Ranger PM6000

Power Quality Monitor

ThermoWestronics

PM6000

The best value available for power quality monitoring

The PM6000 is the most user-friendly, comprehensive, compact, cost-effective unit to be introduced to the power monitoring field. It offers virtually everything needed to monitor and record power for surveys and audits. It is another exclusive addition to the Ranger line of data and power loggers. There are 3 voltage input channels capable of measuring 0 to 600 VAC and 3 current input channels for use with current probes. The PM6000 is designed for use with existing current probes with 1 amp or 1 volt outputs. Eleven pre-stored configurations are set for 3 phase, 2 phase, and single phase hook-ups with several math channels pre-configured for power and harmonic measurements. Users can also configure their own set-up and math calculation requirements and save them to non-volatile memory.

Simple Touchscreen Programming

A simple, revolutionary touchscreen LCD display makes programming very straightforward. A resident on-line HELP feature assists users with configuration and hook-up. No more thumbing through pages of an instruction manual. Users simply touch and hold on any feature on the display and an immediate description or walk-through will appear. Another innovative feature is Menu Flow, which shows users exactly where they are in the menu sequence. It is accessed by pressing the upper left corner of the display screen. New setups are saved to nonvolatile memory for recall at any time for easy on-site installation. Recording mode, sample rate and recording length can be programmed as well as parameters such as scales, CT and PT ratios, engineering units, alarm levels, math functions and more. Password protection allows limiting of programming options to protect against unauthorized access.

Versatile Communication & Data Storage Options

The PM6000 features an RS232, RS422 or RS485 port for direct communication with your PC or laptop via the powerful Ranger Pronto for Windows® software. Data can be collected and displayed through other software packages that support MODBUS ASCII protocol. Data can also be downloaded via modem. Direct data storage includes 4 MB RAM, 1 MB internal flash memory and optional ATA flash memory card. The PM6000 samples 128 samples/cycle per channel with true RMS to the 50th harmonic. Ranger's patented Adaptive Storage recording process provides extremely high resolution (down to a single cycle) for up to 2 years on all parameters being measured. Users can record up to 32 power quality parameters at one time.

A resident on-line HELP feature provides users with a description or walk-through of any display feature.

Minimal Job Site Set-up

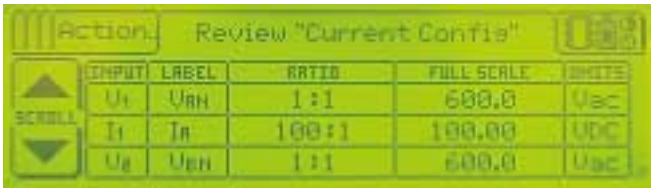
With everything self-contained and pre-configured, setup at the job site is fast and easy. You will be connected and recording in just a few minutes. The voltage input cable included with the unit is color-coded for both phase and polarity and is easily connected in seconds. In-line fusing on all voltage leads protects expensive power line equipment in the event of a short circuit. A Connection Wizard ensures proper phase-to-phase connection before recording is started. It will also determine if current transformers are properly oriented. The PM6000 can be powered independently by AC measurement or by an optional line cord for voltages below 90 volts.

Pressing the upper left corner of the screen accesses the Menu Flow feature, which shows users exactly where they are in the menu sequence.

Unparalleled Display Flexibility

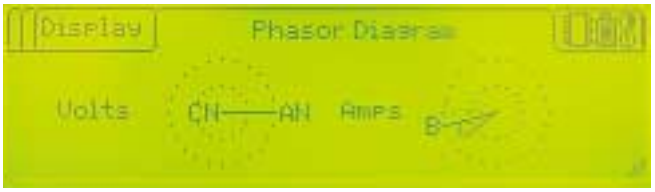
The PM6000 Power Quality Monitor is unequaled in the scope and flexibility of its touchscreen display. The displays on this page are just some of those available to users.

The Main Menu screen allows users to choose one of 6 functional options or to check battery/memory status.



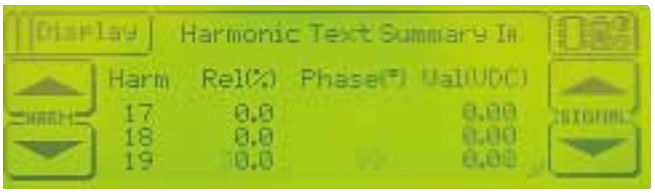
Verification of all inputs and their parameters can be seen on the Review screen.

The Hook-Up screen provides several detailed diagrams of electrical connections.



The Phasor Diagram screen displays real-time phasor diagrams, which instantly show the relationship of all the input channels in terms of direction and magnitude.

Harmonic Spectrum Bargraph screens graphically depict the amount of harmonic energy present in each of the inputs selected and display harmonic direction.

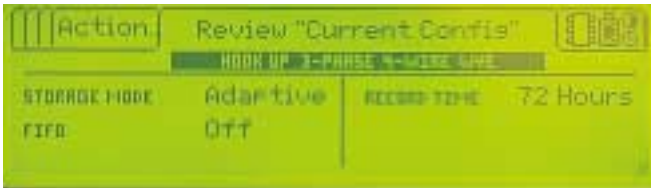


The Harmonic Text Summary screen offers detailed data for each harmonic up to the 50th.

Users can scroll through all channels to view real-time values in two independent panels.

The Utilities screen allows for battery management and configuration of communication requirements.

Users can access the Status screen to confirm battery/memory status from all screens.

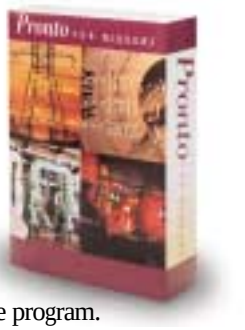


Quick verification of project setup can be accessed by reviewing Current Configuration.

Pronto for Windows Application Software

Pronto for Windows is a full-featured, Windows-based program designed to extract data from the Ranger family of data and power loggers and present it graphically for analysis. Through the use of straightforward icons and keyboard commands, you can graph and analyze data and create hard copy reports. Pronto for Windows is the only program you will need to communicate, analyze, report, and manage data as well as configure the data logger itself.

Selection of icons from the toolbar makes all commonly used instructions such as zooming, statistical analysis, annotation, playback, and printing as easy as pointing and clicking the mouse. File management is greatly improved through the use of projects, which define how the data will be stored, grouped, and how it will appear on screen and in reports. Easy-to-follow dialog boxes provide step-by-step choices for all data management tasks.



A multi-functional communication set allows interface to data loggers by serial port, RS485 local area network, or modem - all in the same program. A comprehensive, context-sensitive help system provides detailed instruction anywhere in the program.

Features

- Download data by modem from multiple computers or while running other applications
- Multiple downloads from the same site can be appended to the same file
- Addressable RS485 communication locally or remotely by modem
- Configure data loggers locally or remotely
- Create projects for storing data
- Create views to display and print data in any form
- Flexible zooming capabilities
- Icons facilitate access to frequently-used functions
- Create listings and exception reports
- Insert text and objects anywhere on the view
- Scheduled Events feature allows user to automate data playback on a schedule
- Export data as ASCII text for spreadsheets

Pronto for Windows Functions

- File Management Tools
- Templates for Viewing Data
- Unlimited Traces on Screen
- Titles, Subtitles & Legends for Text & Data
- Text Annotation
- Arrow Pointer for Text
- Cut & Paste Options
- Font Selection of Size & Type
- Color Selection for Text & Graphs
- User Information Screen
- Modem Communications
- Local Data Logger Network Support
- Remote Data Logger Network Support
- Notebook
- Access to Word Processors
- 38.4 K Baud (up to 230 K Baud for PM6000 only)
- Zooming Tools
  - Frame
  - Pan
  - Exception Zooming
  - Limits (value or %)
- Playback Tools
  - Manual
  - Auto
  - Scheduled
  - Multiple/Groups
- Reporting Tools
  - Exceedence Reports
  - Customer Statistics
  - Tabular Listings
  - Custom Reports
- Network-Addressable Data Logger Access
- Windows-Controlled Printer Support
- Built-In Address Book
- Context-Sensitive, On-Line Help System

Screens and Functions

Pronto for Windows software provides an extensive set of screens and functions that allows the user to plot, annotate, analyze, and print reports from the information collected by Ranger data and power loggers. This program has been designed so all functions can be implemented quickly with the minimal number of keystrokes in a logical, straightforward fashion.

Graph Assistant provides a comprehensive set of tools for creating user-defined views.

For example, Pronto's exceptional zooming capabilities let you define how you want to zoom in or out on the data on-screen. You can zoom to exception filter parameters, page left or right and snap to zoom box limits by drag and click mouse action.

Allow for folding and drill holes

Allow for folding and drill holes

PM6000

More features than any other power quality monitor

- Graphical touchscreen interface provides straightforward, user-friendly operation
- Resident on-line HELP guides users through configuration and hook-up
- Records and displays up to 32 channels of voltage, current, power, power factor, VARs, phase angle, frequency, THD, odds, evens, triplens, individual harmonics and much more
- Real-time displays allow users to zero in on exact point conditions and view phasor diagrams, harmonic bargraphs, and directional harmonics in both text and graphical format
- Built-in Connection Wizard ensures correct hook-up, provides suggestions upon detecting errors and determines if clamp-on transformer is properly oriented
- Data storage includes internal flash memory and ATA flash memory card
- Records harmonic magnitude and direction over time down to single cycle resolution for accurate analysis
- Can be powered independently by AC measurement circuits or optional line cord for voltages below 90 volts
- Battery backup provides 10 minutes resettable timed ride-through in case of loss of AC voltage
- RS422, RS485 and RS232 with MODBUS ASCII protocol or modem communications
- True RMS to the 50th harmonic
- Fused voltage leads and internally fused voltage inputs protect expensive equipment
- Pre-stored configurations for easy set-up
- Rugged, compact, portable case is lockable and waterproof
- Panel-mount configuration available
- Patented Adaptive Storage recording process provides extremely high resolution down to single cycle over long recording periods

Typical Applications

- Voltage complaint monitoring
- Power quality analysis
- Peak load profiling
- Power factor correction monitoring
- Load management
- Stray voltage monitoring
- Faulty ground detection
- Rate change analysis
- Tap change monitoring
- Feeder current monitoring
- Load growth curves
- Motor efficiency
- Surges and sags
- Distribution transformer monitoring
- Time of use surveys
- Energy audits
- Harmonic surveys

Specifications

INPUTS

Voltage
- 3; 0-600 Vac
  Inline shrouded 4 mm banana plugs and fused crocodile clips

Current
- 3; 0-1 Aac or
  3; 0-1 Vac 4 mm banana plugs

Channels
- 32

Accuracy
- < 0.25% to 50th harmonic

Resolution
- Programmable to 0.1 Vac and 0.1 Aac
- Records harmonic magnitude and direction over time with resolution down to a single cycle.

Harmonic Measurement
- True RMS to the 50th harmonic

Math
- Vac, Iac, KW, KVAR, PF, phase angle, VA, frequency, %THD, odds, triplens, imaginary impedance, real impedance, Nth harmonic, Nth harmonic with direction, voltage unbalance, current unbalance, K-factor, RMS, 1ø real power, apparent power, filtered ch X, channel X-constant, channel X/channel Y, battery volts on charge, internal temperature

RECORDING

Sample Rate
- 128 samples per cycle; single cycle true RMS response time; 16 bit simultaneously sampling all channels

Memory
- 4 MB RAM
  ATA flash memory card (optional)

Recording Mode and Rate
- Point Store: selectable from single cycle rate to once every 12 hours
- Adaptive Store: extended recording with single cycle resolution on changes

Data Retention
- Back-up battery provides 2 months retention @ 77˚ F (25˚ C)
  System detects remaining charge on battery while in storage, and if necessary writes recently used configurations to internal flash for permanent retention

DISPLAY

Type
- Backlit LCD graphic touchscreen display
  5.25” (133.4 mm) x 1.5” (38.1 mm)

POWER

Requirements
- 90-600 Vac off of Phase A voltage measurement or separate line cord

Battery
- 5 AF Ni-Cad battery pack

COMMUNICATIONS

Serial Ports
- RS232, RS422 or RS485 (up to 230<None> K baud); > 4 K Isolation

Protocol
- MODBUS ASCII

Computer Requirements for Pronto Software
- Windows 95, 98, or NT; 486DX66 or higher; 250 MB hard drive; 16 MB RAM

ENVIRONMENTAL

Operating Temperature
- 14˚ F (-10˚ C) to 140˚ F (60˚ C)

Case
- NEMA 4X; 10.63” L (270.0 mm) x 9.75” W (247.7 mm) x 4.94” D (125.5mm)

Weight
- 10lbs. without leads and current clamps

Certifications
- CE

Adaptive Store Mode
A Patented Ranger Exclusive

Ranger's patented Adaptive Store recording mode is designed to make the best use of available memory, to meet two conflicting requirements:

- To provide long-term trend data, observing the worst extremes of maximum and minimum values, and;
- To provide detail where new activity occurs, i.e., detecting and capturing transients.

Adaptive Store does not require any prior knowledge of signal conditions. The only required parameter is the total time of the record.

Adaptive Store recognizes the *unpredictability* of future signal activity by employing its 13 predictive algorithms, against which all samples are tested as they are received. This unique method of *anticipating* the possible signal path and testing each sample for conformity has these advantages:

- It spreads out the computational load uniformly over time
- It allows for immediate reaction to transients
- It works with extremely long recording periods

The Ranger Adaptive Store recording mode is the most powerful automatic data compression system available on any data logger.

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