Megger®

MR-4
Meter Adapter Recorders

- **Records voltage and current at the meter**

- **Ideal for split-phase residential and light commercial investigations**

- **Detects sags, swells, flicker, loose neutrals and harmonics**

- **Installs quickly and safely**

DESCRIPTION

With more and more equipment and appliances emerging with sensitive electronics, power quality problems have found their way into homes and offices. The MR-4 Meter Adapter Recorders provide a powerful tool to track down these problems. They are ideal for split-phase residential and light commercial power quality monitoring.

The MR-4 simultaneously records the two line currents in addition to the two line voltages, as well as computes the line to line voltage and neutral current. They are digital recorders totally contained in a standard universal ring or ringless type meter adapter.

The MR-4 records voltage and current at the meter. It is installed quickly and safely. There are no external boxes or connections, and no customer panel boxes left open.

APPLICATIONS

The MR-4 uses a very high speed Digital Signal Processor sampling at 256 samples/cycle. This provides measurements that are true RMS beyond the 50th harmonic, and allows capture of subcycle events as fast as 65 microseconds. The stringent demands of power quality sensitive equipment in "home offices" and light commercial establishments makes high speed sampling mandatory.

They also use Flash PROM's for program (firmware) memory. Flash PROM's offer the major advantage of using your computer to update the recorder firmware. Flash PROM technology allows the Power Quality Option and

Power Flow Option, along with Megger's product enhancements to be easily installed by users at their own facilities.

FEATURES AND BENEFITS

Key features include half cycle response time, capturing subcycle events as fast as 65 microseconds, flicker recording, and viewing real time data while recording. The large 128 Kbyte standard memory easily allows recording for more than a week.

The MR-4 recorders have LEDs so your problem investigators can see, at a glance, if an event has occurred.

They show recording status, swells, sags, flicker, and suspected loose neutrals.

Since the RS-232 port is optically isolated, you can view real-time voltage/current and the number of events which have occurred. Unlike other meter adapter recorders, you do not have to uninstall the recorder to retrieve data.

The MR-4s are designed with the emphasis on ease of use. An internal display shows the two voltages indicating whether the recorder is functioning properly. Recording can be initiated in many ways: manually with an internal slide switch; a delayed start allowing time for the meter to be installed before recording; a specified date/time to start recording; for a specific length of time only, or sensing that voltage or current is present.

All recorded measurements are time stamped for easy correlation of events.

Upgrade for More Capabilities

The Power Quality Option and Power Flow Option can be purchased and field updated at anytime, making the MR-4 a full feature power analyzer. The Power Quality Option adds the capability to capture waveforms with time or event triggers, and use Metrosoft®'s harmonic analysis features. The Power Flow Option adds the capability to record demand data (watts, VARs, PF), for applications such as billing verification.

The broad range of capabilities, combined with the ability to add options as needed, gives users an upgrade path to the features their application requires.

SPECIFICATIONS

Input Channels
L1-N/L2-N (L1-L2 Computed): 2 Voltage, 2 current
L1 & L2 (Neutral Current Computed)

Range
Voltage: 50-150 V RMS Line to Neutral; 250 V Peak Line to Neutral
Current: 5-200 A RMS/Phase; 350 A.
Peak: 200 A max continuous without damage

Sample Rate
256 samples/cycle per channel (DSP Based)
Statistics Stored: min/True rms/max for voltage and current per storage interval with cycle resolution, 65 microsec event detection, flicker event detection.

Accuracy and Resolution
Voltage Accuracy: ± 0.35 % of reading
Voltage Resolution: 0.1 v AC
Current Accuracy (MR-4 only): ± 0.35% of reading
Current Resolution (MR-4 only): 0.1 Amp
Real Time Clock: 0.01%

Software

ms-mrW Metrosoft® 32-bit software for Windows
Graphs: Voltage/Current with zooming, etc.
Reports: Tabular, Event (swell, sag, flicker), Regulation Table and Histogram

Power

Derived from L1-L2 voltage
Battery Backup: sealed lead acid battery
Run-Through Time: 2 minute below 180 V cutoff. Resume recording on power restoration
Data Retention: 14 days with fully charged battery. Battery charges from L1-L2 voltage.
Min Charging Voltage: 180 V ac

Display
4 Digit, 7 segment LED display inside meter adapter. Display continuously scrolls through VL1, VL2, countdown time

Recording
Manual (slide switch inside meter adapter), Scheduled run, voltage present, current present, auto-stop, delayed start

Indicating LEDs
External on side of meter adapter.
LEDs marked as follows:
R (Record), S (Surge/Sag), F (Flicker), L (Suspected Loose Neutral)

Memory
128 Kbytes (29,000 readings standard). Expandable to 1 Megabyte (500,000 readings). Program memory is FLASH PROM for easy field updating

Memory Modes
Stop-when-full or wraparound

Programming/Data Retrieval
Isolated RS-232 port. Real-time data can be viewed.
Baud Rates 4800, 9600, 19200

SWC
ANSI C37.90.1

Operating Temperature
-22 to +149° F (-30 to +65° C)
Weathertight when meter is reinstalled and sealed

In actual field tests, all MR recorders installed in under two minutes

Step 1: Remove the meter

Step 3: Plug in the meter

Step 2: Plug in the MR

Step 4: Walk away and let the MR do the work

Physical

Case: Universal Ring/Ringless Meter Adapter for Forms 2S, 12S, 25S
Weight: 3 lbs (1.4 kg)

Typical Recording Time

(Saving Min, RMS, Max for Channels "ON", Data for Histogram, Regulations Table & Flicker)

MR-4 (4 Channels On):

1 Minute-standard 1$\frac{1}{2}$ days, expanded 27 days
2 Minutes-standard 3$\frac{1}{4}$ days, expanded 55 days
3 Minutes-standard 8 days, expanded 138 days

MS MRW 32-BIT SOFTWARE
METROSOFT® FOR WINDOWS

ms-mrW is a 32 bit Windows software package for use with the MR-Series Recorders. It offers many powerful features that save you time.

Detailed Charts

Metrosoft® allows viewing multiple parameters on a single chart, so problems are quickly identified. An exceptional graphing feature is the ability to *zoom-in* and enlarge specific time periods for a closer look at unusual events. A *scan-line* feature lets you move a line across the chart and the software instantly displays the values for the specific date/time on the chart. This gives you exact numbers and eliminates the need to approximate. All charts can be printed on any printer supported by Windows.

Complete Reports

Metrosoft® generates numerous types of detailed reports which can be viewed, printed or exported to popular spreadsheet programs.

- **Summary and Setup Report** lists instrument setup information and a summary of all recorded data.
- **Tabular Report** includes all Voltage/Current data recorded for each input. With the Power Flow Option, you can also create tabular reports of the demand data.
- **Out-of-Limits Reports** provide information on all out-of-limit events showing swells, sags, subcycle events and harmonic events.
- **Exceedance Report** is created by searching all recorded data and reporting incidents where a specified limit was exceeded.
- **Flicker Report** shows flicker events using the GE Flicker Curve standard.
- **Regulation Report** provides a daily profile of how well the voltage is regulated at the site.
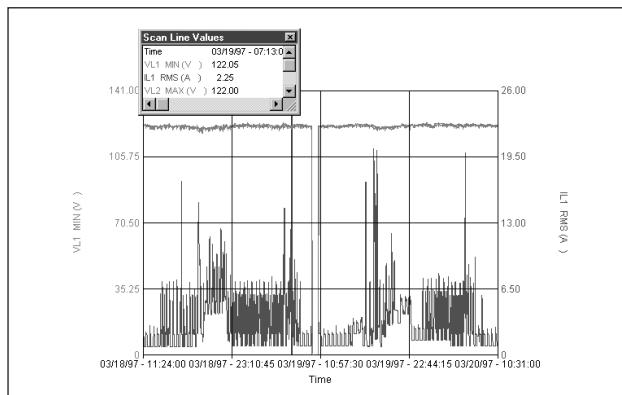- **Histograms** show the distribution of voltage and current readings.

Harmonic Analysis

With the Power Quality Option, the mr records data for harmonic analysis and Metrosoft® provides the following:
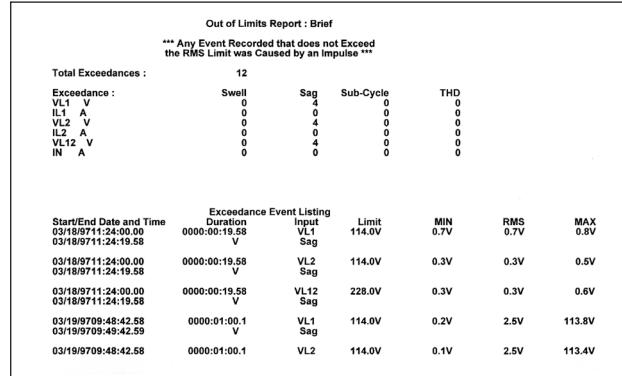
- Chart of actual waveforms analyzed
- Bar chart of harmonic magnitude for the selected waveform
- Harmonic analysis report for the selected waveform cycle
- Total Harmonic Distortion (THD) summary report for each input as a percent of the fundamental for the first cycle of each event

Quick Recorder Setup

With Metrosoft®, the recorder can be set up for different test conditions in a matter of seconds. Once the instrument is set up for a test, it will retain this information until you change it. The setup files may be saved on disk for reuse.
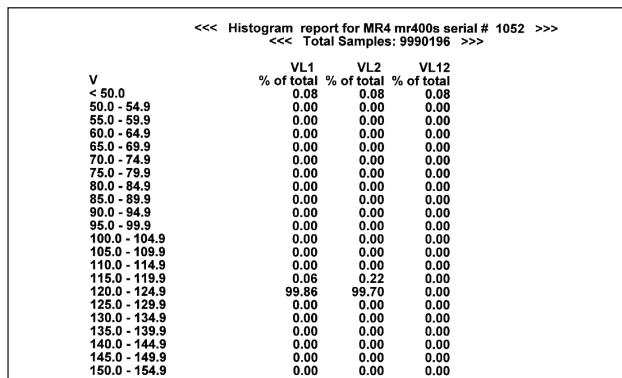

Graph of RMS data

Out-of-Limits Report

Regulation Report

Voltage Histogram

ORDERING INFORMATION

Item (Qty)	Cat. No.
Four Channel Recorder (2 voltage/2 current) for split phase service (120/240 V). DSP and Flash PROM based. This recorder is totally self-contained within a universal ring/ringless meter adapter for Forms 2S, 12S, 25S. Samples at 256 samples/cycle, has integral internal display and external indicating LED's to indicate Recording Status, Suspected Loose Neutral, Flicker Event and Surge/Sag Event. Also, calculates L1-L2 Voltage and Neutral Current. Captures 65 microsecond Voltage and Current events. Isolated RS-232 port facilitates viewing real time data and retrieving data without removing recorder. Standard 128 KB memory stores 33,000 readings. Includes Software for Windows 95/98/NT/2000, neutral blade, neutral clip lead and manual	MR-4

Options and Accessories

Metrosoft Software for Windows 32-bit Windows applications software for IBM and compatible computers. Programs unit, provides data retrieval, generates graphs, reports and data files, compatible with	
Lotus 1-2-3 and Excel software, and saves recorder setup files. Compatible with Windows NT and Windows 95, 98, Me, WIN2000	35173-1
Memory Module - 1 MB memory upgrade	MM-MR-1
Computer interface cable - RS-232 isolated (only 1 per computer required)	CA-MR
Power Quality Option - captures waveforms based on time/event trigger. Requires MM-MR-1	MM-PQ
Power Flow Option - records Watts, Var's, VA, Power Factor and other key power parameters. Available for MR-4 only	MM-PF
External Power Supply - Charges MR-4 from 120 V	PS-MR
Nylon Carrying Case, soft-sided	CC-MR
Charger cable with plug for car cigarette lighter	DC-MR
Fuse kit	EF-MR
Neutral blade	NJ-MR
Neutral clip lead	NL-MR

Starter Kits

Includes MR-4 Meter Adapter Recorder, MM-MR-1 memory expansion and CC-MR nylon carrying case	SK-MR-4-01
Same as SK-MR-4-01 *plus* DC-MR charger cable for car cigarette lighter and PS-MR external power supply	SK-MR-4-02
Same as SK-MR-4-02 *plus* CA-MR optically isolated Rs-232 cable	SK-MR-4-03
Same as SK-MR-4-03 *plus* MM-PQ power quality option and MM-PF power flow option	SK-MR-4-04

Product Kits

Includes (6) MR-4 Meter Adapter Recorders, (6) MM-MR-1 memory expansion modules, (6) DC-MR charger cables, (3) PS-MR external power supplies, (1) CA-MR RS-232 computer interface cable and (6) CC-MR nylon carrying cases	PK-MR4-6
Includes (12) MR-4 Meter Adapter Recorders, (12) MM-MR-1 memory expansion modules, (12) DC-MR charger cables, (6) PS-MR external power supplies, (1) CA-MR RS-232 computer interface cable and (6) CC-MR nylon carrying cases	PK-MR4-12