x500	1800	2000/1800	1604

■ For larger sizes or 240 V systems contact your nearest Square D/Schneider Electric sales office. See page 4-33 for Medium Voltage Systems.
♦ Only Type 1 Indoor enclosure available. For dimensions, see page 4-34.
★ Consult local Electrical Codes for proper sizing of molded case circuit breakers, disconnect switches and cables.
▼ Top entry is standard. For alternate entry, consult your nearest Square D/Schneider Electric sales office.
△ Order only. Typical delivery is 8-10 weeks. Contact local sales office for committed delivery.
□ One remote current transformer must be located on the bus/cable at the main service entrance terminal compartment, "A" phase. **CTs sold separately. See page 4-34.**

MVC systems are suitable for power factor correction of steady harmonic-free motor loads.

NOTE: *Power factor correction, harmonic mitigation, and voltage support in medium voltage electrical systems. Custom engineered for steady and rapidly fluctuating loads.*

ReactiVar® Medium Voltage Fixed Power Factor Capacitors

The ReactiVar MVC fixed capacitors are ideally suited for power factor correction in applications where the load does not change or where the capacitor is switched with the load, such as the load side of a motor contactor. ReactiVar capacitors are available up to 300 kVAR as individual units, and up to 600 kVAR in banks. Unfused or fused (2 fuses) assemblies are available. Other ranges available upon request.

Features:

- Fused and unfused applications
- Standard rating up to 600 kVAR, 4800 V (for specials, consult factory)
- Metallized polypropylene film capacitors for low dielectric loss
- Internally mounted discharge resistors
- Operating temperature range of –25°C to +45°C
- Built to applicable NEMA, IEEE, and IEC standards
- Available in indoor (Type 1/12) and outdoor (Type 3R) enclosures
- Painted ASA 61 gray

Lead time: 12–14 weeks typical (consult factory for committed delivery)

Prices & assistance: Call PQc Group at (905) 678-6699 or email pqc@ca.schneider-electric.com

---

MV5000 systems are suitable for use where harmonic generating loads are less than 15% of the total connected load.

MV6000 systems are suitable for use where harmonic generating loads are less than 50% of the total connected load.

MV7000 systems are suitable for use where harmonic generating loads exceed 50% of the total connected load.

MVHVC High-Speed compensation systems are designed for compensation of rapidly fluctuating loads

ReactiVar Medium Voltage Metal Enclosed Automatic Capacitor Banks (MV5000/MV6000/MV7000)

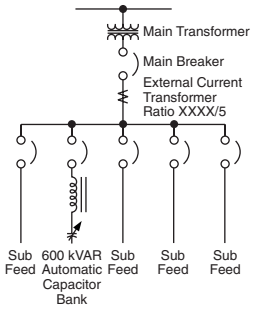
The ReactiVar medium voltage automatic capacitor banks are ideally suited for centralized power factor correction and/or harmonic filtering in applications where plant loading is constantly changing, resulting in the need for varying amounts of reactive power. All MV capacitor systems are a custom-engineered to meet project specific application and installation needs.

Features:

- Standard metal enclosures available up to 20,000 kVAR, 5/15 kV, 50/60 Hz
- The Square D HVL load interrupter switch (fused or unfused)
- Externally fused Merlin Gerin PROPIVAR (or equivalent) or Cooper capacitors with excellent life due to high temperature withstand, small temperature rise, chemical stability, overvoltage and overcurrent withstand. (Internally fused capacitor available upon request)
- Three-bushing capacitor cells connected in delta available up to 5 kV. Two-bushing capacitor cells connected in ungrounded wye for higher voltages
- Current limiting capacitor fuses with blown fuse pop-up indicators
- current limiting reactors in multistage-step MV5000 standard systems to limit high capacitor inrush currents
- Iron core reactors in MV6000 de-tune banks to prevent parallel resonance
- Heavy-duty iron core reactors in MV7000 filtered banks for effective 5th harmonic filtering.
- Available in Type 1 indoor and 3R outdoor enclosure types
- Key interlocking system forces sequential operation of the controls, non-load break switch (or circuit breaker) and ground switches
- Superior Square D Varlogic™ microprocessor based power factor controller
- The Merlin Gerin SEPAM protective relaying.

Lead time: 12–16 weeks typical (consult factory for committed delivery)

Prices & assistance: Call PQc Group at (905) 678-6699 or email pqc@ca.schneider-electric.com



Single Line (Typical) Diagram 1

CT Selection Guide for Class 5830, 5860, 5870 and 5880

The current transformer is located on a phase A bus or cable at the main service entrance as illustrated in Diagram 1. The CT should be sized for the maximum load current. The CT should be installed upstream of the capacitor bank and plant loads to measure the combined current.

CT catalog number: TRAI••••SC♦ ♦ where •••• is current rating code of bus/cable and ♦ ♦ is window size code. Codes are listed in table to the right.

e.g. TRAI1000SC07 is a CT for 1000 A bus with 7"x4" window.

Unit Price: **$673.**

Table 4.49:

Current Rating of Bus/Cable		Window Size	
Amperes	**Rating Code ••••**	**7" x 4" Size Code ♦ ♦**	**11" x 4" Size Code ♦ ♦**
300	0300	07	11
400	0400	07	11
500	0500	07	11
600	0600	07	11
750	0750	07	11
800	0800	07	11
1000	1000	07	11
1200	1200	07	11
1500	1500	07	11
1600	1600	07	11
2000	2000	07	11
2500	2500	07	11
3000	3000	07	11
3500	3500	07	11
4000	4000	07	11
5000	5000	N/A	11
6000	6000	N/A	11

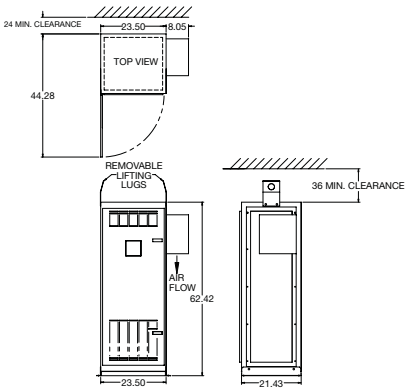


Figure 1—AV4000

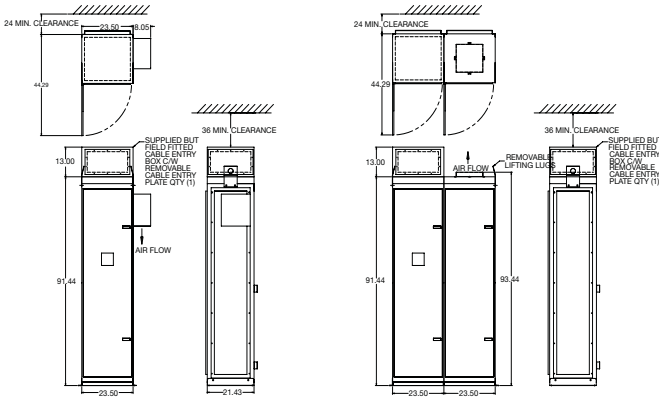


Figure 2—AV5000

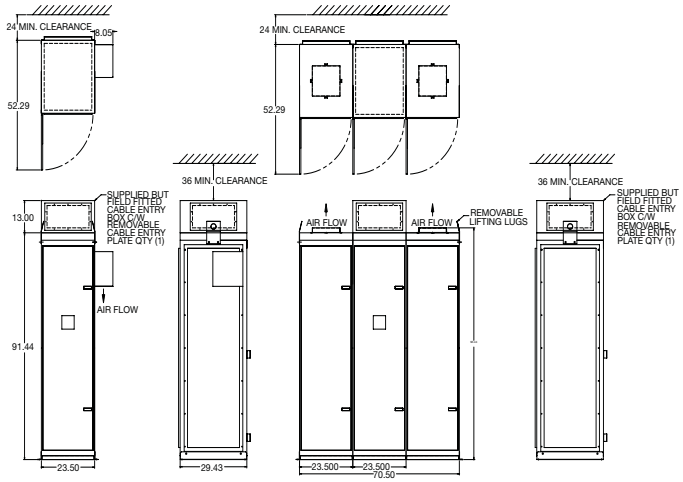


Figure 3—AV6000

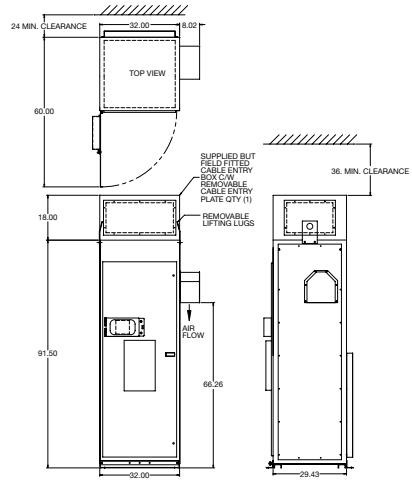


Figure 4—AT6000

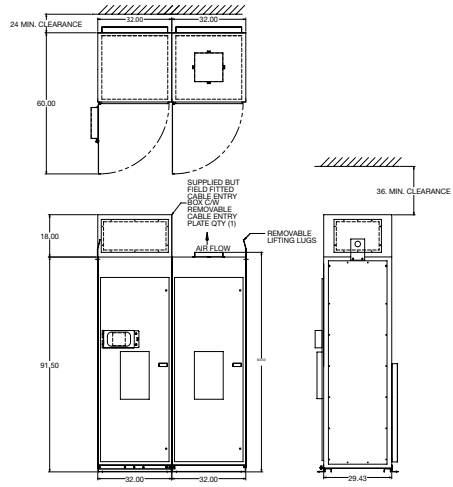


Figure 5—AT6000 (2 Section)

Enclosure Dimensions

Table 4.50: Dimensions▲

Type	Encl.	Figure	Sections	Dimensions "B" (Width)	
				IN	**mm**
AV4000	1	1	1	23.5	597
AV5000	2	2	1	23.5	597
	3	2	2	47.0	1194
AV6000 & AV7000	4	3	1	23.5	597
	5	3	2	47.0	1194
	6	3	3	70.5	1791
	7	3	4	94.0	2388
AT6000	8	4	1	32.0	813
	9	5	2	64.0	1626

▲ Dimensions provided are approximate only. Do not use for construction. For actual dimensions, contact your nearest Square D/Schneider Electric sales office.

The problem:

High levels of harmonics generated by non-linear loads can have significant negative impact in the facility electrical system. It can cause malfunction of the equipment, disrupt plant operation, thus, resulting loss of productivity.

Harmonic filtering:

The AccuSine Power Correction System (PCS) is Active Harmonic Filter (AHF) which actively injects opposite harmonics current on the source side of the load and it:

- Decreases harmonic related overheating of cables, switchgear and transformers
- Reduces downtime caused by nuisance thermal tripping of protective devices
- Increases electrical network reliability and reduces operating costs
- Corrects to the 50th harmonic, reduce harmonics level to meet IEEE 519, IEC 61000 3-4, and UK G5/4-1 standards.
- Compensates entire network or specific loads depending on installation point

Power Factor Correction and Dynamic VAR Compensation:

AccuSine PCS features a 100 microsecond response providing for dynamic VAR injection to reduce voltage sags created by inductive load switching. In addition, AccuSine PCS can inject peak current at 2.25 times its rms current rating for 3 cycles. AccuSine PCS can also operate in a dual mode where current is first injected to reduce hamonics and any excess current capacity is used to improve the power factor.

Other Features:

- Independent phase compensation
- UL, CE, ABS, and CSA approved
- Parallel connection allows for easy retrofit and installation of multiple units for large networks
- Response to load fluctuations begins in 100 microseconds with 1/2 cycle for full response to step load changes
- 50, 100 and 300 A models for 208–480 V. Other voltages available.

Accusine PCS Sizing

For proper sizing of AccuSine units, contact the Square D/Schneider Electric Power Quality Correction Group at (905) 678-6699. To expedite the product selection process, please have a single line diagram and/or details of the application including sizes of transformers, non-linear and linear loads, and any existing filters and capacitors.

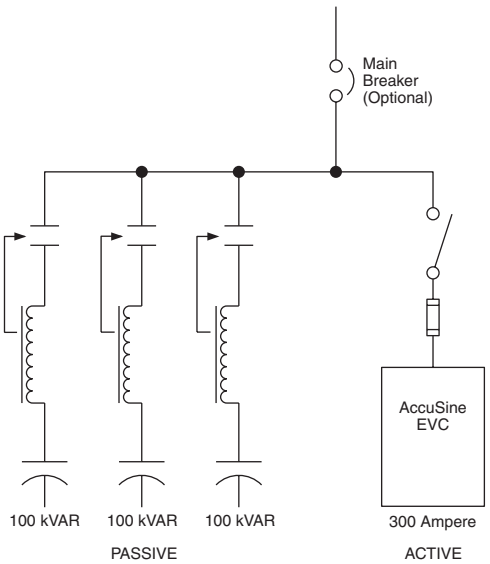
Table 4.51: AccuSine—208–480 V▲, 50/60 Hz■ NEMA rated

Rated Current A (rms)	Max. Reactive Power (kVAR)			Frequency (Hz)	Catalog No.	$ Price	Enclosure			Exterior Dimensions♦						Weight♦ Lbs (kg)
							Rating	Style	Cable Entry	H		W		D		
	208 V	400V	480 V							IN	mm	IN	mm	IN	mm	
50	18	34.6	41.6	50/60	PCS050D5N1	**23269.00**	NEMA 1	Wall Mount	Bottom þ	48	1219	21	526	19	470	250 (114)
				50/60	PCS050D5N12	**35825.00**	NEMA12	Floor Standing▼	Top/Bottom	75	1900	31	800	24	600	661 (300)
100	36	69.2	83.1	50/60	PCS100D5N1	**36754.00**	NEMA 1	Wall Mount þ	Bottom þ	65	1650	21	526	19	475	350 (159)
				50/60	PCS100D5N12	**44518.00**	NEMA12	Floor Standing▼	Top/Bottom	75	1913	31	800	24	600	771 (350)
300	108	207.8	249.4	50/60	PCS300D5N1	**73534.00**	NEMA 1		Top þ	75	1900	31	800	20	500	775 (352)
				50/60	PCS300D5N12	**88227.00**	NEMA12		Top/Bottom	91	2300	39	1000	32	805	1212 (552)

Table 4.52: AccuSine—208–480 V▲, 50/60 Hz■ IP rated★

Rated Current A (rms)	Max. Reactive Power (kVAR)			Frequency (Hz)	Catalog No.	$ Price	Enclosure			Exterior Dimensions♦						Weight♦ Lbs (kg)
							Rating	Style	Cable Entry	H		W		D		
	208 V	400V	480 V							IN	mm	IN	mm	IN	mm	
50	18.0	34.6	41.6	50	PCS050D5IP305	**39060.00**	IP30	Floor Standing▼	Top/Bottom	75	1900	31	800	24	600	661 (300)
				50	PCS050D5IP545	**41229.00**	IP54									
				50	PCS050D5CE305	**42538.00**	IP30 (CE certified)									
				50	PCS050D5CE545	**44707.00**	IP54 (CE certified)									
				60	PCS050D5IP306	**39060.00**	IP30									
				60	PCS050D5IP546	**41229.00**	IP54									
				60	PCS050D5CE306	**42538.00**	IP30 (CE certified)									
				60	PCS050D5CE546	**44707.00**	IP54 (CE certified)									
100	36	69.2	83.1	50	PCS100D5IP305	**47932.00**	IP30	Floor Standing▼	Top/Bottom	75	1900	31	800	24	600	7
				50	PCS100D5IP545	**50752.00**	IP54									
				50	PCS100D5CE305	**52493.00**	IP30 (CE certified)									
				50	PCS100D5CE545	**55313.00**	IP54 (CE certified)									
				60	PCS100D5IP306	**47932.00**	IP30									
				60	PCS100D5IP546	**50752.00**	IP54									
				60	PCS100D5CE306	**52493.00**	IP30 (CE certified)									
				60	PCS100D5CE546	**55313.00**	IP54 (CE certified)									
300	108	207.8	249.4	50	PCS300D5IP305	**91974.00**	IP30	Floor Standing▼	Top/Bottom	91	2300	39	1000	32	805	1212 (550)
				50	PCS300D5IP545	**97946.00**	IP54									
				50	PCS300D5CE305	**99195.00**	IP30 (CE certified)									
				50	PCS300D5CE545	**110217.00**	IP54 (CE certified)									
				60	PCS300D5IP306	**91974.00**	IP30									
				60	PCS300D5IP546	**97946.00**	IP54									
				60	PCS300D5CE306	**99195.00**	IP30 (CE certified)									
				60	PCS300D5CE546	**110217.00**	IP54 (CE certified)									

▲ Other voltages available. Contact your nearest Square D/Schneider Electric sales office. Multiple units can be connected in parallel.
■ Two remote 400 Hz rated current transformers required for three phase loads. Three remote 400 Hz rated CTs required when single phase loads are present. Select proper CTs per table in section 4-36.
♦ Dimensions and weights are approximate. Do not use for construction. For actual dimensions, contact your nearest Square D/Schneider Electric sales office.
★ Anti-runaway feature included. CE certified unit meets EMC directive 89/336 EEC.
▼ A main disconnect is included in all floor standing units.



HVC Topology (Typical)

The Hybrid VAR Compensator (HVC) is ideally suited for industrial facilities with power quality or production problems caused by rapidly changing load demands typical of highly cyclical loads such as welders, mining conveyors and heavy stamping machines.

The problem:

Traditional capacitor systems have a minimum response time of five to ten seconds for load fluctuations. As a result of this limitation, uncompensated faster loads can produce voltage instability, voltage flicker, increased losses and poor power factor which reduces the electric supply capacity. Problems can often be seen inside the facility, on the utility feeder to the facility or in neighboring facilities. Problems can include:

- Poor weld quality or reduced weld line productivity (due to restrikes or interlock weld controls)
- Failure to start motor loads (due to voltage sag on startup)
- Undervoltage tripping of sensitive loads (Robots, PLCs, VFDs)
- Lighting flicker and/or HID lighting shutdown
- Overloaded distribution equipment (cyclical current pulses may exceed the rated current of the distribution equipment)
- Poor power factor and associated utility demand charges
- High harmonic levels

Ultra-Fast Reactive Power Solution:

- The Hybrid VAR Compensator is ideally suited for power factor correction and voltage sag support in many applications where conventional systems are not suitable:
- One cycle or less for full response
- Infinite VAR resolution
- Compensates for large inductive inrush currents
- Transient free compensation
- Improves voltage regulation
- Reduces flicker

HVC systems can alleviate any of the problems created by cyclical loads that require large amounts or reactive power for short duration.

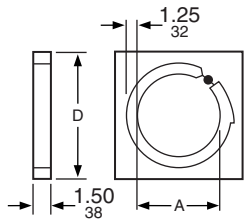
Unique, cost-effective construction:

HVC systems couple a detuned capacitor system (fixed, contactor or power electronic switched) with the AccuSine® Electronic VAR Control (EVC) unit. The Accusine EVC is able to inject leading or lagging VARs to provide variable compensation over the operating rating. For example, coupling a 500 kVAR fixed detuned bank with a 300 A Accusine EVC yields an HVC that can provide reactive compensation between 250 kVAR and 750 kVAR.

Custom Designed Solution:

Sizing of the HVC will often require a site visit by Square D Power Quality Correction Group technicians to take real-time measurements of the network. Please contact the PQc group at (905)678-6699 or email pqc@squared.com

---



Round Split-Core Selection:

Three CT's required for networks with line-neutral loads. Two remote current transformers required for three phase loads. For installations requiring parallel connection of multiple AccuSine for increased correction capacity, special considerations may be required. Contact the Square D Power Quality Correction Group for details.

Table 4.53:

Ampacity	Catalog No.	$ Price	Dimensions (IN)		Weight (lbs.)	Accuracy	Burden Capacity	Secondary Current
			A (ID)	D (OD)				
500	CT500SC	**642.00**	4.0	6.5	3.5	2%	3 VA	5 A
1000	CT1000SC	**642.00**	4.0	6.5	3.5	1%	10 VA	5 A
3000	CT3000SC	**800.00**	6.0	8.5	4.25	1%	45 VA	5 A
5000	CTFCL500058	**1082.00**	8.0	10.5	5.5	1%	45 VA	5 A

Note: Rectangular CTs also available; contact PQC group.