



Company Profile

The Experts in Energy Management

Technological excellence, innovation, quality and a commitment to customer service place SATEC at the forefront of the energy industry.

SATEC has been a proven solutions-oriented global leader in the research, development and manufacturing of energy management systems since 1987. With two decades of rich experience in energy management, SATEC provides total solutions for customer applications worldwide. Our greatest strength lies in our deep technological expertise and our ability to provide flexible solutions for a wide range of customer applications.

Application-Based Solutions

SATEC's device product line serves both energy utilities and energy consumers in various fields. Our application-based product line includes devices spanning from basic power meters up to high performance revenue meters with advanced power quality analysis capabilities. All SATEC devices comply with world-acknowledged regulations and are supported by our energy management software.

Our cutting-edge power quality analysis capabilities provide a rewarding solution enabling energy utilities to take timely corrective action and permitting energy consumers to prevent equipment failures.

SATEC and the Environment

SATEC is committed to protecting the environment. SATEC products help our customers save energy and reduce CO₂ as well as other greenhouse gas emissions, while our unique renewable energy management solutions increase the performance of solar and wind power generation plants. SATEC products are RoHS compliant and are lead free.

Customer Satisfaction

We at SATEC regard our clients as our most valuable asset. We consider excellence of products and service as a key to gaining customer loyalty and satisfaction. Our customer base consists of industrial facilities, commercial enterprises, government and public services, and major power utilities.

SATEC takes pride in catering to the unique needs of our varied customer base. As a leader in the field, we at SATEC set the standard by continuously developing and upgrading our products and services, to perfect our clients' energy management systems. Our products are user-oriented and designed for easy installation and operation.

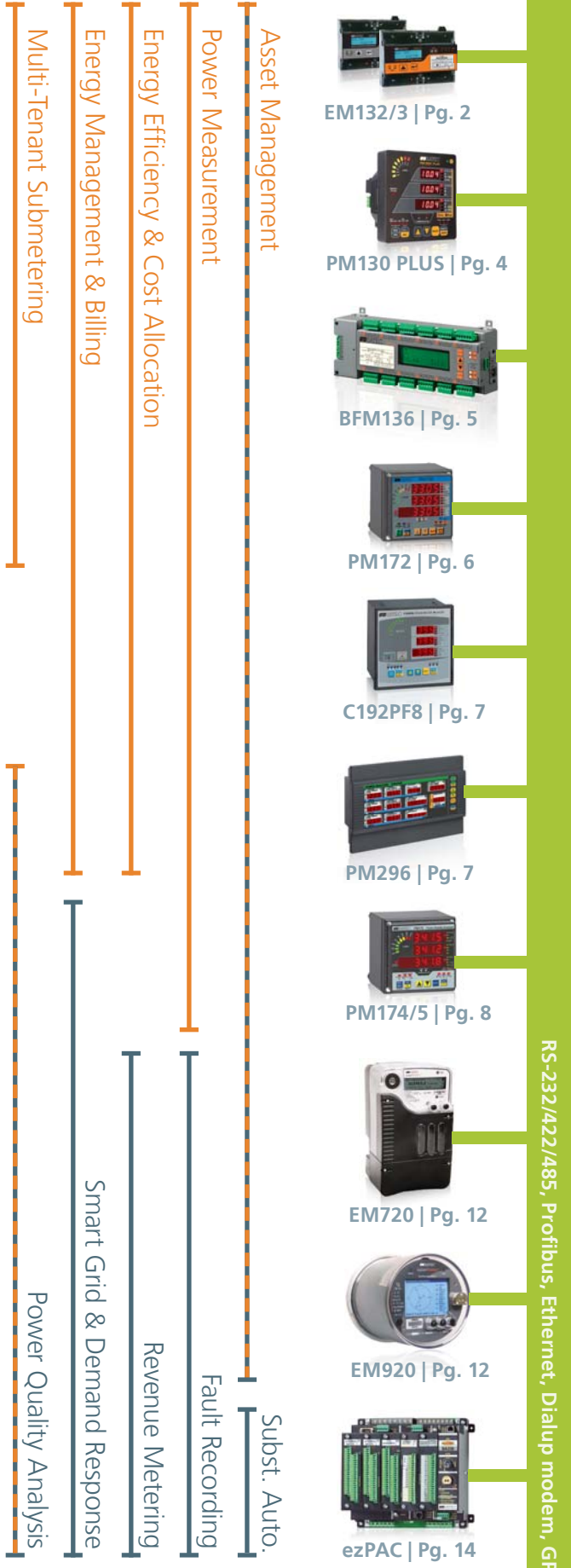
Global Distribution

SATEC exports to over 60 countries worldwide throughout Europe, North and South America, Asia, Oceania and Africa. Our worldwide distribution network provides local marketing service and prompt professional support.

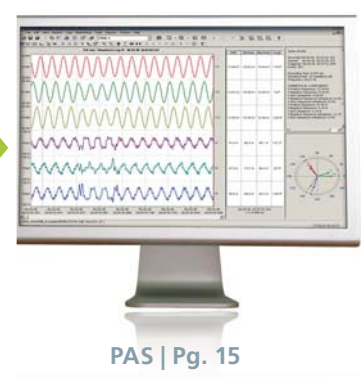
Our Expertise at Your Service

Our team of scientists and industry experts are available to dispense expert technical support, and provide technical solutions to questions ranging from generic to complex. SATEC's support team is closely involved in the development process, to assure a product of the highest quality that is also tailored to our customer's needs.

The Full Range of Electricity Management Solutions for Every Application



RS-232/422/485, Profibus, Ethernet, Dialup modem, GPRS, RF



EM132/133 Series



Plug-in Modules

- **Digital Input/Output (4DI & 2DO)**
2 form A relay outputs 250V AC/5A
4 form A Solid state inputs
250V AC/400V DC 0.15A
- **4 Analog Outputs**
± 1mA / 0-20mA
0-1mA / 4-20mA
- **RS-232/422/485**
- **GPRS**
- **Ethernet**
- **Profibus**
- **RF** (module & accessories available in certain regions only)

Models

Model Features

Measurement Features

EM132 Multi-functional 3-phase power transducer functionality (see Features)

EM133 All the features of the EM132 model plus TOU, 2xDI, DO (see Features)

Current Inputs

1A Standard 1A CT

5A Standard 5A CT

RCT Remote CTs (see pg. 10)

100A Direct Connection



Features

Multi-Functional 3-Phase Power Meter

- Voltage, current (including neutral current), power, energy, power factor, frequency, voltage/current unbalance
- Current range up to 200% (120% for 100A model)

Revenue Meter

- Exceeds accuracy class 0.55
- Time of Use (TOU) tariffs (EM133 Model)

Basic Power Quality Control (EM133 Model)

- Individual voltage and current harmonics (up to the 40th)
- Voltage and current THD, TDD & K-Factor
- Time stamped max/min values

Real Time Clock

- Built-in clock and calendar functions

Event/Data Log (EM133 Model)

- System events & data logging
- Real-time stamps

Alarm and Control Functions

- 16 programmable set points
- 4 counters

Power Supply

- Self powered plus auxiliary multi-purpose AC/DC power supply (85-265V AC, 88-290V DC)
- Special versions (12, 24-48V DC)

Communication protocols

- Protocols: Modbus RTU, ASCII, DNP 3.0, Modbus/TCP, DNP3/TCP

Mounting

- DIN Rail sealable connection

Dimensions

- 3.5x4.9x2.7" / 90x125x68.5mm (HxWxD)

EM132

Multi-Function Transducer



The EM132 is a cost-effective multi-function transducer with local display, designed to replace analog or digital transducers. Its local display allows setup and verification of installation, without the hassle of using computers. One device supports all network configurations (i.e., 3 wire, 4 wire, wye, delta, etc.) and is field configurable.

The EM132 accurately measures over 100 parameters from basic frequency, voltages and currents, to all power parameters, 4 quadrant active, reactive and apparent energies.

The EM132 has an integral RS-485 communication port for a wide range of protocols—Modbus, DNP 3.0 and IEC 60870. Its expansion port allows connection of a second communication port, including Ethernet, Profibus, RF or GPRS, as well as second RS-485 and RS-232 ports.

The unique field installable add-on feature allows adding digital and analog I/Os. When using the 4 analog output add-on, the EM132 can replace 4 analog 4-20mA transducers. Each one can be freely programmed to any parameter and scaling.

EM133

TOU Smart Energy Meter



The EM133 is a comprehensive multi-function energy meter, designed to provide a complete range of energy measurement and management. It measures the electrical energy and connects via digital

inputs to water, gas or air condition (flow / temperature) meters. The device has a relay output that can be freely programmed to remotely discontinue the supply (using external contactors) or raising alarms. The information is displayed on the local display and is available remotely via the communication.

The EM133 accurately measures over 100 parameters from basic frequency, voltages and currents, through all power parameters, 4 quadrant active, reactive and apparent energies, to harmonics information. The harmonics information includes the harmonics coefficients of THD, TDD and K-Factor plus individual voltage

and current harmonics up to the 40th harmony. The energy measurement includes an on-board Time of Use (TOU) suitable to virtually any utility tariff.

The EM133 includes an integral RS-485 communication port for a wide range of protocols—Modbus, DNP 3.0 and IEC 60870. Its expansion port allows connection of a second communication port, including Ethernet, Profibus, RF or GPRS, as well as second RS-485 and RS-232 ports.

The unique field installable add-on feature allows adding digital and analog I/Os to facilitate any control scheme with up to 6 digital inputs and 3 digital outputs.

PM130 PLUS

Multi-Functional Power Meter



The PM130 PLUS series provides a cost-effective substitute for numerous analog meters used by industrial, commercial and utility customers for basic power metering. The PM130 PLUS devices are multi-functional three-phase power meters. The PM130EH PLUS model also offers basic revenue metering and Power Quality.

The PM130 PLUS is widely integrated in panel boards and SCADA systems. With the addition of the unique TOU module, the PM130EH PLUS model answers the needs of revenue metering applications. It is also suitable for utility substation automation with its support of the industry standard DNP V3.0 and Modbus RTU protocols, as

Plug-in Modules

- **Digital Input/Output (4DI & 2DO)**
2 form A relay outputs 250V AC/5A
4 form A Solid state inputs
250V AC/400V DC 0.15A
- **4 Analog Outputs**
+/-1mA / 0-20mA
0-1mA / 4-20mA
- **TOU Module:** high precision clock + 4 digital inputs + Time-of-Use tariffs for revenue metering (EH model)
- **RS-232/422/485**
- **GPRS**
- **Ethernet**
- **Profibus**

well as its I/O capabilities (using the Digital Input/Output module).

The PM130 PLUS series consists of two basic models providing digital measurements of more than 80 electrical parameters locally, and more than 100 electrical parameters via RS-485 interface.

The PM130 PLUS modular approach enables users to assemble a system that meets their specific needs. The wide choice of plug-in modules includes digital I/O, analog output, TOU, Ethernet, Profibus, RS-232/422/485 or GPRS.

Models

Model	Features
Measurement Features	
P	Multi-functional 3-phase power meter functionality (see Features)
EH	All the features of the P model plus Revenue Meter & Power Quality control (see Features)
Current Inputs	
1A	Standard 1A CT
5A	Standard 5A CT
RCT	Remote CTs (see pg. 10)

Measurement Features

P	Multi-functional 3-phase power meter functionality (see Features)
EH	All the features of the P model plus Revenue Meter & Power Quality control (see Features)

Current Inputs

1A	Standard 1A CT
5A	Standard 5A CT
RCT	Remote CTs (see pg. 10)



Features

Multi-Functional 3-Phase Power Meter

- Voltage, current (including neutral current), power, energy, power factor, frequency, voltage/current unbalance
- Current range up to 200%

Revenue Meter (EH Model)

- Exceeds accuracy class 0.5S
- Time Of Use (TOU) tariffs

Basic Power Quality Control (EH Model)

- Individual voltage and current harmonics (up to the 40th)
- Voltage and current THD, TDD & K-Factor
- Time stamped max/min values

Real Time Clock

- Built-in clock and calendar functions

Event/Data Log (EH Model)

- System events & data logging
- Real-time stamps

Alarm and Control Functions

- 16 programmable set points
- 4 counters

Power Supply

- Multi-purpose AC/DC power supply (85-265V AC, 88-290V DC)
- Special versions (12, 24-48V DC)

Communication protocols

- Protocols: Modbus RTU, ASCII, DNP 3.0, Modbus/TCP, DNP3/TCP

Mounting

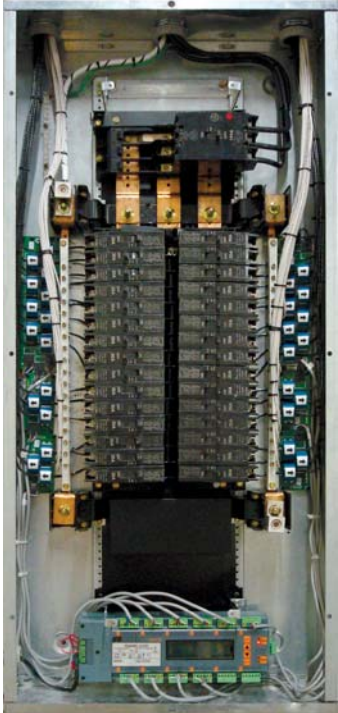
- Dual panel mounting:
4" Round; Square 96x96 DIN

Dimensions

- 4.5x4.5x4.3" / 114x114x109mm (HxWxD)

BFM136

Multi-Tenant Submetering



This compact instrument is designed to easily fit into existing panel boards, thus eliminating the need for expensive retrofit projects or for allocating extra space. For billing purposes, single or multiple circuits can be defined for each customer. This flexibility allows to reassign circuit groups to changing customers without complicated electrical procedures, and allows for easy changes when tenants move in and out.

The BFM136 user-defined and easily configured alarm system enables preventive maintenance to avoid unnecessary outages.

Combined with SATEC's eXpertpower™, a comprehensive web service enabling users to access energy, power quality and real-time data, the BFM136 completes the total solution for multi-tenant energy management.



SATEC's unique offering for the commercial market answers customer needs in multi-tenant submetering applications. This solution is based on the new generation multi-tenant Branch Feeder Monitor and supported by the groundbreaking web application eXpertpower™.

Ideal for both new and retrofit projects, the BFM136 can monitor energy (on multi-tariff TOU basis), demands and data logging. The device can monitor up to 12 three-phase channels or 36 single-phase channels, or any other combination of both. This flexibility and cost-efficiency make the BFM136 especially suitable for multi-tenant facilities, such as office buildings, shopping malls, residential buildings, hotels, government facilities, universities, etc. Cost-efficiency is also achieved by the considerable installation and infrastructure cost savings.

Features

- Provides a complete set of energy and demand data on multi-tariff basis for billing purposes
- Accuracy class 0.5S revenue metering
- Meter sealing option for voltage and current inputs
- Current and voltage monitoring
 - 12 3-phase channels
 - 18 2-phase channels
 - 36 1-phase channels
 - Any combination of the above
- Compliant with IEC specifications
- LCD display for on-site access
- Data access and TOU via PAS software (see pg. 15 for more information)
- Web-based energy management with eXpertpower™ providing online data access (see pg. 16 for more information)
- Compact design for easy installation within existing or new electric panelboards
- Durable design for tamper resistance
- Communication platforms
 - Built-in serial RS-485
 - Optional: modem, Ethernet, wireless, GPRS
- Real Time Clock
- Event and data logging
- Flash memory 8 Mb
- **Dimensions:** 4.2x13x2.3" / 107x331x58mm (HxWxD)
- Selection of Remote Current Transformers—see pg. 10.



Split Core Remote CT

PM172

Advanced Power & Revenue Meter



The PM172 is a high performance feeder monitoring instrument that includes revenue class measurements and logging capability. With over 100 electrical measurements, long term memory logging capability and breaker contact status inputs, this series is an economical approach to distribution automation for utilities. The PM172 series is widely integrated in panel boards and SCADA systems by commercial and industrial facilities. It is also successfully used for electric generator applications.

Revenue class metering and the built-in TOU function provide a solid background for commercial and industrial submetering applications. The event and data log on the basis of programmable set points is a differentiating feature of the PM172 series. This capability facilitates a wide range of commercial and industrial applications demanding data analysis as well as corrective actions for specific recorded events. The recorded data is a valuable asset for energy management.

The PM172 series includes a choice of built-in communication platforms, such as modem, Ethernet, Profibus DP, and serial communication.

RPM072 Remote Power Meter



Non-display Remote Power Meter for panel/wall or DIN rail mounting.

Models

Model Features

Measurement Features

P	Multi-functional 3-phase power meter functionality (see Features)
E	All the features of the P model + revenue meter (see Features)
EH*	All the features of the E model + power quality control (see Features)

* Available in certain regions only

Current Inputs

1A	Standard 1A CT
5A	Standard 5A CT
RCT	Remote CTs (see pg. 10)

Display Modules



RGM180 TFT Touch Panel
High-resolution graphical display

RDM172 Remote Display

Features

Multi-functional 3-Phase Power Meter

- Voltage, current (including neutral current), power, energy, power factor, frequency, voltage/current unbalance, load profile

Multi-Tariff Revenue Meter (E/EH Models)

- Exceeds accuracy class 0.2S
- Built-in Time of Use (TOU) tariffs to meet any billing requirements
- Sealing option

Power Quality Control (EH Model)

- Individual voltage and current harmonics (up to the 40th)
- Voltage and current THD, TDD & K-Factor
- Total Harmonic Powers
- Total Harmonic Energies

- Waveform recording with 6 channels (3 voltage inputs, 3 current inputs)

Real Time Clock

- Built-in clock and calendar functions with back-up battery
- Time synchronization via communication port or digital input

Event/Data Log

- Logging capability for more than 100 parameters
- Logging parameters with real-time stamps

Alarm and Control Functions

- 16 programmable set points
- 2 programmable relay outputs 3A, 250V
- 2 digital inputs
- Optional 2AI or 2AO

- Optional 2DI+2DO (total 4DI+4DO)

Communication

- 2 independent communication ports (RS-232, RS-422, RS-485, modem, Ethernet, Profibus DP, GPRS)
- Protocols: Modbus RTU, ASCII, DNP 3.0, Modbus/TCP, DNP3/TCP

Isolation

- Full galvanic isolation of voltage and current measuring circuits—6 kV Impulse

Mounting

- Dual panel mounting:
4" Round; Square 96x96 DIN

Dimensions

- 5x5x5.6" / 127x127x143mm (HxWxD)

PM296

Power Quality Analyzer



The Power Quality Analyzer PM296 offers highly accurate advanced metering, fit for any power monitoring, data acquisition control and PQA and IED (Intelligent Electronic Device) applications.

The PM296 series is ideal for generator applications where simultaneous viewing of electrical measurements is required. The Analyzer includes dual port communications and triple communication protocols (Modbus, ASCII and DNP 3.0 Lev.2) and built-in I/O.

Features

- 11 window simultaneous display
- Long term memory for logging and trending
- 2 independent communication ports
- 6 programmable control relays
- 12 digital inputs
- 2 analog outputs
- Dimensions:**
7.3x11x3.3" / 185x280x85mm (HxWxD)

C192PF8

Power Factor Manager



The C192PF8 is a multi-purpose energy multi-meter combining the abilities of two instruments: power measurement and advanced capacitor bank control and protection.

The C192PF8 performs both single-phase and three-phase measurements, in full compatibility with all electric networks (both high and low), and includes 8 multi-purpose relays for control and protection.

Features

- 3-phase measurement of V, A, P, Q and Energy
- Dual power factor
- Controls up to 8 capacitor banks
- Phase failure protection
- Harmonic and voltage protection
- Cos ϕ monitoring & control
- kVAR monitoring & control
- Dimensions:**
5.6x5.6x3.4" / 144x144x86mm (HxWxD)

PM174 / PM175

IEEE1159 / EN50160 / GOST 13109 Advanced Power Quality Analyzers



The Advanced Power Quality Analyzers PM174/5 are compact, multi-functional three-phase power and revenue meters equipped with advanced power quality analysis capabilities.

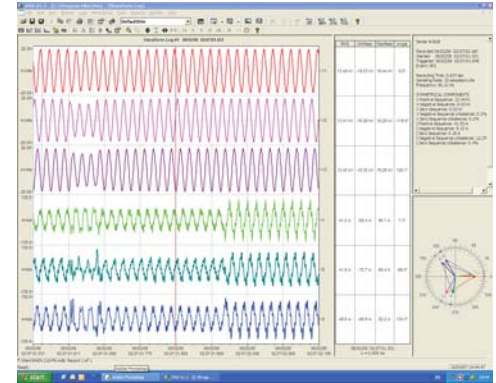
The analyzers have been developed to answer the needs of a wide range of

users: substation operators, electrical energy system integrators, generator users, industrial and commercial energy consumers. These analyzers cover the entire range of applications demanding high performance power quality monitoring and root cause analysis.

The PM174 provides the full range of power quality monitoring, logging and statistics according to IEEE1159. The PM175 provides similar performance according to EN50160 or GOST 13109.

The PM174/5 allows both suppliers and consumers to monitor the quality of outgoing or incoming electric power. This enables power suppliers to prepare timely corrective action, and helps consumers prevent equipment damages caused by power quality issues.

Two independent communication ports allow local and remote data acquisition.



Waveform analysis via PAS

Features

Multi-Functional 3-Phase Power Meter

- Voltage, current (incl. neutral current), power, energy, power factor, frequency, voltage/current unbalance, load profile

Multi-Tariff Revenue Meter

- Accuracy class 0.2S according to ANSI C12.20/ IEC 62053-22
- Built-in Time of Use (TOU) tariffs to meet any billing requirements
- Sealing option
- Built-in clock and calendar functions with back-up battery
- Time synchronization via communication port or digital input

Advanced Power Quality Analysis

- Monitoring, statistics & reports according to EN50160, IEEE1159 or GOST 13109 specifications
- Directional power harmonics (via PAS)

- Power Quality event logging with waveform recording
- Waveform recording with 6 channels (3 voltage inputs, 3 current inputs)
- Harmonics & inter-harmonics according to IEC 61000-4-7
- Voltage and current THD, current TDD, K-Factor
- Flicker according to IEC 61000-4-15
- Dips, swells, interruptions and transient recording with waveforms

Event/Data Log

- Power quality event/data logging
- Logging capability for more than 100 parameters
- Logging parameters with real-time stamps

Alarm and Control Functions

- 16 programmable set points
- 2 programmable relay outputs 3A, 250V

- 2 digital inputs
- Optional 2AI or 2AO
- Optional 2DI+2DO (total 4DI+4DO)

Communication

- 2 independent communication ports (RS-232 /422/485, modem, Ethernet, Profibus DP, GPRS)
- Protocols: Modbus RTU, ASCII, DNP 3.0, Modbus/TCP, DNP3/TCP

Isolation

- Full galvanic isolation of voltage and current measuring circuits—6 kV Impulse

Mounting

Dual panel mounting:
4" Round; Square 96x96 DIN

Dimensions

- 5x5x5.6" / 127x127x143mm (HxWxD)

PM17X Series Models

Models



PM174
Power Quality Analysis (PQA) according to IEEE1159

PM174: Green Solar Monitoring



PM175
Power Quality Analysis (PQA) according to EN50160 or GOST 13109



RPM074/5
Non-display Remote Power Meter for panel/wall or DIN rail mounting.

EDL174/5
Portable Power Quality Analyzer



Remote Displays



RGM180 TFT Touch Panel
High-resolution graphic display

RDM174/5 Remote Display
Remote display for RPM074/5 or second display for PM174/5 via RS-485.



Pole-Top MV Sensors (PT/CT)

For Smart Grid Deployment



SATEC PM17x series can be supplied with Line Post Sensors for replacing of existing pole isolators with voltage and current sensors for MV grids of 15kV, 25kV or 35kV.

The MV Sensors are designed for Distribution Automation to provide:

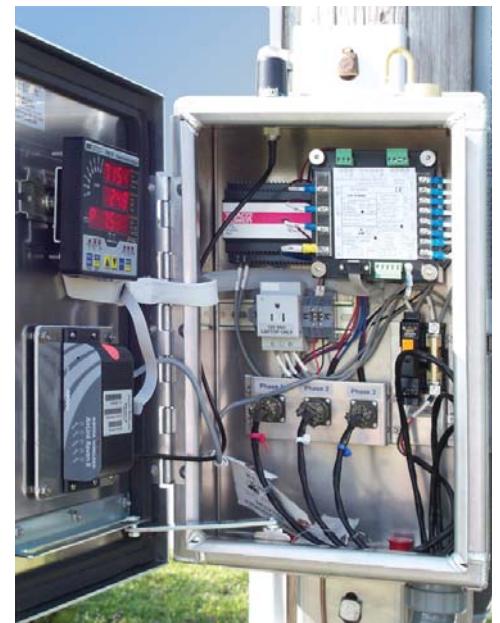
- Compact, economical power-line sensing
- No line cutting
- Not for dead-end use
- Linear outputs up to fault levels
- Accurate performance
- Non-hazardous voltage on output
- Completely sealed against moisture

Advantages of Sensor Monitoring

- Precise Real-Time measurements
- Provides DNP3.0 protocol
- GPRS communication
- Local display
- Memory (redundancy)
- Waveform / PQ features
- Phasors & phase rotation
- Directional harmonics
- Neutral currents
- Complete Total Cabinet Package
- Expandability

Help Manage

- Line losses
- Capacitor controls
- Voltage regulation
- Outage detection
- Load balance
- Harmonics
- Fault location
- Power theft



Remote Current Transformers

The following products can be ordered with dedicated high accuracy Remote Current Transformers rather than with the standard 1A/5A CT input:

- PM130 PLUS Series
- PM172 Series
- PM174/5
- BFM136
- SA330 ezPAC

All CTs are supplied with 8ft / 2.5m cable.
Maximum cable length: 650ft / 200m



5A Split Core CT
Diam. 0.63"/16mm



100A Split Core CT
Diam. 0.63"/16mm



800A Split Core CT
Opening:
3.2x2"/81x50mm



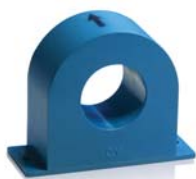
100A Solid Core CT
Diam. 0.47"/12mm



400A Solid Core CT
Diam. 1.02"/26mm



1200A Split Core CT
Opening:
4.7x3.1"/121x80mm



100A Solid Core CT
Diam. 0.9"/23mm



400A Split Core CT
Diam. 1.2"/30.5mm

RGM180

Graphic Touch Screen



PM175X connected to RGM180-G1

The RGM180 is a 5.7" large color graphic touch screen that takes power quality and energy monitoring to a new level.

The RGM180 can display comprehensive information in easy to read screens that allow monitoring complex information at a glance.

The touch screen makes the operation and configuration so simple that it completely eliminates the need for employee training.

Models

RGM180-G1

The RGM180-G1 controls and monitors information from a single SATEC eXpertMeter™.

The RGM180-G1 can be connected directly without an additional power source to PM17x or ezPAC SA3x0. The PM17x is attached directly to the RGM180 (which replaces the LED display)—as shown in the image on the left). The ezPAC is connected via cable, up to 10m long. Up to 1600m cable can be used with remote power supply for both ezPAC and PM17x direct connection. The RGM180-G1 adds to existing SATEC meter devices full speed USB 2.0 capabilities.

RGM180-G3

The RGM180-G3 controls and monitors information from several SATEC eXpertMeters™ over RS-485 or 10/100 Base-T Ethernet, using MODBUS Master protocol.

The RGM180-G3 model has two power sources—Power over Ethernet (PoE) or external AC/DC-DC/DC power supply which can be connected in parallel.



Features

- 5.7" color graphic display with touch panel, TFT technology
- High speed RS-485 communication port at up to 480kb/s
- Wide range operating temperature: -20°C to +70°C / -4°F to +158°F
- More than 500,000 touch screen operation lifetime
- 200Mips SOC ARM9 based controller, up to 64MB RAM and 256MB NAND Flash
- Programmable system setup, including multi-language support
- Plug & Play device display detecting SATEC device type for Device Monitoring and Configuration
- Programmable screen saver
- Extends SATEC eXpertMeters™ with full speed USB 2.0 port
- Dimensions:** 7.1x8.7x1.9" / 181x221x48mm (HxWxD)

eXpertMeter™ EM720 / EM920

High Performance Revenue Meter & Cutting Edge Power Quality Analyzer & Fast Transient and Fault Recorder

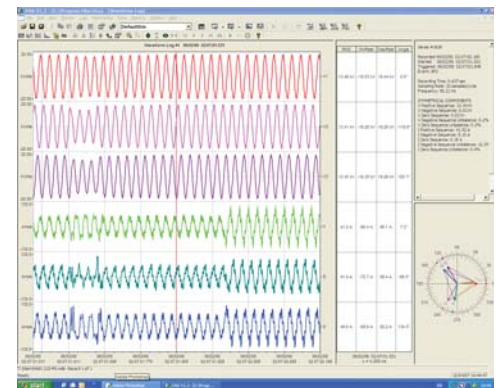


The eXpertMeter™ EM720 and EM920 are 4-in-1 multi-functional energy analyzers that include Class A power meter, high precision revenue meter, unsurpassed power quality analyzer and unique digital fault recorder. They differ in their mechanical construction (the EM720 is built with accordance to IEC standards while the EM920 is a socket meter), I/O and add-ons.

The eXpertMeter™ all-in-one solution has been developed to comply with the most demanding customer requirements in energy generation and distribution (power stations, electric companies, substation operators, electric energy system integrators) and in energy consumer segments (industrial and commercial). The eXpertMeter™ can serve as a main revenue meter or test meter to manage advanced energy supply contracts that include a commitment to the most demanding power quality standards. The eXpertMeter™ can be used to resolve disputes between electric energy suppliers and consumers regarding power quality EN50160 standard violations.

The EM720/EM920 takes the AMI (or AMR)

to a new level, by adding power quality and fault recording to gain complete control over the smart grid.



Waveform analysis via PAS

Features

Multi-Functional 3-Phase Power Meter

- Voltage, current (including Neutral current), power, energy, power factor, frequency, voltage/current unbalance, load profile

Multi-Tariff Revenue Meter

- Precise 0.05% measurement
- Accuracy class 0.2S according to IEC 62053-22 / ANSI C12.20
- Time Of Use (TOU) tariffs to meet any billing requirements (8 tariffs, 4 seasons)
- Unique anti-vandalism & anti-tampering features
- Transformer and transmission line losses calculation (8 points, PT & CT)
- Built-in self accuracy test

Advanced Power Quality Analysis

- Power Quality Analysis according to IEC 61000-4-30 Class A

- Built-in EN50160 statistics & reports
- Back-up battery and/or auxiliary power supply for recording major dips & interruptions
- Harmonics & Inter-harmonics according to IEC 61000-4-7
- Directional power harmonics (via PAS—see pg. 15)
- Voltage and current THD, current TDD, k-factor
- Flicker measurement according to IEC 61000-4-15
- Waveform recording, up to 1024 samples/cycle
- Three voltage & four current inputs for waveform records
- Dips, swells, interruptions
- Fault recording
- Four measured and recorded currents up to 50 A (10In)
- ITI (CBEMA) curves (via PAS)

Transient Recorder

- High Speed Transient detection as little as 17 μ s @ 60Hz / 20 μ s @ 50Hz
- Transients measured relative to ground
- Measures up to 2 kV pulses

Event/Data Log

- Power Quality events with waveforms
- Logging capability for more than 100 parameters with real-time stamps
- Logging memory 8-16 MB built-in
- Time synchronization—IRIG-B (GPS) or Ethernet (SNTP)

Additional Features

- Dielectric withstand: 6 kV impulse, 4 kV AC @ 1min
- I/O and ComPorts isolation—4 kV AC
- Optional Remote Display Module (RDM) LED front panel display
- Anti-tampering and self test functions

eXpertMeter™ EM720



The EM720's unique "Add-On" hot-swap module concept allows you to configure the meter to your changing needs, thus saving valuable time in the field or future costly replacements. Technological advancements revitalize legacy applications to rapidly and cost-efficiently respond to changing market conditions.

Models

EM720: Basic
EM720T: Transient Power Master

Alarm and Control Functions

- 16 programmable set points
- 4 digital inputs with 1 ms sample rate
- Up to 4 programmable relay outputs
- Up to 4 digital inputs with ½ cycle sampling rate

Rechargeable battery

- Up to 6 hours full operation

Communications

- RS-232/RS-485/Ethernet/USB/GPRS/IR
- **Protocols:** Modbus RTU, ASCII, DNP 3.0, Modbus/TCP, DNP3/TCP, IEC 62056-21/61 (OBIS), IEC 61850

Dimensions

- 12x7x5.7" / 303x177x144mm (HxWxD)



Field Replaceable Hot Swap Modules

Communications

- RS-232/485 IRIG-B Low Speed
- Ethernet / USB / RS-232/485 High Speed
- GPRS/GSM

Auxiliary Power Supply Options

- 24V DC
- 88-265V AC and 90-290V DC

Digital Input/Output—2DI/2DO

- Form A Relay Output 250V AC/5A
- Form A Solid State Relay Output 250V AC/0.1A

eXpertMeter™ EM920



The Model EM920 eXpertMeter™ is an advanced energy meter that exceeds Class 0.2S class revenue billing requirement. It provides long term memory for load and trend profiles, as well as battery backup and auxiliary power supply that allow logging even during power outages. The EM920 also includes advanced power quality analysis to detect and record waveform events and fault currents harmful to power systems.

Alarm and Control Functions

- 16 programmable set points
- 2 digital inputs with 1 ms sample rate
- Up to 8 digital inputs with ½ cycle sample rate
- 1 KYZ relay output
- Up to 6 programmable relay outputs
- Up to 4 programmable analog outputs

Communications

- Ethernet/IRIG-B, GPRS/GSM, USB, RS-485, RS-232/485, Dial-up Modem, IR
- **Protocols:** Modbus RTU, ASCII, DNP 3.0, Modbus/TCP, DNP/TCP, MV90, IEC 61850

Dimensions

- 8.5x7" / 214.3x176.7mm (HxDiameter)

EM920 Modules

Transient

- Transient module (to be released in 2012)

Communications

- Ethernet / IRIG-B / RS-232/485
- GPRS/GSM
- Dial-up Modem V.90 (to be released in 2012)

Input/Output

- 6 relay outputs:
2 form A (5A @ 250V AC/0.2A @ 250V DC) & 4 form C (0.15A @ 250V AC/DC)
- 8 digital inputs
- 4 analog outputs +/- 1mA
- 4 analog outputs 0-1 mA
- 4 analog outputs 0-20 mA
- 4 analog outputs 4-20 mA

Auxiliary Power Supply Options

- 50-288V AC and 90-290V DC

ezPAC™ SA300

Advanced Control & Power Quality Analysis

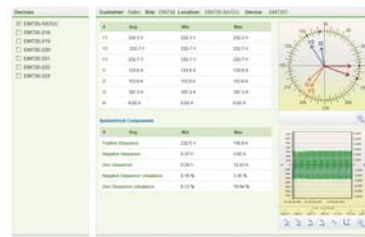
The Total Solution for Add-On Substation Automation



The SATEC ezPAC™ SA300 Series Power Intelligence Unit is an advanced power analysis and control device unmatched in the utility and industrial environments. The ezPAC™ SA300 Series is a fusion of many Intelligent Electronic Devices (IED) combined into a single powerful unit. The ezPAC™ unites advanced control and automation functions, intelligent fault-recorder, power quality and sequence of events (SOE) with automatic analysis and reports. It also offers revenue metering,

back-up protection equipment and control devices to provide a complete solution for substation and industrial automation. The ezPAC™ is suitable for retrofit as well as for new utility projects.

This instrument is an ideal cost-effective means to automating electrical substations with existing electro mechanical (EM) relays. The ezPAC™ Series extends the life expectancy of EM protection relays for many years by providing the information lacking from these highly reliable devices without interfering with the protection scheme.



Fault recording with phasor—eXpertpower™

Modular Design

The unique modular design of the ezPAC™ SA300 ensures its adaptation to changing needs, through a selection of numerous plug-in options for multiple customer applications.

Display Modules



**RGM180
Graphic Touch Screen**
High-resolution TFT touch panel (see pg. 11)



RDM LED
Remote Display Module



RDM312
Multi-window Display Module

Features

Multi-Functional 3-Phase Power Meter

- Accuracy class 0.2S Revenue Meter
- Voltage, current (including neutral), power, energy, power factor, demands, frequency, voltage/current unbalance, load profile
- 1 DC voltage input (up to 300V DC)
- 4 additional revenue grade AC current inputs (SA330 model)

Fault Recorder

- Up to 150A fault currents
- Pre and post fault recording
- Fault distance calculations
- Fault reports
- Up to 48 fast (1 ms) digital inputs, 16 fast (1 ms) analog inputs
- Sequence of events with 1 ms accuracy

Event/Data Log

- Built-in 256 MB logging memory
- Synchronized waveforms from multiple devices in a single plot (via PAS—pg. 15)
- Power Quality events with waveforms

- Multiple parameter logging with real-time stamps

Advanced Power Quality Analysis

- Power quality according to IEC 61000-4-30 Class A
- Power quality analysis, statistics & reports according to IEEE1159, EN50160 or GOST 13109
- Sags/swells detection and logging
- Interruptions detection and logging
- Harmonics & inter-harmonics according to IEC 61000-4-7
- Directional power harmonics
- Voltage and current THD, current TDD and K-factor
- Flicker measurement according to IEC 61000-4-15
- Transient detection and logging
- 4 voltage and 4 current inputs for fast waveform recording
- Up to 57 channel simultaneous recording (8 AC, 1V DC, and 48 digital input channels)

Control & Alarm Functions

- 32 programmable set points
- 5 slots for plug-in I/O modules
- Up to three modules of 32-channel digital inputs
- Up to four 16-channel relay output modules
- Up to 4 combined 4-channel analog input/output modules (4AI and 4AO per module)
- Up to two 8-channel fast (1 ms) analog input modules

Communication

- Three serial ports (RS-232 & RS-422/485)
- Ethernet
- Infrared port / Built-in modem / USB port
- Protocols: Modbus RTU & ASCII, Modbus TCP, DNP3/TCP
- Optional IEC 61850 protocol

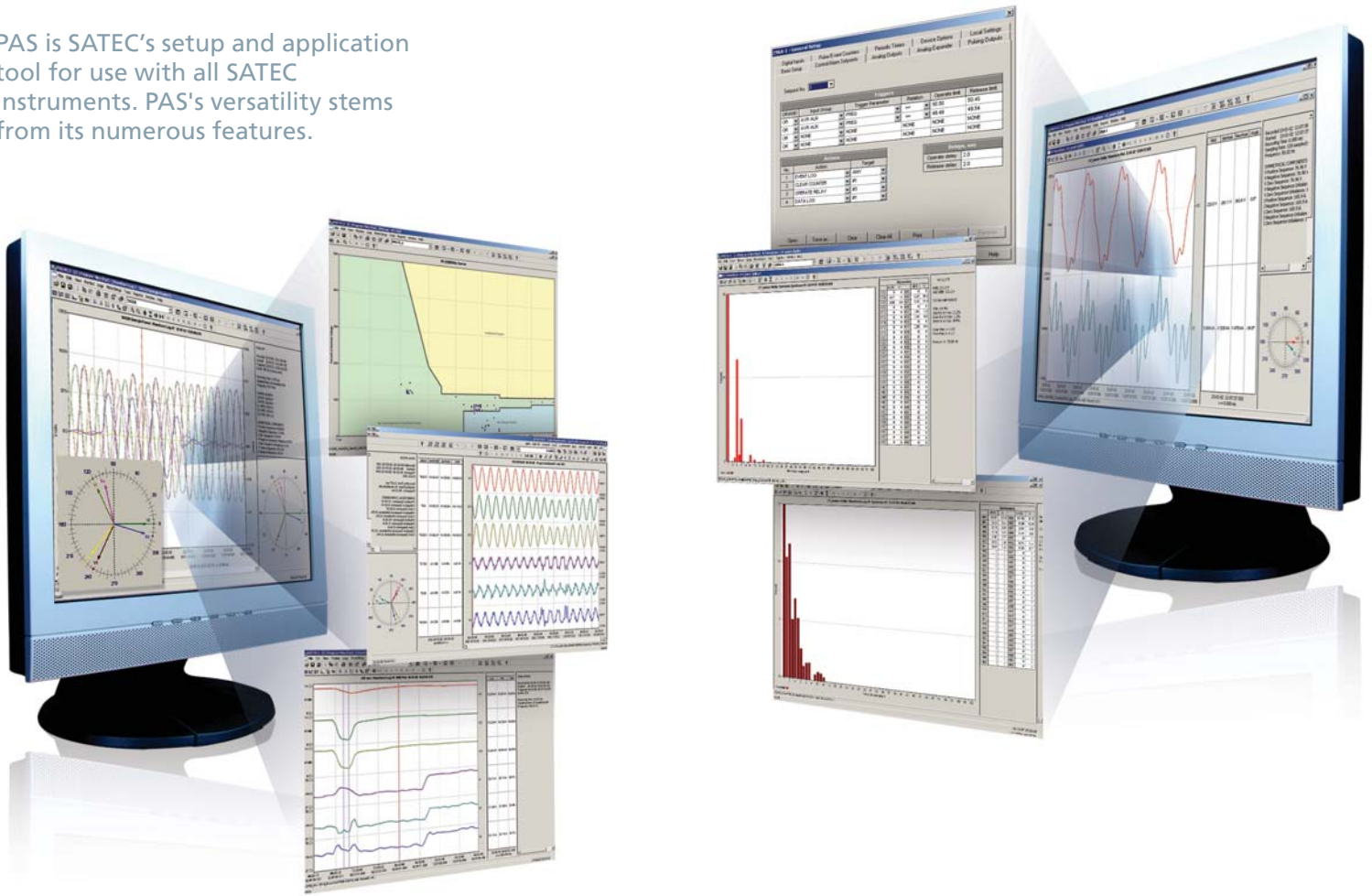
Dimensions

- 10×11.2×7.3" / 256×284×185mm (H×W×D)

PAS

Power Analysis Software

PAS is SATEC's setup and application tool for use with all SATEC instruments. PAS's versatility stems from its numerous features.



Features

- Automatic power quality reports for EN50160, IEEE1159 and GOST 13109
- Automatic polling of devices
- Simple off-line instrument setup
- Direct data access for status monitoring or analysis
- Wide range of communication platforms:**
 - RS standard serial lines
 - TCP/IP
 - USB
 - Telephone/Modem
- Self-test
- Easy export to spreadsheet, Word, Excel or database
- Extensive graphic and reporting capabilities for waveforms and harmonics
- Export COMTRADE (IEEE standard common format for transient data exchange)
 - Export PQ
- Comprehensive analysis**
 - Data logs—historical or current
 - Trends—individual or 3 phases together
 - Trend over time data log or waveform
 - Trend based on user-selected parameters or limits
 - Harmonic spectrum
 - Harmonics power direction
- EN50160 comparison tables for HV and LV applications
- G5/4 comparison tables for HV and LV applications
- Vector analysis/phasor diagram
- Automatic power quality and fault categorization
- Synchronized waveforms from multiple devices in a single plot
- ITI (CBEMA) curve
- Automatic sort and filter capabilities
- Uploading TOU settings
- Uploading with variable setpoints
- Alarms with variable setpoints
- Delta measurement

expertpower™



eXpertpower™ software solution provides comprehensive energy management, billing, demand response, power quality analysis and generator control. eXpertpower™ is available either as an on-line service (SaaS—Software as a Service) or as a stand-alone package (Pro).

SATEC's complete solution includes our wide range of analyzers combined with eXpertpower™ software, providing the information and analytics to improve the efficiency, reliability, security and profitability of our customers' energy system.

eXpertpower™'s web-enabled concept makes controlling comprehensive electrical data as easy as ABC. It reduces the total cost of ownership (TCO) by eliminating the need for training, special hardware or software—without compromising the power of the server side. With installations of over 10,000 managed devices at one site, it is the most powerful energy management solution in the market. Its scalability allows you to start with small installations and to expand as your business grows.

Applications

Real time & Historic data display

- ▣ Electrical data
- ▣ Max demands
- ▣ Data logs

Energy Consumption

- ▣ Import, Export and Total
- ▣ TOU (Time of Use)

Power Quality Analysis

- ▣ Events
- ▣ Compliance reports
- ▣ Waveforms analysis

Sub-metering Billing

- ▣ Dynamic tariff definitions
- ▣ Accurate cost calculations
- ▣ Invoices generations

Demand response

- ▣ Calculate facility usage and energy distribution
- ▣ Automatic generators operation

Advanced Reporting

- ▣ Scheduled reports
- ▣ Multi-dimensional comparisons
- ▣ Customized content and look per report
- ▣ Print, export, save and send reports

Features

- ▣ State-of-the-art user interface
 - ▣ Web based (no client side installations), multi-browser support (IE, FF, SA)
 - ▣ Fully customized tables and graphs
 - ▣ Personalized dashboards
 - ▣ User defined graphic maps and themes
- ▣ Events and Alarms
 - ▣ Configurable emails and SMS notifications
 - ▣ Multi-level criteria and thresholds
 - ▣ Remote device configuration for all SATEC products
 - ▣ Connects to any Modbus-compatible 3rd party devices
- ▣ Integration with 3rd party applications (BMS, SCADA)
- ▣ Built-in export to different formats (Excel, PDF, etc.)
- ▣ Customized access permission per user, per group

Selected Screenshots

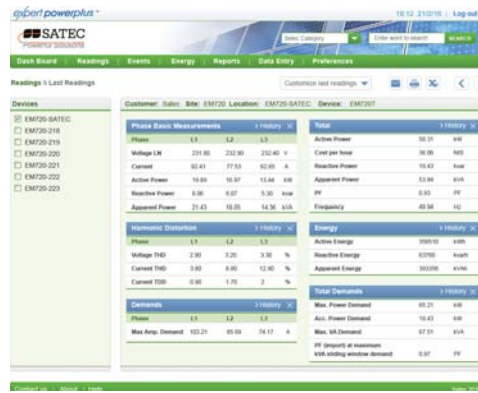
Dashboard

The Dashboard page enables a customized view for each user. It offers many optional modules, such as last reading, history, events, graphical maps and more.



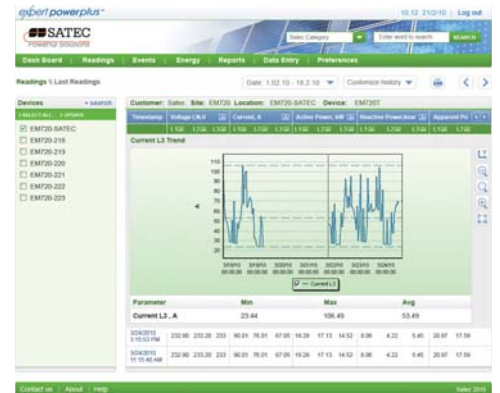
Last Reading

The Last Reading page shows the last basic measurement readings according to the selected device type. The data can be printed or exported to datasheet. The user can also drill down to gain the detailed historic data by selecting the appropriate History link.



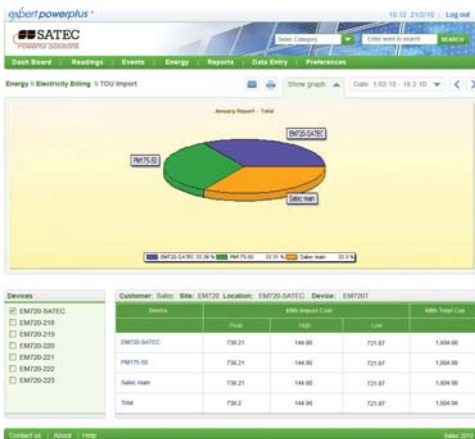
History Graph

The page shows historic data in graphic and tabular forms. There is an option to change the shown parameter type as well as the presented date range, through the toolbar options. Also, there is full support for datasheet data export and printing of all the selected data.



Summary TOU

The summary TOU (Time of Use) page displays energy and cost values for each measured point for a selected site. The pie chart presents a clear view for comparing each measured point behavior.



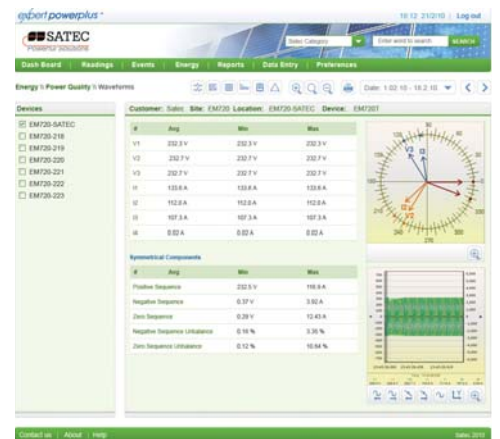
Energy Billing

The energy billing page details all the data required to generate a bill for a selected period. The bill is constructed based on tariff definitions. Energy and cost indicator graphs are also available.



Power Quality

The Power Quality analysis module provides comprehensive tools for troubleshooting events. It includes statistical and detailed event information, including waveforms, phasors and tables, for easy generation of compliance reports according to EN50160, IEEE1159, GOST 13109 and more.



Accessories & Add-Ons

ETC2002 Intelligent Network Communication Device



The ETC2002 Network Communicator opens a new era for energy management by enabling users to advance from serial network (RS-485) and exploit the advantages of the Internet and Intranet. The ETC2002 offers full control of entire power systems, from anywhere, anytime, via an Internet/Ethernet connection, and supports various protocols. Its compact design and easy DIN/Rail wall mounting allow for ease of use.

Four Main Functions

- 1. Transparent** (from serial communication to TCP/IP communication, in any of these protocols: Modbus TCP/IP, DNP TCP/IP and ASCII TCP/IP)
- 2. Protocol Converter** for all third-party instruments, such as protection, relay, frequency driver and PLC (from serial communication to TCP/

IP communication, in any of these protocols: Modbus TCP/IP, DNP TCP/IP and ASCII TCP/IP)

3. Data Server Applications

The ETC2002 Data Server provides the user with a mechanism that allows data accumulation from instruments in a background mode, using Modbus protocol (Modbus master). The instruments and register range for polling are defined in the polling tables. A total of 64 address ranges can be defined. The data is stored in a buffer, where 120 16-bit registers are reserved for each server address range. Users can specify up to 120 contiguous registers (per address range) in the connected instrument that would be continuously polled and updated in the server register array. Any number of device register ranges can be defined for each instrument.

Important features include:

- Memory logging
- Reduction of network traffic
- Backup memory for Internet and other applications

- 4. Web-Based Energy Management Service:** See eXpertpower™ on page 16.

Features

- Ethernet 10 Base-T port
- Two RS-422/RS-485 ports (Modbus, ASCII, DNP 3.0 protocols)—Master
- One RS-232 port—Slave
- Modem port (optional)
- Provides support for communication protocols (Modbus/TCP, ASCII/TCP, TCP, DNP 3.0, DNP3/TCP)
- Serial slave mode (Modbus, ASCII, DNP 3.0 protocols) for the entire range of SATEC products
- Four Digital inputs
- IRIG-B port
- Real Time Clock
- Large non-volatile memory
- Terminal connection
- Telnet service
- Field setup
- Wide range of power supply options
- Compact design
- Table top (DIN rail and wall mounting option)
- **Dimensions:** 3.7×7.3×5.6" / 95×186×144mm (H×W×D)

RSC232 Communications Converter



The RSC232 communications converter, with a built-in power supply, is designed to handle up to 31 IEDs connected via RS-485 up to 1200 meters/4000 feet. It can be powered from AC/DC power supply, and permits easy conversion of RS-232 PC signals into full duplex (RS-422) or half duplex (RS-485) communication. DIN/Rail Wall Mounting. **Dimensions:** 6×1.6×3.3" / 154×41×84mm (H×W×D).

AX-8 Analog Expander



The AX-8 Analog Expander enables power meters to interface with other devices that require analog signals. The AX-8 can be connected to any power meter equipped with an RS-422 communication port and an analog expander option. 8 channels are provided for high-resolution analog output. Two units can be connected in sequence, providing as many as 16 analog outputs with the use of one power meter. A wide range of operations offers current output or voltage output. **Dimensions:** 3×7.3×5.1" / 76×186×130mm (H×W×D).

Note: □/* = Option

Analysis (PQA)		Transformer Calculation	I/O Programmable	Basic Communication	Special Communications	GPS	Communication Protocols	Auxiliary Inputs	Additional Features
Flicker	□		64*		□	□		1-SA320 5-SA330	□
Symmetrical Components	□		1+6*	□	□	□		1	LED/ Graphic LCD*
EN50160 Reports	□		4*	□	□	□			□
IEEE1159 & IEEE519 Reports	□		4*	□	□	□			□
Fault Current	□		4*	□	□	□			□
Transformer Correction	□		4*	□	□	□			□
Transformer/Line Loss Compensations	□		4*	□	□	□			□
Relay Outputs	□		2+2*	□	□	□			□
Analog Outputs	□		2*	□	□	□			□
Digital Inputs	□		2+2*	□	□	□			□
Analog Inputs	□		2*	□	□	□			□
Analog Output Expander AX-8	□		2*	□	□	□			□
RS-485	□		6	□	□	□			□
RS-232/485	□		2*	□	□	□			□
RS-422/485	□		12	□	□	□			□
RS-232/422/485	□		8	□	□	□			□
Dial-up Modem	□		2+2*	□	□	□			□
Ethernet Port	□		2*	□	□	□			□
USB	□		2*	□	□	□			□
IR	□		2*	□	□	□			□
Profibus DP	□		2+2*	□	□	□			□
GSM/GPRS Wireless Modem	□		2*	□	□	□			□
Max. No. of Ports	2		2*	□	□	□			□
IRIG-B (GPS Time Synchronization)	□		2	□	□	□			□
Modbus RTU	□		2	□	□	□			□
Modbus/TCP	□		2	□	□	□			□
DNP3.0	□		2	□	□	□			□
DNP3/TCP	□		2	□	□	□			□
ASCII	□		2	□	□	□			□
IEC 61850	□		2	□	□	□			□
AC Current	□		1	□	□	□			□
AC Voltage	□		1	□	□	□			□
DC Voltage	□		1	□	□	□			□
Display	□		1	□	□	□			□
Back-up Power Supply	□		1	□	□	□			□
Capacitor Bank Control	□		1	□	□	□			□



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