



# Ranger PM6000

Power Quality Monitor



# 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.

### 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.



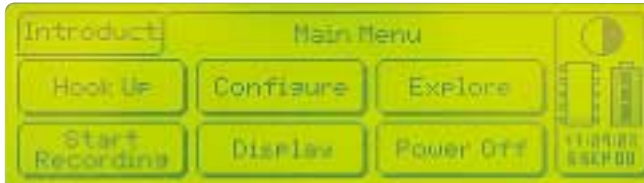
A resident on-line HELP feature provides users with a description or walk-through of any display feature.



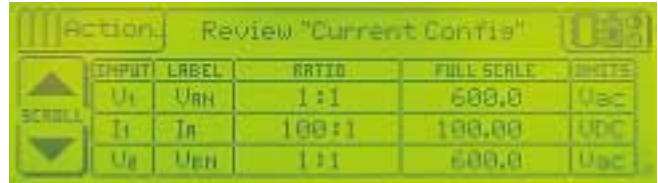
Pressing the upper left corner of the screen accesses the Menu Flow feature, which shows users exactly where they are in the menu sequence.

# Unparalleled Display Flexibility

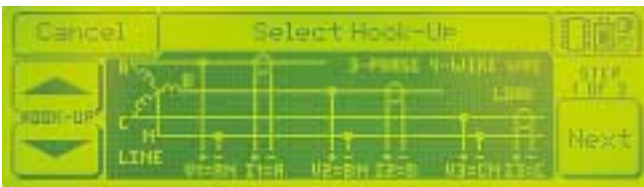
The PM6000 Power Quality Monitor is unequalled in the scope and flexibility of its touchscreen display. The displays on this page are just some of those available to users.



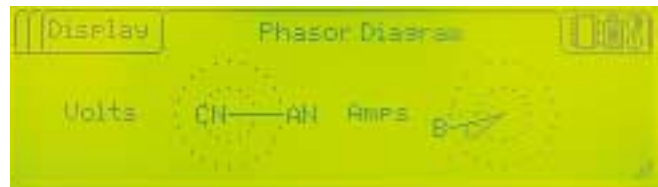
The Main Menu screen allows users to choose one of 6 functional options or to check battery/memory status.



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 present in each of the inputs selected and display harmonic direction.

Harm	Rel(%)	Phase(°)	Val(VDC)
17	0.0		0.00
18	0.0		0.00
19	0.0		0.00

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

## 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.

## 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

# 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, I<sub>0</sub> 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)

Thermo Westronics  
22001 North Park Drive, Suite 100  
Kingwood, Texas 77339-3804  
Phone: 800 787.8725  
281 348.1800  
Fax: 281 348.1288  
E-Mail: sales@thermowestronics.com  
Internet: www.thermowestronics.com

## 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.

