

CLASS 0.5 ACCURACY

AS/IEC 62053-41 COMPLIANT

UP TO 3 DC CHANNELS

UP TO 1500V DC

View the PRO Series PM335 product page on satec-global.com.au

PRO SERIES DC

High Accuracy DC Power & Energy Metering

The PRO Series DC power and energy meters are advanced DC meters, fully compliant and tested to the DC metering standard **AS/IEC 62053-41**. Available as the panel-mounted PRO-PM335 or DIN-rail PRO-EM235, the range suits battery energy storage systems, EV charging, solar and other DC applications that need revenue-grade measurement, alongside substation and industrial monitoring.

The PRO Series DC measurement system operates via Hall Effect sensors or SATEC's UHACS (Flux Gate) current sensors, for up to three DC channel inputs, with a wide voltage input range from 10–820V DC standard, extendable to 1500V DC with SATEC's Voltage Ratio Module (VRM). Dual Ethernet ports with daisy-chain Ethernet, RS-485 and an infrared port are built in, supporting Modbus, IEC 61850 and DNP3 protocols.



PRO-PM335-HACS-DC

Panel-mounted DC meter with a 3.5" TFT colour display, measuring voltage, current, power, energy and demand with data logging capabilities.

PRO-EM235-HACS-DC

DIN-rail mounted DC meter with a 1.77" TFT colour display, measuring voltage, current, power, energy and demand with data logging capabilities.

Main Features

- **DC power and energy metering** – volts, amps, power, energy and demand
- Up to three isolated DC channel inputs via Hall Effect or UHACS (Flux Gate) current sensors
- Wide-range voltage inputs – 10–820V DC standard, up to 1500V DC with SATEC's Voltage Ratio Module (VRM)
- Four isolated DC current inputs up to 2500A DC
- Dual Ethernet ports, daisy-chain Ethernet, RS-485 and infrared port
- Modbus, IEC 61850 and DNP3 protocol support
- Up to 26 external digital triggers, with fault waveform and fast RMS trace capture
- 16GB memory for long-term waveform and data recording

Feature Capabilities

DC Power & Energy Metering

- Three isolated DC voltage inputs (10–820V DC), extendable up to 1500V DC via VRM
- DC voltage/current accuracy 0.5%
- Four isolated DC current inputs up to 2500A DC (via UHACS or Hall Effect sensors)
- **Precise energy & power demand metering:** TOU, 16 summary/TOU energy and demand registers, block and sliding demands, up to 64 energy sources
- 32 digital counters for pulses from external sources and internal events

Event & Data Recording

- Event recorder for internal diagnostic events, control events and I/O operations
- 16 programmable data recorders, logging on a periodic basis or on any internal/external trigger
- **Embedded programmable controller** – 64 control setpoints, OR/AND logic, extensive triggers, cross-triggering between devices via Ethernet for synchronous event capture
- Up to sixteen triggering channels
- 16 programmable timers, from ½ cycle to 24 hours

High Precision Time Synchronisation

- SNTP
- 1 pps via digital input
- IRIG-B time-code input (future release)
- Real-time clock with battery backup and three-year retention
- Backup power supply unit

Communications (Standard)

- Dual Ethernet ports (10/100 Base-T, transformer-isolated), up to 10 simultaneous connections per port
- Daisy-chain Ethernet
- RS-485 optically isolated port, up to 115,200 bps
- Infrared port, front panel access with magnetic head
- USB 2.0 Type-C port

ExpertPower™ Client & Notifications

- **ExpertPower™ client** for Modbus/TCP communication with a remote or local (stand-alone) SATEC ExpertPower server
- TCP notification client to a remote Modbus/TCP server, on events or periodically, via any IP-enabled communication port
- Meter security – password protection for meter setups and accumulated data against unauthorised changes

Feature Capabilities (continued)

Optional Built-In I/O Ports

- **2 optically isolated digital inputs** – 24V DC dry contact, 1 ms sampling rate
- **1 solid-state relay output** – unlatched, latched and pulse operation, fail-safe for alarm notifications
- **1 optically isolated analogue input** – configurable universal range

PRO SERIES MODULES ONLY

Add-On Modules

- **8DI** – 8 optically isolated digital inputs, dry contact or 24/48/125/250V AC/DC wet
- **4RO** – 4 relays, electromechanical or solid-state, with fail-safe alarm operation
- **4DI + 2RO** combination module
- **4AO** – 4 isolated universal analogue outputs
- Up to 4 expansion modules side by side; 3 modules requires an auxiliary power supply module

Software Support

- **PAS** – SATEC's bundled configuration and data-acquisition tool, including waveforms, phasors and harmonics
- **ExpertPower™** – SATEC's internet-based energy management software, with no client software installation required
- **eXpertConnect™ App** – mobile connection to the meter for on-site configuration, readings and diagnostics

Applications

- Energy management and revenue metering
- SCADA-ready industrial automation
- Substation automation and industrial monitoring
- Renewable energy and SATEC data centre solutions

Specifications

VOLTAGE INPUTS	
Operating range	10–820V DC (standard)
Extended range	Up to 1500V DC via SATEC Voltage Ratio Module (VRM)
Input impedance	4 MΩ
Isolation	4000V AC @ 1 min
Wire size	Up to 14 AWG (≤2.5 mm²)

CURRENT INPUTS — DC HALL EFFECT SENSORS	
HCS100-S	100A split-core
HCS1000	1000A solid-core
HCS2000-S	2000A split-core

CURRENT INPUTS — UHACS (FLUX GATE) SENSORS	
FCS-300	300A
FCS-600	600A
FCS-1000	1000A
FCS-2500-13	2500A

Certificate of conformity to AS/IEC 62053-41 is based on the use of UHACS (Flux Gate) current sensors. Both Hall Effect and UHACS sensors require a separate power supply; the FCS-2500-13 UHACS sensor requires two power supplies connected in parallel.

DIGITAL INPUTS (2 DI) — BUILT-IN, OPTIONAL	
Contact type	Dry contacts, internally wetted @ 24V DC
Galvanic isolation	4000V AC @ 1 min
Internal power supply	24V DC
Scan time	1 ms
Connector type	Removable, 5 pins
Wire size	14 AWG (up to 1.5 mm²)
Terminal pitch	5 mm

DIGITAL OUTPUT (1 DO) — SOLID-STATE RELAY	
Rating	0.15A/250V AC/DC, 1 contact (SPST Form A)
Galvanic isolation	4000V AC @ 1 min
Operate time	1 ms max.
Release time	0.25 ms max.
Update time	1 cycle
Connector type	Removable, 4 pins
Wire size	14 AWG (up to 1.5 mm²)

ANALOGUE INPUT (1 AI)	
Range	Universal, -1mA to 20mA (configurable: ±1mA, 0–1mA, 0–20mA, 4–20mA, etc.)
Galvanic isolation	4000V AC @ 1 min
Scan time	1 ms
Accuracy	<0.5% FS
Connector type	Removable, 5 pins
Wire size	14 AWG (up to 1.5 mm²)
Terminal pitch	5 mm

Specifications (continued)

ADD-ON MODULE — DIGITAL INPUTS (8 DI)

Contact type	Dry contact @ 24V DC, or wet contact @ 250V DC (8DI only)
Sensitivity	Open >100 kΩ, closed <100 Ω
Galvanic isolation	4000V AC @ 1 min
Internal power supply	24V DC
Scan time	1 ms
Connector type	Removable, 2×5 pins
Wire size	Up to 14 AWG (≤1.5 mm ²)

ADD-ON MODULE — DIGITAL OUTPUTS (4 DO)

Electromechanical (option 1)	4 relays, 5A/250V AC or 5A/30V DC, 1 contact (SPST Form A); isolation 3000V AC (contacts-coil), 750V AC (open contacts)
Solid-state (option 2)	4 relays, 100mA/800V AC, 1 contact (SPST Form A); isolation 3000V AC @ 1 min (800V peak open contacts)
Operate / release time	5–10 ms max. / 5 ms max.
Wire size	14 AWG (up to 1.5 mm ²)

DIGITAL INPUTS + OUTPUTS (4DI + 2RO)

Combination module	4DI + 2RO, per the digital input and output specifications above
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ANALOGUE OUTPUTS (4 AO)

Ranges	±1mA, 0–20mA, 4–20mA, 0–1mA (max. load 10 kΩ or 510 Ω per range, 100% overload)
Accuracy	0.5% FS
Scan time	1 ms (manually or remotely programmed)
Wire size	Up to 14 AWG (≤1.5 mm ²)
Terminals pitch	5 mm

POWER SUPPLY

Rated input	57.7–277V AC @ 50/60 Hz, 48–290V DC
Tolerance	±15%
Burden	11VA @ V AC, 6VA @ V DC
Isolation	4000V AC @ 1 min
Wire size	Up to 14 AWG (≤1.5 mm ²)

AUXILIARY POWER SUPPLY MODULE — AC/DC

Rated input	88–264V AC / 90–290V DC
Output	5W
Burden	15VA
Withstand	4kV AC @ 1 min
Wiring	L/+, N/-
Terminals pitch	5 mm
Wire size	Up to 12 AWG (≤2.5 mm ²)

AUXILIARY POWER SUPPLY MODULE — 24V DC

Rated input	9–36V DC
Output	7W
Galvanic isolation	4000V AC @ 1 min
Isolation	4 kV
Terminals pitch	5 mm
Wire size	14 AWG (up to 1.5 mm ²)

COMMUNICATION — SERIAL

Port	RS-485, optically isolated, up to 115,200 bps
Isolation	4000V AC @ 1 min
Supported protocols	Modbus RTU, DNP3, SATEC ASCII, IEC 60870-5-101

Specifications (continued)

COMMUNICATION — ETHERNET (DUAL / 2 PORTS)

Port	Transformer-isolated 10/100 Base-T Ethernet, RJ45
Supported protocols	Modbus/TCP (port 502), DNP3/TCP (port 20000), IEC 60870-5-104 (port 2404), IEC 61850 (port 102, SNTP)
Simultaneous connections	10 (5 Modbus/TCP + 5 DNP3/TCP)
Isolation	4000V AC @ 1 min

COMMUNICATION — INFRARED (IR)

Port	Infrared COM port, front panel access with magnetic head
Supported protocols	Modbus RTU & DNP3, IEC 62056-21 (for local meter data exchange)
Isolation	4000V AC @ 1 min

COMMUNICATION — USB

Port	Full-speed USB 2.0, Type-C connector
Isolation	4000V AC @ 1 min
Supported protocols	Modbus/TC

LOG MEMORY

Capacity	16GB for long-term waveform and data recording
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DISPLAY

PM335	3.5" LCD TFT colour display, 320×480 dots resolution
EM235	1.77" LCD TFT colour display, 120×160 dots resolution

ENVIRONMENTAL CONDITIONS

Operating temperature	-40°C to +70°C (-40°F to 158°F)
Display operating temperature	-25°C to +70°C (-13°F to 158°F)
Storage temperature	-40°C to +85°C (-40°F to 185°F)
Humidity	0 to 95% RH, non-condensing
Degree of protection	IP51

CONSTRUCTION

Weight	0.70kg (1.54 lb)
Dimensions (PM335)	108.6×74.7×113.3 mm
Dimensions (EM235)	89.5×72×90 mm

MATERIALS

Case enclosure	Plastic PC/ABS blend
Display body	Plastic PC/ABS blend
Front panel	Plastic PC
PCB	FR4 (UL94-V0)
Terminals	PBT (UL94-V0)
Plug-in connectors	Polyamide PA6.6 (UL94-V0)
Labels	Polyester film (UL94-V0)

Standards Compliance

Electromagnetic Immunity

- IEC 62052-11, CLC/TR 50579 (conducted disturbances 2-150kHz), IEEE C62.41 and C37.90.1
- IEC 61000-6-2
- IEC 61000-4-2 level 3: Electrostatic Discharge
- IEC 61000-4-3 level 3: Radiated Electromagnetic RF Fields
- IEC 61000-4-4 level 3: Electrical Fast Transient
- IEC 61000-4-5 level 3: Surge
- IEC 61000-4-6 level 3: Conducted Radio Frequency
- IEC 61000-4-8: Power Frequency Magnetic Field
- ANSI/IEEE C37.90.1: Fast Transient SWC

Environmental

- IEC 60529: Protection
- IEC 60068-2-1: Cold
- IEC 60068-2-2: Dry Heat
- IEC 60068-2-30: Damp Heat
- IEC 60068-2-5: Solar Radiation

Accuracy

- AS/IEC 62053-22:2003, Class 0.2S
- IEC 62053-24:2014, Class 0.5S
- ANSI C12.20-2015, Class 10 (0.2%)

Electromagnetic Emission

- IEC 61000-6-4* Radiated/Conducted Class B
- IEC CISPR 22* Radiated/Conducted Class B
- Emission per EN 55011/22 Class B, FCC p.15 Class B

Safety / Construction

- IEC 61010, IEC 62052-11 & IEC 61557-12
- UL61010-1, Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 1: General Requirements, Edition 3, Revision Date 07/19/2019
- CSA C22.2 No. 61010-1, Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 1: General Requirements, Edition 3, Revision Date 11/2018
- AC Impulse Insulation: meets IEC 62052-11 – 4000V AC for 1 minute, 6KV/500Ω @ 1.2/50 μs impulse
- IEC 60068-2-6: Vibration (sinusoidal)
- IEC 60068-2-27: Shock Test
- IEC 60068-2-75: Hammer Test
- AS 62052-11*
- NMI

* Meets standard requirements.

Ordering Information

MODEL – CURRENT – CALIBRATION – POWER – I/O – LANGUAGE – PROTOCOL

MODEL		
PM335 Panel-Mount		PRO-PM335
EM235 DIN-Rail Mount		PRO-EM235
Transducer Version		PRO-RPM035
CURRENT INPUTS		
High Accuracy Current Sensors (HACS), 50/60Hz only		HACS
CALIBRATION FOR DC CURRENT (DC)		
DC		DC
POWER SUPPLY		
88–320V AC / 40–290V DC		ACDC
BUILT-IN I/O		
2×DI (dry contact) + 1×SSR output + 1×universal AI (–1mA to 20mA)		IOS
DISPLAY LANGUAGE		
English		EN
OPTIONAL PROTOCOLS		
IEC 61850 Communication Protocol		850

Ordering Information (continued)

OPTIONAL MODULES* — MAXIMUM OF 3 MODULES

4 Relay Outputs – 250V/5A AC	EMR4
4 SSR Outputs – 250V/0.1A AC	SSR4
4 Digital Inputs (Dry Contact @ 24V DC) + 2 SSR Outputs	4DIOS-DRC
4 Digital Inputs (Dry Contact @ 24V DC) + 2 EMR Outputs	4DIOR-DRC
8 Digital Inputs – Dry Contact	DI8-DRC
8 Digital Inputs – 24, 48, 125, 250V DC	DI8-24,48,125,250V
4 Analogue Outputs; configurable range	4AO

AUXILIARY POWER SUPPLY — MAXIMUM OF 1 MODULE

AUX. P.S. AC/DC – 88–264V AC / 90–290V DC	AUX-ACDC
24V DC (9–36V DC)	AUX-24DC

* Auxiliary power supply required when configured with 3 modules.



To place an order or request a quotation for the PRO Series DC meters, contact the SATEC Australia sales team, or scan the QR code.

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DOCUMENT REVISION HISTORY

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