# PRO SERIES ADVANCED POWER METERS
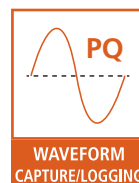
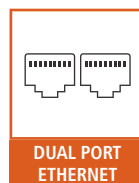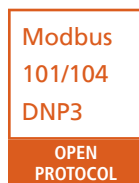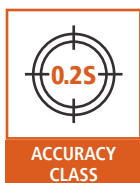## Revolutionary Design

## Superior Performance

## Intuitive User Interface

The PRO Series is SATEC's cost-effective line of power meters for advanced power monitoring applications. With waveform recording capabilities and 16GB of storage it is a powerful power-quality analyzer and event recorder.

Featuring multiple protocols (IEC 61850, DNP3 and IEC 60870-5-101/104) and dual port ethernet, it is the ultimate solution for power monitoring, meeting and exceeding the most current requirements in utility and industrial applications.

**PM335:** PANEL MOUNT

**EM235:** DIN RAIL

## HIGHLIGHTS

- **Precision**: Class 0.2S accuracy
- **Memory**: 16GB on-board
- **IEC 61850** protocol
- **Power Quality**: Waveform capture and event recording

- **Com Ports**:
  - Dual Port Ethernet
  - USB (type C) on-board
  - Optical Port (IR) supporting IEC 62056-21

- **DC Metering** via Hall Effect Sensors
- **Neutral Current Metering**
- **Flexible Modularity**: Up to 26 digital and analog I/O
- **Ultra-compact design**

| 0.2S ACCURACY CLASS | I/O DIGITAL IN/OUT | Modbus 101/104 DNP3 OPEN PROTOCOL | DUAL PORT ETHERNET | PQ WAVEFORM CAPTURE/LOGGING | IEC 61850 | 16GB MEMORY |
|---|---|---|---|---|---|---|

# Revolutionary Design

3.5"(49x73mm) LCD

1.8"(28x35mm) LCD

**Top**: Communication & I/Os
**Bottom**: All power connections

Fastening latch

Up to 4 add-on modules

Dual TCP/IP, RS-485, USB-C, 2DI, 1DO, 1AI

Additional modules compatible with all PRO Series models

50mm deep, 92×92 square or 4" round cutout fits type-tested switchboards with add-on modules

Anti-tamper sealed enclosure

# Superior Performance

## CONNECTIVITY

In today's world of power metering and telemetry, the requirement for full connectivity, which relies on advanced communication protocols and enveloping cyber-security, is on the rise.

Protocols such as IEC 61850, DNP3 and IEC 60870-5-101/104 allow the PRO meter the versatility of interfacing the dominant communication platforms on the market.

## COMPLIANCE

The PRO Series is designed to comply with IEC/AS 62052-11, IEC 62053-22/24, IEC 61557-12 (PMD-Sx), EN 50470, WELMEC 7.2, MID MI-003 and ANSI C12.1/20 standards.

## SUBSTATION REVENUE METERING AND POWER MONITORING COMBINED

Designed as revenue-grade (anti-tamper construct), the PRO meters combine and bundle, in one ultra-compact IED device, multiple features which ordinarily would be found in several different pieces of equipment. No need for device duplication.

## DC METERING

This unique capability for direct metering of DC systems (via Hall Effect sensors) is available in the PRO meter alongside standard AC metering.

## INDUSTRIAL/UTILITY PLC CONTROL

The PRO Series meters can simultaneously host a variety of attachable I/O modules (digital and analog inputs and outputs).

These I/Os, combined with measured electrical parameters and the ability to program the meters with PLC logic setpoints, enables a variety of control functionalities. These capabilities include integration of external digital and analog parameters or readings into control setpoints.

# Intuitive User Interface

The PRO Series is designed with special emphasis on user experience, ease of use and navigation. Paging through the parameters and waveforms, all in full color graphics, is facilitated by navigation buttons which allow scrolling through intuitive menus. The PRO Series' graphic interface is user configurable. The **favorites** screen is an example of how the user gives the meter a personal touch.
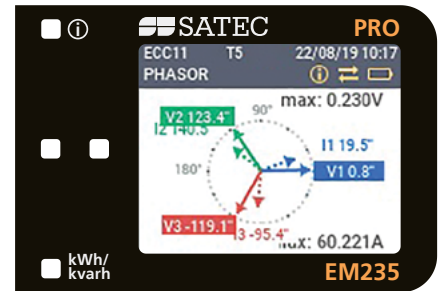
## EM235 SCREENS
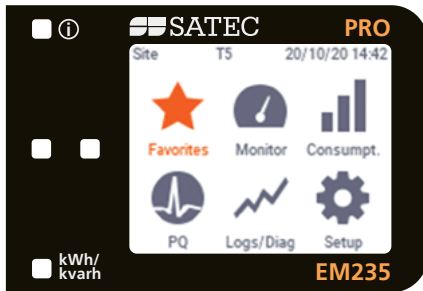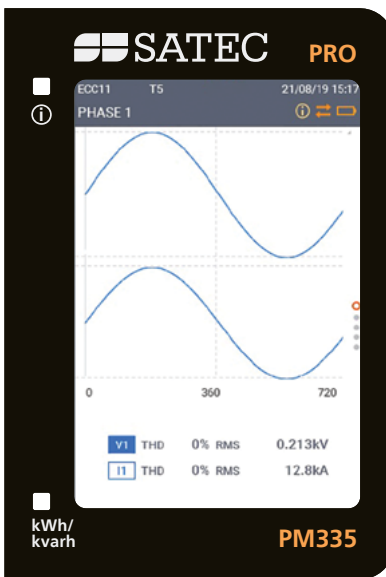


Main Menu with Favorites Area
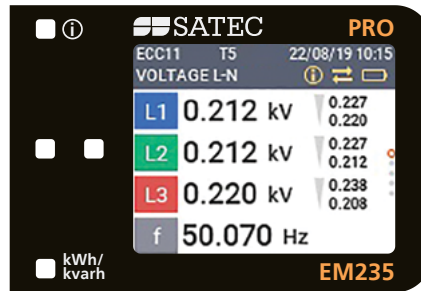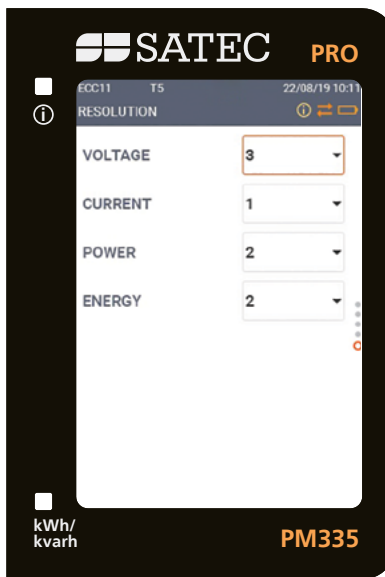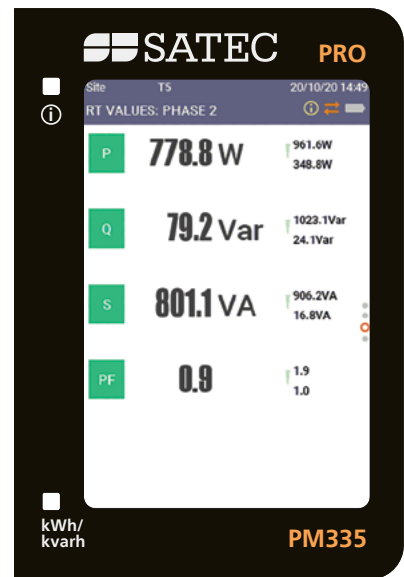

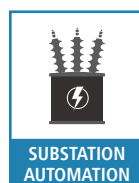
Monitoring: L-N Voltage



Phasor Diagram

## PM335 SCREENS
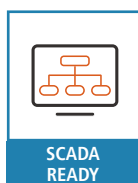


Power Quality: Real-Time Waveform



Setup: Resolution Menu



Monitoring: Power and PF



| ENERGY MANAGEMENT | REVENUE METERING | SCADA READY | SUBSTATION AUTOMATION | INDUSTRIAL MONITORING | RENEWABLE ENERGY |
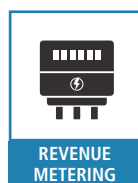
# Technical Specifications

## PRECISION METERING

- Class 0.2S accuracy IEC 62053-22, ANSI C12.20 Class 0.2 (active energy)
- IEC 61557-12 class 0.2 (PMD standard)
- Up to 16 TOU tariffs profile and up to 16 register sources; internal or external tariff control
- Cycle-by-cycle RMS measurements updated every ½ cycle
- Anti-tamper protection seals

## POWER QUALITY AND MEASUREMENT CAPABILITIES

- Harmonic analysis: THD of voltage and current, custom alarming, TDD, K factor, Crest factor. Individual harmonics, up to the 63$^{rd}$ harmonic
- Voltage calculation and analysis: ½ cycle RMS calculation, symmetrical components, Voltage Dips/Sags, Interruptions, Swells, Unbalance, Transient and THD events recording
- Programmable resolution waveform capture
- Screen display of waveforms and power quality data

## COMMUNICATION

- Ports
    - 2 x ETH (independent interfaces), USB, RS-485, optical port
    - Additional communication ports: Serial, ETH
    - Daisy-chain
- Protocols
    - IEC61850 (MMS and Goose support)
    - DHCP support
    - Modbus RTU/TCP, MODBUS Master
    - DNP3/ DNP3.0/TCP (level 2)
    - IEC60870-5-101/104
    - IEC 62056-21 for local meter data exchange

## CURRENT INPUT OPTIONS

- 1A or 5A inputs from CT secondary
- Flex Clamp: 200A/2V, 30A-300A-3000A/3V
- Optional: 40mA input designed for:
    - SATEC HACS CTs (5-3000A options)
    - DC metering: current measurements using Hall Effect Sensors

## VOLTAGE INPUTS

- Operating range:
  10-1000V AC (L-L) @ 50/60 Hz
  10-3000V DC *
  * Additional adaptor is required for voltage measurement above 800V DC

## INPUTS / OUTPUTS AND ADDITIONAL MODULES

- Built-in I/Os (option): 2 digital inputs; 1 SSR output; 1 analog inputs
- Add-on I/Os: Up to 3 add-on I/O modules: up to a total of 26 DI (dry/wet) / 9 DO per unit
- Auxiliary power supply

## PROGRAMMABLE LOGICAL CONTROLLER

- 64 control setpoints with programmable operate and release delays
- Setpoint using OR/AND logic, extensive triggers, programmable thresholds and delays
- 16GB memory for recording billing data, PQ logs, data logs, event logs and waveforms
- 16 user-definable data logs

## FRONT PANEL

- Backlit color LCD display
- Simultaneous viewing of four values on a single screen
- Display language may be set and changed through the front panel

## RTC BATTERY BACK-UP

The meter is equipped with a battery backed-up real-time clock.

## POWER SUPPLY

- 90-332V AC L-N  ±15% or 40-290 ± 15% VDC
- Optional Auxiliary power supply plug-in module:
  88-264V AC, 125-300V DC

## ENVIRONMENTAL

- Meter operating temperature: -40 to 70°C (-13 to 158°F)
- Display operating temperature: -20 to 70°C (-4 to 158°F)

## EMC & SAFETY

- Immunity
    - Per IEC 62052-11, CLC/TR 50579 (conducted disturbances 2-150kHz), IEEE C62.41 and C37.90.1
    - Emission per EN55011/22 class B and FCC p.15 class B
    - Insulation: dielectric withstand for 1 minute (ETH) = 4kV
- Safety
    - IEC 61010-1 3$^{rd}$ ed., IEC 62052-11 & IEC 61557-12, protective class II
    - IEC 62052-11
    - UL 61010-1 3$^{rd}$ ed., CAT IV
    - AS 62052-11
    - NMI M6-1