SATEC
Powerful Solutions

TOTAL ENERGY MANAGEMENT SOLUTIONS

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 analyisis 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 CO_2 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.
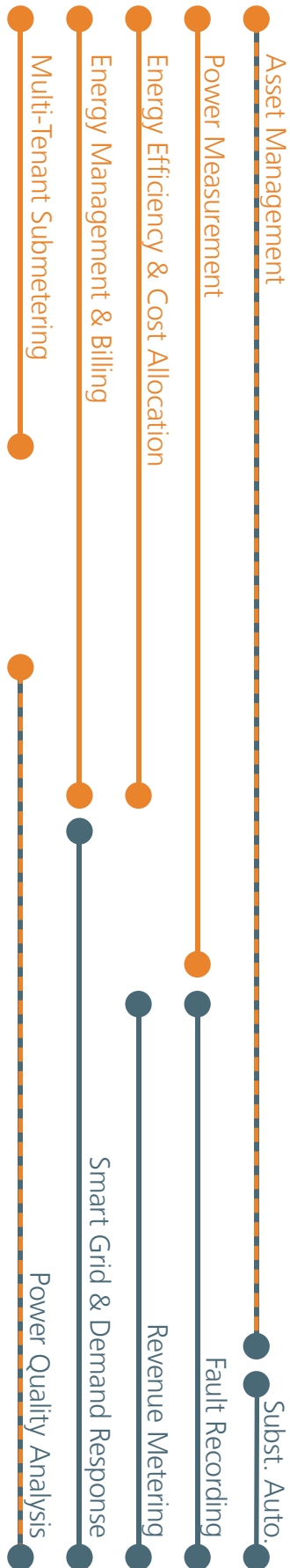
Global Distribution

SATEC exports to over 60 countries worldwide throughout Europe, North and South America, Asia 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

Multi-Tenant Submetering

Energy Management & Billing

Energy Efficiency & Cost Allocation

Power Measurement

Asset Management

Power Quality Analysis

Smart Grid & Demand Response

Revenue Metering

Fault Recording

Subst. Auto.

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EM720 | Pg. 8

EM920 | Pg. 8

ezPAC | Pg. 10

RS232/422/485, Profibus, Ethernet, Dialup modem, GPRS, RF
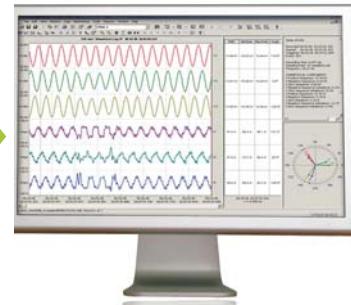
PAS | Pg. 11
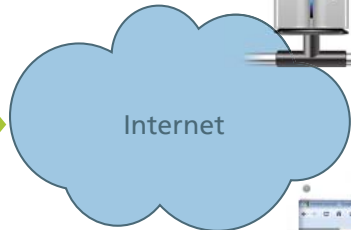
Internet

LAN

eXpertpower™ | Pg. 12

ETC2002 | Pg. 14

AX-8 | Pg. 14

RSC232 | Pg. 14

● Commercial & Industrial
● Utilities & Renewable

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 mangement.

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. 11 for more information)
- Web-based energy management with eXpertpower™ providing online data access (see pg. 12 for more information)
- Compact design for easy installation within existing or new electric panelboards
- Durable design for tamper resistance
- Communication platforms
    - Built-in serial RS485
    - Optional: modem, Ethernet, wireless, GPRS
- Real Time Clock
- Event and data logging
- Flash memory 8 Mb
- **Dimensions**: 4.2×13×2.3" / 107×331×58mm (H×W×D)

- Selection of Remote Current Transformers—see pg. 7.

Split Core Remote CT

PM130 PLUS

Multifunctional 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 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

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 RS485 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, RS232/422/485 or GPRS.

Models

Model	Features
Measurement Features	
P	Multifunctional 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. 7)

Features

Multifunctional 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
- Multipurpose 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
- 4.5×4.5×4.3" / 114×114×109mm (H×W×D)

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)
- **RS232/422/485**
- **GPRS**
- **Ethernet**
- **Profibus**

Plug-in Module

Pass-Thru 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 sub-metering applications. 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.

Models

Model	Features
Measurement Features	
P	Multifunctional 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. 7)

RPM072 Remote Power Meter

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

RDM172 Remote Display

Remote display for RPM072 or second display for PM172 via RS485.

Features

Multifunctional 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 (RS232, RS422, RS485, 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 96×96 DIN

Dimensions
- 5×5×5.6" / 127×127×143mm (H×W×D)

PM296

Power Quality Analyzer

series is ideal for generator applications where simultaneuos viewing of electrical measurements is required. Both Analyzers include dual port communications and triple communication protocols (Modbus, ASCII and DNP 3.0 Lev.2) and built-in I/O.

RDM096 Remote Display unit

The Power Quality Analyzer PM296 and Remote Power Analyzer RPM096 offer highly accurate advanced metering, fit for any power monitoring, data acquisition control and PQA and IED (Intelligent Electronic Device) applications. The PM296

The RPM096 can be interfaced with Remote Display RDM096 via an RS485 communication port, or added as a second display for the PM296 series.

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
- Dual panel mounting:
  4" round; square 96x96 DIN
  (RPM096 only)
- **Dimensions**:
  7.3×11×3.3" / 185×280×85mm (H×W×D)

C192PF8

Power Factor Manager

The C192PF8 is a multipurpose energy multimeter 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 multipurpose 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
- Cosφ monitoring & control
- kVAR monitoring & control
- **Dimensions**:
  5.6×5.6×3.4" / 144×144×86mm (H×W×D)

PM174 / PM175

IEEE1159 / EN50160 / GOST 13109 Advanced Power Quality Analyzers

The Advanced Power Quality Analyzers PM174/5 are compact, multifunctional 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.
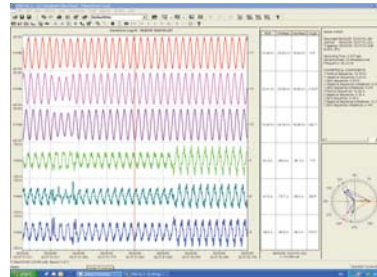
Waveform analysis—PAS

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.

RDM174/5 Remote Display
Remote display for RPM074/5 or second display for PM174/5 via RS485.

EDL174/5
Portable Power Quality Analyzer

Features

Multifunctional 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 (RS232 /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
- 5×5×5.6" / 127×127×143mm (H×W×D)

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, 35kV or 46kV.

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
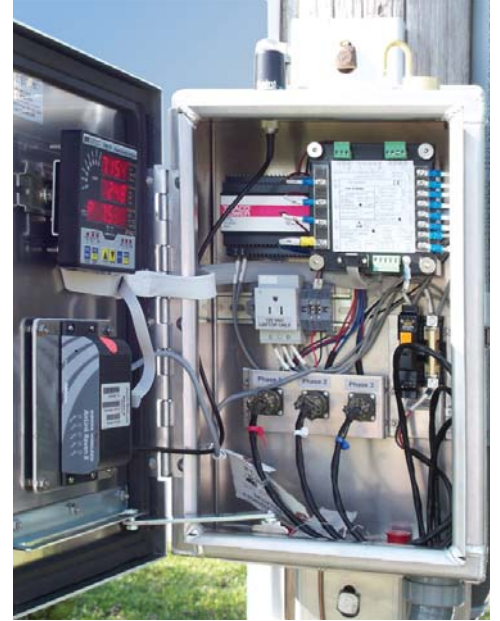
Current Transformer Options

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

Maximum cable length for all Current Transformers: 200m / 656ft

Suitable for retrofit installations with existing 5A secondary CTs

Single CT 100A Split Core
600V, Diam. 16mm/0.63"
Cable length 2.5m/8.2ft

Single CT 400A Split Core
600V, Diam. 30.5mm/1.2"
Cable length 2.5m/8.2ft

Single CT 100A, 600V
Diam. 12mm/0.47"
Cable length 2.5m/8.2ft
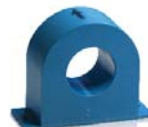
Single CT 100A 600V Large Hole
Diam. 23mm/0.91"
Cable length 2.5m/8.2ft

Single CT 400A, 600V
Diam. 26mm/1.02"
Cable length 2.5m/8.2ft

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 which include Class A power meter, high precision revenue meter, unsurpassed power quality analyzer and unique digital fault recorder. They differ by 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.
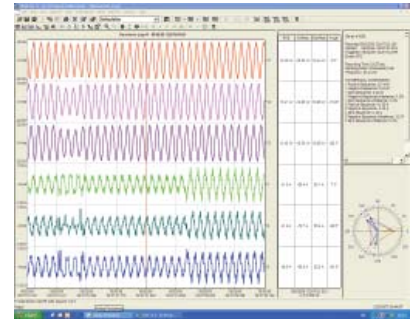
Waveform analysis—PAS

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/S

- 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. 11)
- 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 μs @ 60Hz / 20 μs @ 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 2.5 hours full operation

Communications
- RS232 / RS485 / Ethernet / USB / GPRS / IR
- **Protocols**: Modbus RTU, ASCII, DNP 3.0, Modbus/TCP, DNP3/TCP, IEC 62056-21/61 (OBIS), IEC 61850

Dimensions
- 12×7×5.7" / 303×177×144mm (H×W×D)

Field Replaceable Hot Swap Modules

Communications
- RS232/485 IRIG-B Low Speed
- Ethernet / USB / RS232/485 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 also 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, RS485, RS232/485, Dial-up Modem, IR
- **Protocols**: Modbus RTU, ASCII, DNP 3.0, Modbus/TCP, DNP/TCP, MV90, IEC 61850

Dimensions
- 8.5×7" / 214.3×176.7mm (H×Diameter)

EM920 Modules

Transient
- Transient module (to be released in 2011)

Communications
- Ethernet / IRIG-B / RS232/485
- GPRS/GSM
- Dial-up Modem V.90 (to be released in 2011)

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 1mA
- 4 analog outputs 0-20 1mA
- 4 analog outputs 4-20 1mA

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

TFT Touch Panel
High-resolution graphical display

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. 11)
- 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 (RS232 & RS422/485)
- 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.
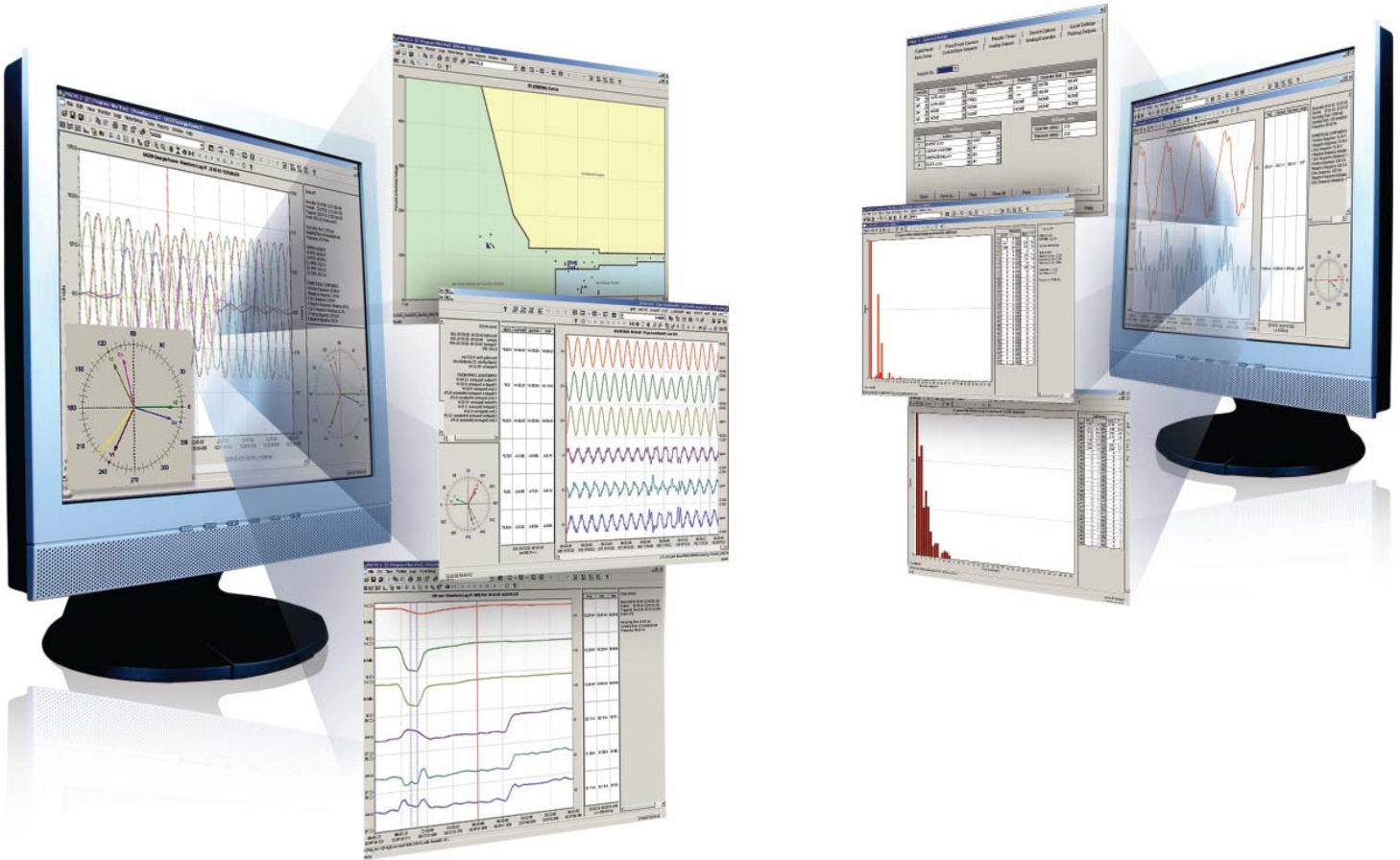
Features

- 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
- **Sophisticated 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
- Self-test
- Easy export to spreadsheet, Word, Excel or database
- Extensive graphic and report capabilities for waveforms and harmonics
- Export COMTRADE (IEEE standard common format for transient data exchange)
  - Export PQ

eXpertpower™

Solar Devices · Generator Systems · Gas Readers · Electricity · Water Meters · Weather Meters

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.

SATEC's solution includes our wide range of analyzers and the 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
- Multidimensional 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
- Connect 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.
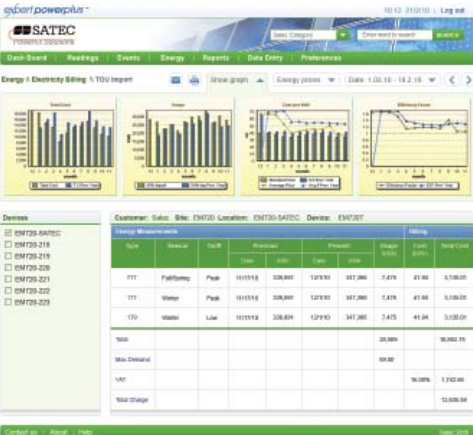
Power Quality

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.
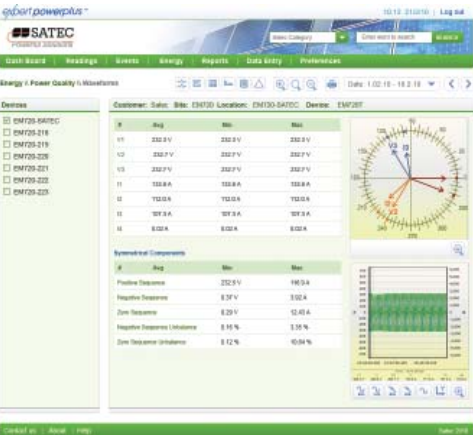
Accessories & Add-Ons

ETC2002 Intelligent Network Communication Device

The ETC2002 Network Communicator opens a new era for energy management by enabling users to advance from serial network (RS485) 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 12.

Features

- Ethernet 10 Base-T port
- Two RS422/RS485 ports (Modbus, ASCII, DNP 3.0 protocols)—Master
- One RS232 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" / 95×7.3×144mm (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 RS485 up to 1200 meters/4000 feet. It can be powered from AC/DC power supply, and permits easy conversion of RS232 PC signals into full duplex (RS422) or half duplex (RS485) communication. DIN/Rail Wall Mounting. **Dimensions**: 6×3.3×1.6" / 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 RS422 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).

Device Comparison Table

Device	Basic Measurements						Power Measurements				Energy Measurements						Total Harm. Distortion			Power Harmonics		Individual Harmonics			Event, Data, Waveform Logging							Power Quality		
	V / A / Hz (50/60)	25/400 Hz	Max/Min V / A / Hz	V/A Demands, Max. Demands	Neutral Current	Unbalance V/A	kW, kVAR, kVA	Max/Min kW, kVAR, kVA	kW/kVAR/kVA Demands, Max. Demand	PF (Power Factor)	IEC 62053-22/ANSI C12.20 (Accuracy Class)	kWh, kVARh Import & Export, kVAh	KYZ Pulse Outputs	KYZ Pulse Inputs	Pulse Inputs	TOU Tariffs	THD (Voltage / Current)	TDD (Total Distortion Demand)	K-Factor	Total Harmonic Powers kW, kVA	Total Harmonic Energies kWh, kVAh	Indiv. Harm. (Voltage/Current): up to order	Directional Harm. Flows kW, kVAR	Interharmonic Calculation	Non-Volatile Memory (MB)	Event Log	Data Logs	PQ Log	Fault Log	Waveform Log	Time Stamps	1/2 Cycle RMS Calculation	Dips/Sags, Interruptions, Swells Recording	Transients Recording
ezPAC SA3x0	●		●	●	●	●	●	●	●	●	0.2S	●	●	●	●	●	●	●	●			63	●	●	256	●	●	●	●	●	●	●	●	●
EM920	●		●	●	●	●	●	●	●	●	0.2S	●	●	●	●	●	●	●	●			50		●	16	●	●	●	●	●	●	●	●	●
EM720	●		●	●	●	●	●	●	●	●	0.2S	●	●	●	●	●	●	●	●			50		●	8 / 16*	●	●	●	●	●	●	●	●	●
PM175	●		●	●	●	●	●	●	●	●	0.2S	●	●	●	●	●	●	●	●			50			1	●	●	●	●	●	●	●	●	●
PM174	●		●	●	●	●	●	●	●	●	0.2S	●	●	●	●	●	●	●	●			50			1	●	●	●	●	●	●	●	●	●
PM296	●		●	●	●	●	●	●	●	●	0.2S	●	●	●	●	●	●	●	●			40	●		1	●				●	●		●	●
BFM136	●			●	●	●			●	●	0.5S	Import only			●		●					8	●	●						●	●			
PM172 Series — EH	●	●	●	●	●	●	●	●	●	●	0.2S	●	●	●	●	●	●	●	●	●	●	40			1					●	●	●	●	
PM172 Series — E	●	●	●	●	●	●	●	●	●	●	0.2S	●	●	●	●	●	●	●	●						1					●	●	●	●	
PM172 Series — P	●	●	●	●	●	●	●	●	●								●	●														●		
C192PF8	●		●	●		●	●	●	●	●			●		●		●	●	●													●		
PM130 PLUS Series — EH	●	●	●	●	●	●	●	●	●	●	0.5S	●	●	●	●	●	●	●	●			40			0.06	●	●				●	●		
PM130 PLUS Series — P	●	●	●	●		●	●	●		●				●	●																	●		

16

Analysis (PQA)					Transformer Calculation		I/O Programmable					Basic Communication				Special Communications							GPS	Communication Protocols						Auxiliary Inputs			Additional Features		
Flicker	Symmetrical Components	EN50160 Reports	IEEE1159 & IEEE519 Reports	Fault Current	Transformer Correction	Transformer/Line Loss Compensations	Relay Outputs	Analog Outputs	Digital Inputs	Analog Inputs	Analog Output Expander AX-8	RS485	RS232/485	RS422/485	RS232/422/485	Dial-up Modem	Ethernet Port	USB	IR	Profibus DP	GSM/GPRS Wireless Modem	Max. No. of Ports	IRIG-B (GPS Time Synchronization)	Modbus RTU	Modbus/TCP	DNP3.0	DNP3/TCP	ASCII	IEC61850	AC Current	AC Voltage	DC Voltage	Display	Back-up Power Supply	Capacitor Bank Control
■	■	■	■	■			64*	16*	96*	16*					■	□	■	■	■	□		6	■	■	■	■	■	■	□	1- SA320 5- SA330	1	1	LED/Graphic LCD*	■	
■	■	■		■	■	■	1+6*	4*	2+8*			■	□			□	□	■	■		□	5	□	■	■	■	■	■	□	1			Graphic LCD	■	
■	■	■		■	■	■	4*		4+4*				■			□	□	■			□	4	□	■	■	■	■	■	□	1			LCD	■	
■	■	■					2+2*	2*	2+2*	2*	■			■	□	□	□			□	□	2		■	■	■	■	■					LED		
■	■		■		■		2+2*	2*	2+2*	2*	■			■	□	□	□			□	□	2		■	■	■	■	■					LED		
	■						6	2*	12		■				■							2		■		■		■		1		1	LED		
					■							■	□	□		□	□				□	2		■	■			■					LCD		
							2+2*	2*	2+2*	2*	■			■	□	■	□	□		□	□	2		■	■	■	■	■					LED		
					■		2+2*	2*	2+2*	2*	■			■	□	■	□	□		□	□	2		■	■	■	■	■					LED		
					■		2+2*	2*	2+2*	2*	■			■	□	■	□	□		□	□	2		■	■	■	■	■					LED		
							8	1*	1				■									1		■				■					LED		■
							2*	4*	4*			■			□		□			□	□	2		■	■	■	■	■					LED		
							2*	4*	4*			■			□		□			□	□	2		■	■	■	■	■					LED		

Certification

We at SATEC pay special attention to quality and reliability of our products, by thorough verification of each product and system at every stage of the products' lifetime.

SATEC is committed to uncompromising compliance with the highest requirements in the energy field. SATEC devices comply with the most demanding international standards. Standard compliance is tested by world acknowledged independent labs. Our quality system is ISO9001:2008 certified.

Some of SATEC's Certificates

www.satec-global.com

SATEC
Powerful Solutions