

The SATEC ezPAC™ SA300 Series

a new concept in measurement, control and logging in the world of 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 SATEC ezPAC™ SA300 Series are a fusion of many intelligent electronic devices (IED) combined into one single powerful unit. The SATEC ezPAC™ SA300 Series unite Distributed Fault-Recording, Sequence of Events (SOE), Revenue Metering, Power Quality, Back up to Protection equipment and control devices to provide a complete solution for substation and industrial automation.

The unique modular expansion chassis of the SATEC ezPAC™ SA300 Series assures the capability of meeting the needs of today and the future by selecting different plug-in options for multiple applications. The ezPAC™ allows a relatively low cost upgrade to be accomplished with just minimal panel and wiring changes. Modular I/O design lets you order a custom-made product according to your needs.

Upgradeable Firmware

The SATEC SA300 uses flash memory for storing device firmware that allows future upgrading of the device without replacing any hardware component. You no longer have to replace EPROM and remove from service. The new features can be easily added to your device by simply replacing the firmware through a local RS-232 port or Ethernet port.

Substation Automation Upgrade

The SATEC ezPAC™ SA300 Power Intelligence Unit is an ideal cost effective means of automating an electrical substation. The SATEC ezPAC™ can be installed at a fraction of the cost and time involved in replacing protection relays. By adding one SATEC ezPAC™ Model on each feeder circuit, ALL the information needed for substation automation is provided. The SATEC ezPAC™ SA300 extends the life expectancy of electromechanical relays for many years to come by providing "INFORMATION" lacking in these highly reliable devices without interfering in the protection scheme.

Date	Time	Fault Type	Phase	Current (A)	Voltage (V)	Power (W)
10/10/2008	10:10:10	Phase to Ground	A	150	240	36000
10/10/2008	10:10:15	Phase to Phase	A-B	150	240	36000
10/10/2008	10:10:20	Phase to Phase	B-C	150	240	36000
10/10/2008	10:10:25	Phase to Phase	A-C	150	240	36000
10/10/2008	10:10:30	Phase to Ground	B	150	240	36000
10/10/2008	10:10:35	Phase to Ground	C	150	240	36000
10/10/2008	10:10:40	Phase to Ground	A	150	240	36000
10/10/2008	10:10:45	Phase to Ground	B	150	240	36000
10/10/2008	10:10:50	Phase to Ground	C	150	240	36000

Fault Log

The SA300 combines in a single enclosure:

- **Distributed Fault Recording** – Functions include true digital fault recording, sequence of event recording, and disturbance recording of four current channels for up to 150 Amps of fault currents (30X). Four AC voltage channels and DC measurement input channels are also included. Multiple ezPAC™



Time	Event	Value	Unit
10:00:00	Phase A Voltage	230	V
10:00:01	Phase B Voltage	230	V
10:00:02	Phase C Voltage	230	V
10:00:03	Phase A Current	10	A
10:00:04	Phase B Current	10	A
10:00:05	Phase C Current	10	A

SQE Log

Time	Parameter	Value	Unit
10:00:00	Voltage Unbalance	0.5	%
10:00:01	Frequency	60	Hz
10:00:02	Power Factor	0.9	
10:00:03	THD	5	%
10:00:04	Harmonics	10	%

Power Quality Log

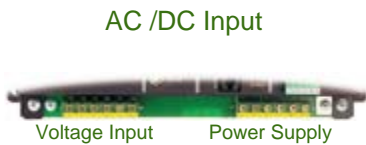
can cross trigger for up to 20 cycles of pre-fault information for distributed recording. Fault information can be exported to optional COMTRADE format via PAS software.

- **Precise Sequence-of-Events Recorder (SOE) -** Designed for a electrical utility substation or plant environment to record contact openings and closing of field devices such as electromechanical and microprocessor controlled relays. 16 digital inputs are provided and can easily expand up to a total of 48 digital inputs (wet or dry type) with a 1 mSec time resolution between events.
- **Power Quality Analyzer -** Advanced power quality monitoring reporting as per IEEE 1159 classification. Report by exception with programmable thresholds and hysteresis, ready-for-use reports; transients, impulses, sags/swells, interruptions, inter-harmonics as per IEEE519, frequency variations, volts unbalance.
- **High Speed Sampling-** The utilization of the latest DSP technology and the innovative data concept allow very long recording periods without compromising the high level of accuracy. Simultaneous sampling with individual A/D conversions assures no phase differential for 12-channels of AC, one VDC and digital inputs recording. Selectable simultaneous AC recording rate of 32, 64 and 128 samples per cycle; over 3 min of continuous recording with a **5-Mbyte onboard expandable memory.**
- **Long Term Recording -** For data logging & trending, internal diagnostics events, control events and I/O operations.
- **Fast Data Logging Recorder -** From 1/2 cycle RMS to 2-hour RMS envelopes are provided. Most useful in quickly determining relay operation by recording the RMS value of each cycle and displaying the entire trend when breaker clears, resets, lockout or fails to operate; up to 20 pre-fault cycles; programmable post fault on any internal and external trigger condition.
- **Programmable Controller –** Advanced programmable logic makes it ideal for controlling multiple CAP banks, Tap changes under load and alarming. Programmable 32 setpoints control, OR/AND logic, operate with release triggers, thresholds with delays, relay control, event-driven data recording.
- **Digital Power Meter -** You can now eliminate the added cost of a multifunction digital meter. Protection relays are poor substitutes for metering and can be dangerous and misleading when high

harmonic contents are present in AC current or voltages typically found in distribution circuits. Providing high accuracy True RMS values for volts, amps, powers, power factors, unbalance, harmonic, demands (predicted, fixed and sliding) and neutral current are included.



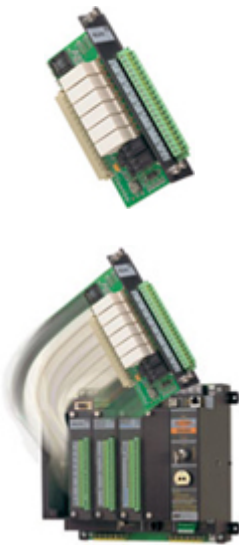
Current Input



AC /DC Input

Voltage Input Power Supply

- **Revenue Accurate Billing** – Meets ANSI C12.2 (0.2 class) Advanced Time-of Use feature for any complex billing scheme is provided. Totalizing from multiple energy and demand registers from energy pulses via external watt-meters.
- **Directional Harmonic Analyzer** - Total Harmonic Distortion for V&I and up to the 63rd. Including directional power harmonics (Load or Source), power factor, phasor diagram, symmetrical components.
- **External Time Synchronization** - provides 1 mSec time resolution via IRIG-B time-code input or GOES type satellite clock.
- **Dual Independent Power Supplies** – Primary AC/DC and Secondary power supply provide continuous operation.
- **Memory Expansion Card** – The SATEC SA300 can be equipped with a **64/128-MByte Expansion Memory** plug-in module for long-term waveform and data, trend recording.



I/O Card

AC/DC Inputs

The SA300 is provided with a set of fully isolated AC/DC inputs for a connection to the AC feeders and station battery:

- **Four 5.5 kV Galvanically Isolated AC voltage inputs** - Up to 690VAC direct input voltage.
- **Four Galvanically Isolated AC current inputs** - Includes an extended input range up to x3000% overload (10A/IEC or 20A/ANSI input currents, to 150 Amps fault currents).
- **A second set of four Galvanically Isolated current inputs (Model SA330 only)** - In addition to the high measurement CT above this additional set of CT inputs (10A/IEC or 20A/ANSI input currents) is used for precise energy metering thus eliminating expensive revenue billing meters.
- **DC voltage input** - Used for station battery monitoring (up to 300VDC). Set point triggers and alarming.



Digital and Analog I/O Options

The SA300 has five I/O expansion slots for removable plug-in I/O modules:

Communication



Remote Display

- **DI - Digital inputs** - 16 optically isolated inputs per module (one provided), up to 3 modules per device; options for dry contacts, 12V, 24V, 48V and 125V wet inputs; programmable de-bounce time from 1 ms to 1 sec; quick linkage to Sequence-of-Events Recorder, Fault Recorder, control setpoints, pulse counters and Energy/TOU subsystem.
- **RO – 8 Relay Outputs** - 6 Form A relays rated at 5 Amps @ 125VDC and two Form C relays for energy pulsing are provided per module. Up to 4 modules per device; programmed for unlatched, latched and pulse operations, failsafe operation for alarm notifications; programmable pulse width; direct remote relay control through communications.
- **AI/AO** - Four optically isolated analog outputs and four optically isolated inputs internal power supplies per module. Up to 4 modules per device; options for 0-1mA, ± 1 mA, 0-20mA and 4-20mA inputs and outputs; $\times 200\%$ overload current for 0-1mA and ± 1 mA AI/AO.

Communications Options

The SATEC **SA300** includes FIVE independent communication ports expandable to SEVEN:

- **Three universal serial communications ports** -
Com 1 = (selectable RS-232, RS-422/RS-485)
COM 2 = (RS-422/RS-485), additional RS-485 port for remote display or external RTU. Independent selectable up to 115,200 bps (includes Modbus RTU/ASCII and DNP3.0 protocols).
- **USB 1.1 port** – 12 Mbps for fast local communications and data retrieving
- **Ethernet 10Base-T port** - Modbus/TCP and DNP3.0/TCP protocols, up to five non-intrusive simultaneous connections, Telnet service port.
- **Embedded 56K modem (optional)** - for communications through public telephone lines (Modbus RTU/ASCII and DNP3.0 protocols).
- **Infrared port (optional)** - (Modbus RTU/ASCII and DNP3.0 protocols).
- **Auto Alarm messages to Pager or E-mail** (notification of priority problems via dial-out modem or Ethernet) – *coming soon*.

Remote Displays

The **SA300** can be ordered with an optional bright LED Remote Display Module (**RDM**). It has a RS485 port and communicate with the **SA300** through the Modbus RTU protocol. Remote display can be located at distances of up to 0.5 km from the device.

The **RDM300** has three six-digit windows with bright red

LEDs well suited for direct sunlight applications. It allows the user to view real-time RMS and harmonics measurements, status indication parameters, and perform basic setup operations when installing and servicing the device.

Device Models

The **ezPAC™ SA300** Series production line includes two device models

- **SA320** - Power Quality model - offers all the **ezPAC™** metering, control, and fault and event recording capabilities. Adds an EN50160 and IEEE 1159 power quality recorder classifications and reports, and also EN50160 statistic acquisition and reports.
 - **SA330** - Premium model – Includes the standard 150A current inputs for fault recording and adds to above additional four current inputs (10A/20A) for revenue energy metering and management.
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