

Ranger PM7500 Specification

Rack Mount for Permanent Substation Power Quality and Energy Monitoring.

Record events, trends, transients, min/max logging, >770 channels recorded simultaneously, expandable memory, automatic sag/swell monitoring down to single cycle, harmonics measurement up to 127th order (voltage and current harmonics to the 50th on 8 inputs or optional **voltage and current harmonics to the 100th on 6 inputs simultaneously**), flicker measurement, waveform capture at 384 samples/cycle at 50Hz, Ethernet, USB and Bluetooth communication. Compatible with IHost.

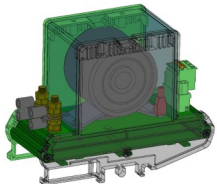


PM7500 Front View

8 Analogue Inputs:

4 Voltage input channels. Nominal 110V (< 600Vac RMS) for secondary VT output. 0-600Vdc.

4 Current input channels. Typical 0-1V RMS. Current to Voltage CTs supplied, nominal input 1A (5A or 10A on special request). Please note that Current clamp primary connection is by Ring Crimps to 5mm Brass Studs. 14 AWG Imperial size 10 (M5 2.5mm²), cable insulation diameter 2.9mm to 4.4mm (primary winding 2.5mm²). DC Current range: +/- 4Vdc peak inc. AC ripple (optional)



Example of a closed, toroid current clamp used (GF1).



1 Volt free contact closure:

Status output. Volt Free 'Status' terminals magnetic isolation. Three terminal relay SPDT (Common, NO, NC) contact specification 125V (Pollution degree 2). Creepage and Clearance ≥ 1.5mm relay between contacts. 'Failed' status indication both when the charge current is interrupted and when the central processor ceases normal operation (watchdog failure).

Five distinct simultaneous recording systems available:

Waveform capture: High Speed sampling:

384 samples/cycle at 50Hz on all inputs.

Troubleshooting: Utilising the patented Single Cycle Adaptive Store™ to capture comprehensive detail over long recording periods on up to 32 selected parameters. Shows anomalies in detail.

General Parameter Analysis / Trends: > 470 parameters recorded automatically and simultaneously enabling reporting to recognised Standards. >770 parameters available with optional Enhanced Harmonics Measurement.

RMS Event Database: Monitoring for 'official' power quality events such as sags/surges/interruptions.

Fault Level (optional): ½ cycle Peak Fault Level, RMS Break Fault Level at 50-100ms and at ½ cycle. Results dependent on presence of abrupt current induced voltage disturbances > 0.15%. Downstream Motor Contribution.

General Parameter Measurement: Records automatically. Fixed functions recorded on (selected) intervals (1sec to 2hours). Voltage & Current RMS (Max, Min, Avg). THD / Harmonic Value (8 inputs with option to the 100th). Flicker (3 Voltage inputs). Power (kW, VAR, AP, PF). Individual Harmonics 2-50 (8*50 signals on Volts and Current) or optional Individual Harmonics 2-100 (6*100 and 2*50 on Volts and Current), Interharmonics and sub-group harmonics to the 100th on voltage. Unbalance.

Troubleshooting Maths Functions:

AC Single Phase Installation: RMS, Stray Voltage RMS Hi Res < 35V, (line-neutral, line-line where appropriate). Real power W, Reactive Power VARS, Apparent Power VA, Power Factor PF, Displacement Power Factor, Phase Angle, Frequency, Instantaneous Flicker Sensation, Short Term & Long Term Perceptibility, Flicker Flag, Distortion Power.

AC 2 (split) Phase Installation: Real Power, Reactive Power VARS, Apparent Power, Power Factor.

AC 3 Phase Installation (Delta, Wye and variants): Real Power, Reactive Power VARS, Apparent Power, Power Factor, Voltage Unbalance, (Conventional & Sequential Components), Current Unbalance. Distortion Power, Fundamental Real & Reactive Power (IEEE1459).

DC: DC component may be extracted on all 8 channels (optional).

Harmonics: Odds, Evens, Triplens, Individual Harmonics value and % and phase angle to the 50th (Harmonics to the 127th, interharmonics and sub-groups is optional), K Factor, % Total Harmonic Distortion to the 50th harmonic (100th optional), Total Harmonic Value to the 50th (100th optional).

Symmetrical Components:

Positive, negative, zero sequence: NPS, NPS/PPS (Voltage and Current), ZPS, ZPS/PPS (Voltage).

Other Maths Options: Channel X * Constant, Channel X / Channel Y, Filtered Channel X, Internal Temperature, On Charge, Battery Volts.

Waveform Capture: Sample rate - 19.2kS/s (~384samples/cycle at 50Hz) on 8 channels. Also records automatically at 60Hz. Events examined, **ranked** & stored in real time.

Selectable Waveform Parameters:

Wave Retention Basis: Greatest disturbances (automatic ranking and low rank discard) and first past a threshold.

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Capture wave bracket: Wave Sets: from 20ms up to 160ms. Can be extended to 60secs. Can be contiguous; no re-arming delay.

Signals to be captured: Offending wave / complementary current or voltage, all voltages, all currents.

Triggers to be used: Transient, Ring, Notch, Sag, Surge, THD Volts, THD Current.

Wave Allocation: Waves allocated across trigger functions.

Frequency:

Automatic frequency tracking in 50 or 60Hz regions. Normal range 45-64Hz.

Dual Frequency Measurement (Optional): Independent frequency variation measurement on V4. Resolution to 0.001Hz (frequency), single cycle (time), latency ~3 cycles. DFM (V4) measurement range 40-70Hz.

Memory: 128MB internal Flash memory for all files. 16MB RAM for waveform capture data, 64MB working RAM. Expansion with USB Memory Device.

User Preferences - Stored in non-volatile Flash Memory.

Configurations: Space for over 200 files that may be used for both configuration and recording sessions.

Data Retention: Sequential data is saved to Flash memory during recording. Waveform capture data is held in RAM and transferred to Flash memory when recording ends. Configurations etc. stored in Flash memory. Recorded data can automatically be transferred to USB memory device at the end of each session.

User Interface is PC/Android App 'PMScreen': Full colour remote display on PC via USB, Bluetooth or Ethernet. Display also available on Android device such as tablet or mobile phone via Bluetooth. Includes setup/configuration, data review and recovery. With mobile network, PMScreen can be controlled worldwide via a Gateway Phone. PMScreen can also initiate data download to USB stick.

Displays On PMScreen:

Live: Power & Energy, Phasors, Flicker, Harmonics, Interharmonics, Harmonic Phasors, Waveforms, ITIC curve, EN50160 Comparison.

Historical: Trends, Statistics, List of Channels, all General Parameters.

Data Retrieval: Automatic download to **USB stick**, and **Android Mobile Phone** via Bluetooth (PMGateway: Data files sent on to email inbox). Download to **PC** via USB, Bluetooth, or Ethernet to an area network (including internet). Download to **Android Tablet** or **Mobile Phone** via Bluetooth.

SCADA: PM7500 is MODBUS compatible. All parameters accessible via MODBUS protocol.

Software: Comprehensive data analysis on PC with Pronto for Windows companion software. Unit configuration possible through Pronto.



PM7500 Rear View

Accuracy: 0.2%. 0.1% in reference range 20-30°C (excluding sensors). +/-2LSB.

Resolution: Programmable to 0.1Vac and 0.1Aac.

Portable Device Requirements for PMScreen: Android, Windows or Windows Mobile 6.5 compatible.

Communications:

Bluetooth: Wireless interface (isolated) reception up to 10m.

USB: Serial interface to PC (isolated > 2.5kV), download to PC & control through Pronto for Windows. Download through serial interface to Android device.

Ethernet: Connectivity through local network. Download to PC. Compatible with IHost.

USB Memory Stick/Hard Drive: Automatic download to USB stick or Hard Drive.

PMGateway App.: Enables Android mobile phone to act as a Gateway. Send data files to your inbox or dropbox, start and stop recordings.

Protocol: MODBUS ASCII.

Power: Requires 100-264Vac 50-60Hz or 110Vdc, rated power consumption 11 W, or 12Vdc at 6 W.

Battery Capacity: 2100mAh (5 HI-Temp NiMH batteries).

Battery Ride Through: Ten minutes at a time.

A/D Converter: 24 bit at 19.2kSamples per second, top 16 bits used normally for harmonics, power & energy, Flicker.

Measurement & Reporting Standards: IEC 61000-4-15, IEC 61000-4-7, IEC 61000-4-30, IEEE1453 (Flicker), IEEE1459, IEEE100, Report to EN50160.

Safety Standards: IEC 61010 second ed., 600V Cat. IV, pollution level 2, IEC 61326 (EMC).

Computer Requirements for Pronto Software: Windows 7, 8, 10, 11; 250MB hard drive space.

Case Dimensions: Standard 19 inch x 2U Sub Rack: minimum depth required behind the front panel 257.5mm. 466.2 x 76.3mm front panel fixing centres

Operating Temp: -20°C (-4° F) to 60°C (140°F).

Applicable Patents: 6424277, 0230712, 4910692.