

PRO SERIES - FCAS METERING

AEMO COMPLIANT

DATASHEET



ADVANCED FCAS POWER METER or **POWER QUALITY ANALYSER**

The PRO Series advanced metering are available as either an advanced FCAS power meter or as Class A or Class S power quality analyser per IEC 61000-4-30. They include multiple capabilities of communications, data logging functions and I/O expansion modules.

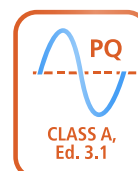
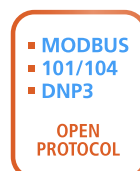
HIGHLIGHTS

- Power & Energy Metering:
 - Class 0.2S accuracy (IEC / ANSI)
 - FCAS compliance
 - AC / DC metering
 - Wide range inputs: 1,000V AC / 820V DC
 - Leakage / residual current detection
- Power Quality (PQ version):
 - Class A IEC 61000-4-30
 - Class S IEC 61000-4-30
 - EN 50160 reports
 - IEEE 519 Harmonic analysis
- Communication:
 - IEC 61850 Ed. 2 (optional)
 - Dual port Ethernet

FCAS MEASUREMENTS

The PRO provides real-time (default) or data recording for FCAS markets based on two separate models.

- ▶ Power - Accuracy 0.2 %
 - ▶ Resolution - 1W/Var/VA (PT=1)
 - ▶ Resolution - 1kW/kvar/kVA (PT<1)
- ▶ Frequency - Accuracy 0.002 %
 - ▶ Resolution - 0.0001 Hertz
- ▶ Real-Time data - 20ms (1cycle data)
- ▶ FCAS Mode (option) internal data recording -20ms data recording (Very Fast, Fast), 1s data recording (Slow, Delayed) pre/post Frequency Deviation Time (FDT)



MODELS

FCAS EM235: DIN-rail with TFT display monitoring voltage, current, power, frequency and energy measurements. Compliance with AEMO FCAS data logging capabilities plus real time electrical measurements at 20 milliseconds (1 cycle) via Modbus registers (Basic PQ functions, no waveform, capture sags/swells or EN 50160 reporting).

Power Quality EM235: DIN-rail with TFT display PQM Class A or Class S per IEC 61000-4-30, monitoring voltage, current, power, frequency, energy measurements. Provides standard data logging capabilities and real time electrical measurements at 20 milliseconds (1 cycle) via Modbus registers.

FCAS PM335: Panel mounted with TFT display monitoring voltage, current, power, frequency and energy measurements. Compliance with AEMO FCAS data logging capabilities plus real time electrical measurements at 20 milliseconds (1 cycle) via Modbus registers (Basic PQ functions, no waveform capture, sage/swells or EN 50160 reporting).

Power Quality PM335: Panel mounted with TFT display PQM Class A or Class S per IEC 61000-4-30, monitoring voltage, current, power, frequency and energy measurements. Provides standard data logging capabilities and real time electrical measurements at 20 milliseconds (1 cycle) via Modbus registers.

CURRENT INPUTS

1A or 5A: from CT secondary (standard)

HACS: 40mA inputs for SATEC's High Accuracy Current Sensors (HACS)

DC Sensors: utilising the 40mA HACS inputs for DC Current Measurements via SATEC's U-HACS sensors or Hall Effect Sensors (HES)

MV Sensors: designated inputs for interfacing MV Sensors manufactured by international vendors



FEATURES

- **Up to 26 external digital triggers** from protection relays; onboard zero-sequence currents and volts, current and voltage unbalance; fault waveforms and fast RMS trace; cross triggering between multiple devices via digital inputs for synchronous event capture and recording
- **Three and 4 decimal resolution** for frequency readings
- **Event recorder** for logging internal diagnostics events, control events, and I/O operations
- **16 Data recorders:** Programmable Data Logs on a periodic basis and on any internal or external trigger
- **8 Fast Waveform recorders:** 7-channel (V1-V3, I1-I4) simultaneous recording; selectable AC sampling rate of 32, 64, 128 or 256 samples per cycle; 20 pre-fault cycles; synchronised waveforms from multiple devices in a single plot; exporting waveforms in COMTRADE and PQDIF file formats is possible via PAS software
- **Embedded Programmable Controller:** 64 control setpoints, OR/AND logic, extensive triggers, programmable thresholds and delays, relay control, event-driven data recording, cross triggering between multiple devices via ethernet for synchronous event capture and recording – up to sixteen triggering channels
- **3-phase Power meter:** true RMS, volts, amps, powers, power factors, unbalance, and neutral current
- **Four-quadrant active & reactive energy polyphase meter:** Class 0.2S IEC 62053-22 / Class 0.2 C12.20
- **Demand Meter:** amps, volts and harmonic demands
- **Precise Energy & Power Demand Meter:** Time-of-Use (TOU), 16 Summary (totalisation) and TOU energy and demand registers for substation energy management; accumulation of energy pulses from external watt meters; block and sliding demands; up to 64 energy sources
- **Harmonic Analyser, per IEC 61000-4-7:** Up to 63rd harmonic for volts and amps; THD for volts and amps, TDD, K-factor, interharmonics for volts and amps, directional power harmonics and power factor
- **Phasor,** symmetrical components
- **32 digital counters** for counting pulses from external sources and internal events
- **16 programmable timers** from 1/2 cycle to 24 hours for periodic recording and triggering operations on a time basis
- **High Precision Time Synchronisation**
 - SNTP
 - 1pps via digital input
 - (IRIG-B time-code input - future release)
- **Backup power supply unit**
- **3 daisy-chain slots** for plug-in I/O and Communication modules
- **Expertpower client** for MODBUS/TCP communication with SATEC's Expertpower Cloud SaaS server
- **TCP notification client** for communicating with a remote MODBUS/TCP server on events or periodically on a time basis, with any IP enabled communication port
- **16GB memory** for long-term waveform and data recording
- **Real Time Clock:** Internal clock with battery backup for three years of retention time

POWER QUALITY

PQ Version

(EM235/PM335-PRO-PQ-A/S)

- Power quality analysis in full compliance with IEC 61000-4-30 Class A or Class S
- Built-in statistics and reports per EN50160
- IEEE 519 Harmonic analysis

All Models

- Sags/Swells (dips / overvoltage), interruptions, frequency variations, voltage variations
- Flicker (according to IEC 61000-4-15)
- Voltage unbalance
- Voltage and current individual harmonics (according to IEC 61000-4-7), interharmonics and directional power harmonics (load/source) up to the 63rd harmonic
- Voltage and current THD coefficients
- Vector diagram and symmetrical components
- Programmable thresholds and hysteresis
- Redundant auxiliary power supply for recording major dips and interruptions
- V-I angle, current TDD coefficients and K-Factors
- Waveform and data recording; phasor display
- Power quality event recorder
- Event recorder for logging internal diagnostic events, control events and I/O operations
- Selectable sampling rate up to 256 samples per cycle

AC MEASUREMENTS

The PRO Series is provided with fully isolated AC inputs for connecting to AC feeders:

- Three isolated AC voltage inputs (Rating: 10-1000V AC (L-L) @ 50/60 Hz)
- Four isolated AC current inputs (see pg. 2 for options)
- Leakage current detection: accurate calculation of residual current is enabled via a 4th current input to monitor the neutral current line. Accordingly, alerts and control thresholds can be configured in response to leakage current detected

DC MEASUREMENTS

The PRO Series measures DC voltage and current, calculating DC Power.

- Three isolated DC voltage inputs (from 10 to 820V DC). Optional: up to 1,500V DC (via adapter)
- DC Voltage Accuracy - 0.2%
- Four isolated DC current inputs up to 3000A DC (using SATEC U-HACS or Hall Effect sensors)
- DC Current Accuracy - 0.2%

COMMUNICATION AND I/O OPTIONS

The PRO Series meters feature a large range of communication and I/O capabilities, as below:

Up to 4 Expansion Modules Side by Side

- Up to 2 expansion modules: self-energised
- 3 expansion modules: requires AUX power supply module

Optional Built-in I/O Ports

- 2 optically isolated inputs: 24V DC dry contact; programmable de-bounce time from 1ms to 1s; control setpoints, 1pps time synchronisation; 1ms sampling rate

- 1 Solid State Relay output: unlatched, latched and pulse operations, fail-safe operation for alarm notifications; programmable pulse width; direct remote relay control through communications
- 1 optically isolated analogue input: Universal input. Universal input of configurable range ($\pm 1\text{mA}$ / $0\ldots 1\text{mA}$, $0\ldots 20\text{mA}$, $4\ldots 20\text{mA}$ etc.)

Optional Digital I/O Modules

- 8 DI: 8 optically isolated digital input options
 - Dry contacts
 - 24/48/125/250V AC/DC wet inputs. Programmable de-bounce time from 1ms to 1s; 1ms sampling rate; control setpoints, pulse counters and Energy / TOU sub-system, 1pps time synchronisation; 1ms sampling rate
- 4RO: 4 relays: Electro-Mechanic (EMR) or Solid State (SSR) relay option. Unlatched, latched and pulse operations, fail-safe operation for alarm notifications, programmable pulse width, and direct remote relay control through communications
- 4DI + 2RO Combo: per above specifications

Optional Analogue Output Module

4 AO: 4 isolated universal analogue outputs configurable for the following ranges: $\pm 1\text{mA}$, $0\text{--}20\text{mA}$, $0\text{--}1\text{mA}$, $4\text{--}20\text{mA}$, $0\text{--}5\text{mA}$, $\pm 5\text{mA}$

Optional Auxiliary Power Supply Modules

These power supply modules are designed to successfully power the whole device on their own, including up to three extra modules (I/O)

Options:

- 88-264V AC / 90-290V DC
- 24V DC (9-36V DC)

COMMUNICATION OPTIONS

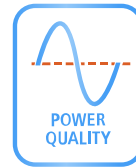
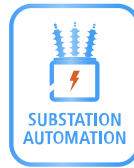
Standard Communication Ports & Protocols

- Serial communication port; RS-485, up to 115,200 bps, Modbus RTU/ASCII, DNP3.0, SNTP and IEC 60870-5-101 protocols
- 2 × Ethernet 10/100 Base-T port, supporting Modbus/TCP, DNP3/TCP, IEC 60870-5-104, and optional IEC 61850 protocols
- Up to 10 non-intrusive simultaneous connections per Ethernet port
- Infrared port (19,200 bps) supporting Modbus and DNP3 protocols for local meter data exchange
- USB 2.0 port (type C)

MOUNTING

- PM335: Panel mount: compatible with 4" round / 92×92mm square cutouts
- EM235: DIN-rail mount

APPLICATIONS



TECHNICAL SPECIFICATIONS

INPUT RATINGS

VOLTAGE INPUTS

| | |
|-----------------------------------------|---------------------------------------|
| Operating range * | 0-600V AC (L-N) 0-1,000VAC (L-L) |
| Operating range for direct DC Voltage** | 10-820V DC |
| Input impedance | 4MΩ |
| Burden for 400V | ≤ 0.04VA |
| Burden for 120V | < 0.01VA |
| Isolation | 4000V AC @ 1mn |
| Wire size | up to 14 AWG (≤ 2.5 mm ²) |

CURRENT INPUTS

1. 1A or 5A from CT secondary (standard)

| | |
|---------------------|--------------------------------------------------------------------|
| Operating range | Continuous 10A RMS |
| Burden | < 0.2 VA @ In=1A or 5A |
| Overload withstands | 15A RMS continuous, 200A (20 × I _{max}) RMS for ½ second |

Optional inputs

| | |
|---------|---------------------------------------------------------------------------------|
| 2. DC | 0-20 mA input for DC Hall Effect Sensors |
| 3. HACS | 0-20mA inputs for solid or split core CTs (SATEC High Accuracy Current Sensors) |

LPCT SENSOR INTERFACE (V/I)

| | |
|----------------|-------------|
| Voltage input | (3.25/√3) V |
| Burden | 200kΩ ±1% |
| Connector type | 2 wires |
| Current input | 225mV |

| | |
|----------------|---------|
| Burden | >20kΩ |
| Connector type | 2 wires |

DIGITAL/ANALOGUE I/O

BUILT-IN (OPTIONAL)

Digital Inputs (2 DI)

| | |
|---------------------------------|-------------------------------------|
| Dry Contacts, internally wetted | @ 24V DC |
| Galvanic isolation | 4000V AC @ 1mn |
| Internal power supply | 24V DC |
| Scan time | 1 ms |
| Connector type | removable, 5 pins |
| Wire size | 14 AWG (up to 1.5 mm ²) |
| Terminal pitch | 5mm |

Digital Output (1 DO)

| | |
|--------------------------------------------------------------|-------------------------------------|
| Solid State relay | |
| 1 relays rated at 0.15A/250 V AC/DC, 1 contact (SPST Form A) | |
| Galvanic isolation | 4000V AC @ 1mn |
| 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 mm ²) |

Analogue Input (1 AI)

| | |
|--------------------------------------------------------------------------------------|-------------------|
| Universal (-1mA to 20mA; range configurable: ±1mA, 0...1mA, 0...20mA, 4...20mA etc.) | |
| Galvanic isolation | 4000VAC @ 1mn |
| Scan time | 1 ms |
| Connector type | removable, 5 pins |

- * 1. UL listing covers nominal voltage up to 277/480V AC (L-N/L-L)
 2. Min. L-N value for accurate detection is 6V
 Min. L-L value for accurate detection is 10V
 ** Measuring up to 1,500V DC is possible via adapter

| | |
|----------------|------------------------------------|
| Wire size | 14 AWG (up to 1.5mm ²) |
| Accuracy | < 0.5% FS |
| Terminal pitch | 5mm |

ADD-ON MODULES

Digital Inputs (8 DI)

| | |
|---------------------------------|-----------------------------------------------------------------|
| Dry Contacts, internally wetted | @ 24V DC |
| Wet contact | @ 250V DC (8DI only) |
| Sensitivity | Open @ input resistance >100kΩ Closed @ Input resistance < 100Ω |
| Galvanic isolation | 4000V AC @ 1mn |
| Internal power supply | 24V DC |
| Scan time | 1 ms |
| Connector type | removable, 2 x 5 pins |
| Wire size | 14 AWG (up to 1.5 mm ²) |

Digital Outputs (4 DO)

Electromechanical relay - DRY contact (option 1)

4 relays rated at 5A/250V AC; 5A/30V DC, 1 contact (SPST Form A)

| | |
|-------------------------|-------------------------------------|
| Galvanic isolation: | |
| Between contacts & coil | 3000V AC @ 1mn |
| Between open contacts | 750V AC |
| Operate time | 10 ms max. |
| Release time | 5 ms max. |
| Wire size | 14 AWG (up to 1.5 mm ²) |

Solid state relay - DRY contact (option2)

4 relays rated at 100mA/800V AC, 1 contact (SPST Form A)

| | |
|-------------------------|-------------------------------------|
| Galvanic isolation | |
| Between contacts & coil | 5000V AC @ 1mn |
| Between open contacts | 800V peak |
| Operate time | 5 ms max. |
| Release time | 5 ms max. |
| Wire size | 14 AWG (up to 1.5 mm ²) |
| Update time | 1 cycle |
| Wire size | 14 AWG (up to 1.5 mm ²) |

DIGITAL INPUTS + DIGITAL OUTPUTS (4 DI + 4RO)

4DI + 2RO combo, per above specifications

ANALOGUE OUTPUTS (4 AO)

Universal (configurable) isolated analogue outputs

| | |
|-------------------------------------------------|------|
| Scan time: (manually or remotely programmed) | 1 ms |
|-------------------------------------------------|------|

| | |
|------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ranges (manually or remotely programmed) | ±1 mA, maximum load 10 k _Ω (100% overload) 0-20 mA, maximum load 510 ohm 4-20 mA, maximum load 510 ohm 0-1 mA, maximum load 10 kohm (100% overload) |
| Accuracy | 0.5% FS |
| Wire size | 14 AWG (up to 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 @ 1mn |
| Wire size | Up to 14 AWG (≤ 1.5 mm ²) |

AUXILIARY POWER SUPPLY (ADD-ON MODULE)

AC/DC module

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

24V DC module

| | |
|--------------------|-------------------------------------|
| Rated input | 9-36V DC |
| Output | 7W |
| Galvanic isolation | 4,000V AC @ 1min |
| Isolation | 4KV |
| Terminals Pitch | 5 mm |
| Wire size | 14 AWG (up to 1.5 mm ²) |

COMMUNICATION PORTS

SERIAL

| | |
|-----------------------------------------------------------|------------------------------------------------------|
| RS-485 optically isolated port. Baud rate up to 115200bps | |
| Isolation | 4000V AC @ 1mn |
| Supported protocols | MODBUS RTU DNP3 SATEC ASCII IEC 60870-5-101 |

* Meets standard requirements

ETHERNET PORT (DUAL / 2 PORTS / DAISY CHAIN)

Transformer-isolated 10/100 Base-T Ethernet port – RJ45

| | |
|----------------------|------------------------------------------------------------------------------------------------------------|
| Supported protocols: | MODBUS/TCP (Port 502) DNP3/TCP (Port 20000) IEC 60870-5-104 (Port 2404) IEC 61850 (Port 102) SNTP |
|----------------------|------------------------------------------------------------------------------------------------------------|

| | |
|------------------------------------|--------------------------------|
| Number of simultaneous connections | 10 (5 MODBUS/TCP + 5 DNP3/TCP) |
|------------------------------------|--------------------------------|

| | |
|-----------|----------------|
| Isolation | 4000V AC @ 1mn |
|-----------|----------------|

INFRARED (IR)

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 @ 1mn |
|-----------|----------------|

USB PORT

Full speed USB 2.0 port

| | |
|---------------------|-----------------|
| Isolation | 4,000 VAC 1 min |
| Connector type | USB Type C |
| Supported protocols | Modbus/TC |

ADDITIONAL SPECIFICATIONS

REAL-TIME CLOCK

| | |
|----------|--------------------------------------------------------------------|
| Accuracy | Typical error ± 15 seconds per month / < 5 minutes/year @ 25°C |
|----------|--------------------------------------------------------------------|

LOG MEMORY

16GB memory for long-term waveform and data recording

DISPLAY

PM335 - 3.5" LCD TFT color Display, 320 × 480 dots resolution

EM235 - 1.77" LCD TFT color Display, 120 × 160 dots resolution

ENVIRONMENTAL CONDITIONS

| | |
|-----------------|---------------------------------|
| Operating temp. | -40°C to +70°C (40°F to 158°F) |
|-----------------|---------------------------------|

| | |
|-------------------|--------------------------------|
| Display op. temp. | -25°C to +70°C (4°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) |
|--------|--------------------------|

* Meets standard requirements

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: Electric 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

- IEC62053-22:2003, 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 EN55011/22 class B, FCC p.15 class B

Power Quality

- Designed to comply with:
- EN50160: Power Quality in European Electricity Supply Networks
- IEC 61000-4-7, Harmonics and inter-harmonics measurement
- IEC 61000-4-15, Flicker measurement
- IEC 61000-4-30 class A (Ed. 3.1), Power quality measurement methods

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 M6-1*

ORDER STRING

MODELS

| | |
|--------------------------------------------------------|----------------|
| EM235 DIN-rail FCAS Power Meter | PRO-PM335-FCAS |
| EM235 DIN-rail Power Quality Analyser Class A or S (x) | PRO-EM235-PQ-x |
| Transducer Version | PRO-RPM035-xxx |
| PM335 Panel Mounted FCAS Power Meter | PRO-PM335-FCAS |
| PM335 Panel Mounted PQ Analyser Class A or S (x) | PRO-EM235-PQ-x |
| Transducer Version | PRO-RPM035-xxx |

OPTIONS

CURRENT INPUTS

| | |
|------------------------------------------------------------------------|-------|
| 5 Ampere | 5A |
| 1 Ampere | 1A |
| 5A split core remote high accuracy current sensor (HACS), 50/60Hz only | RS5 |
| High Accuracy Current Sensors (HACS), 50/60Hz only | HACS |
| Pole Top Sensor Interface - 0-10V (Voltage& Current) | PTS |
| Pole Top Sensor Interface - 0-10V (Voltage), Current - 5A | PTS-5 |
| LPCT: dedicated low voltage interface for MV sensors | LPCT |
| 3V AC inputs for Rogowski current clamps | FLEX |

CALIBRATION AT FREQUENCY

| | |
|-------|------|
| 50 Hz | 50HZ |
| 60 Hz | 60HZ |

POWER SUPPLY

| | |
|-------------------------|------|
| 88-320V AC / 40-290V DC | ACDC |
|-------------------------|------|

BUILT-IN I/O

| | |
|-------------------------------------------------------------------------|-----|
| 2 x DI (dry contact) + 1 x SSR output + 1 x Universal AI (-1mA to 20mA) | IOS |
|-------------------------------------------------------------------------|-----|

DISPLAY LANGUAGE

| | |
|---------|----|
| English | EN |
|---------|----|

OPTIONAL PROTOCOLS

| | |
|----------------------------------|-----|
| IEC 61850 Communication Protocol | 850 |
|----------------------------------|-----|

OPTIONAL MODULES*

I/O (Max. 3 modules per device)

| | |
|---------------------------------------------------------|------------------------|
| 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, 250 V DC | DI8-24, 48, 125, 250 V |
| 4 Analogue Outputs; configurable range | 4AO |

*AUXILIARY POWER SUPPLY MODULE (MAX. 1 PER DEVICE)

| | |
|-----------------------------------------|----------|
| 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