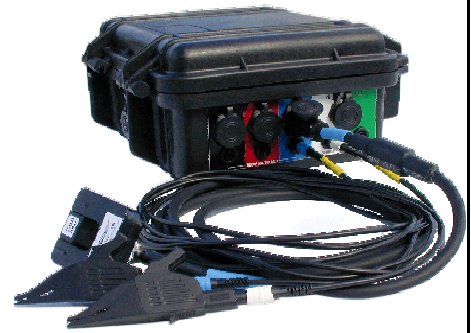


### LM-5410/LM-5415

#### Your Full-Featured Line Of First Defense!

- Three Phase 600v Monitor/Recorder
- Power Quality + Power Consumption
- Months of Storage Capacity
- Automatic Remote Notification/Alarms
- Optional Ethernet; Wireless; or Telephone Communications
- Optional Self-Powered Dual Range Flexible SMART CT's
- IP65 Weatherproof/Ruggedized For Field Use
- Selectable Internal Power
- Small (10.75"x 8.5" x 4.5") And Light (4 lbs)
- Database/Analysis Software Included
- CE Certified
- 3 Year Warranty



The LM-5400 series is comprised of two unique 3-phase 600v recorders (Models LM-5410 and LM-5415) each capable of simultaneously recording all energy parameters including frequency for 4 voltages, 4 currents. The 5415 adds disturbance (sags, swells), both V and I individual and THD and waveform capture recording. The fourth voltage and current channels can record neutral-ground voltage and neutral or ground current. These units provide practical power monitoring needs by providing all the features required by your front-line personnel and at an attractive price.

#### Power Consumption Recording

The unit records more than 30 power parameters including Frequency, KW, KVAR, KVA, True and Displacement Power Factors. The LM-5400 series uses Enetics SmartCT™ technology so that calibration data on every CT is stored on a chip in the CT itself full-spec accuracy end-to-end.

Dual range, self-powered flexible CT's are offered as well as split core units. With any of several available communications options installed, either of the 5400 products performs automatic alarms on exceedance of any of up to 12 parameters.

#### Swells/Sags, Harmonics, Current and Voltage THD, Waveform Capture

The LM-5415 calculates rms voltage and current and saves time-stamped event data if they are outside of user-specified or auto-threshold limits. Swell/sag data is then available for every event including Min/Max Vrms, duration, and worst-case single-cycle current at the event's worst-case voltage. Data on up to 3000 events can be saved.

The LM-5415 also adds waveform capture on dV/dt trigger, or auto-threshold, current and voltage harmonic magnitude recording including THD; current harmonics in % or RMS Amps through the 25<sup>th</sup> order based on 128 samples/cycle.

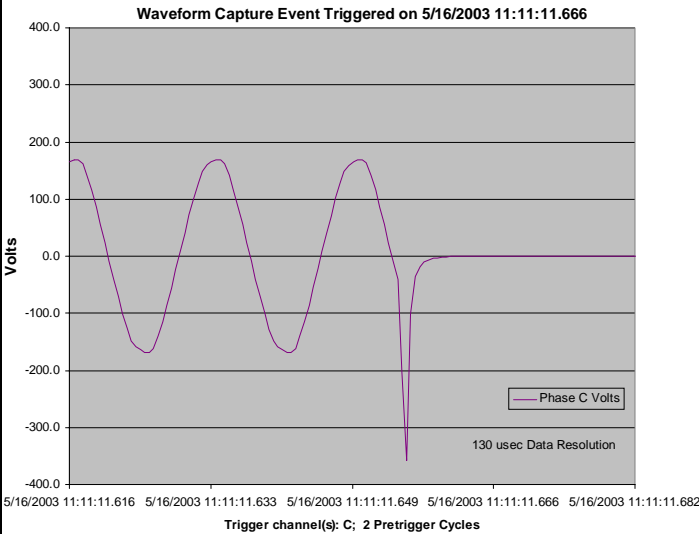
View Readings (Enetics Test Site)											
August 06, 2003 05:37:08 PM [Eastern Daylight Time] Recorder S/N: 10023 [Enetics Test Site]											
	Phase A		Phase B		Phase C		N-G		Neutral		
Voltage:	125.04 V		122.88 V		123.12 V		0.000 V		0.000 V		
Voltage Peak +:	+176.11 V		+171.18 V		+171.69 V		+0.00 V		+0.00 V		
Voltage Peak -:	-175.67 V		-171.18 V		-171.25 V		-0.00 V		-0.00 V		
Current:	76.04 A		61.48 A		94.52 A		0.000 A		0.000 A		
Real Power:	8.768 kW		7.040 kW		10.344 kW		0.000 kW		0.000 kW		Total: 26.752 kW
Reactive Power:	3.600 KVAR		2.656 KVAR		3.424 KVAR		0.000 KVAR		0.000 KVAR		Total: 9.680 KVAR
Apparent Power:	9.568 kVA		7.552 kVA		11.632 kVA		0.000 kVA		0.000 kVA		Total: 28.704 kVA
Total PF:	0.916 Lag		0.931 Lag		0.940 Lag		0.940 Lag		0.940 Lag		Total: 0.931 Lag
Displacement PF:	0.968 Lag		0.934 Lag		0.954 Lag						
THD:	1.50%	9.60 A	1.58%	4.84 A	2.07%	15.76 A					Operating Frequency
Harmonic 2:	0.05%	0.86 A	0.13%	0.84 A	0.05%	1.00 A					60 Hz
Harmonic 3:	0.55%	7.64 A	0.53%	4.40 A	1.21%	12.80 A					1-minute Average
Harmonic 4:	0.05%	0.08 A	0.06%	0.04 A	0.03%	0.15 A					05:37:00 PM
Harmonic 5:	1.04%	4.88 A	1.02%	1.72 A	1.41%	8.40 A					25.813 kW
Harmonic 6:	0.01%	0.00 A	0.02%	0.04 A	0.01%	0.08 A					9.701 KVAR
Harmonic 7:	0.68%	2.40 A	0.62%	0.44 A	0.76%	2.60 A					27.857 KVA
Harmonic 8:	0.03%	0.00 A	0.04%	0.04 A	0.00%	0.08 A					Daily Peak Interval
Harmonic 9:	0.47%	1.46 A	0.34%	0.44 A	0.42%	1.08 A					15-minute Average
Harmonic 10:	0.01%	0.04 A	0.02%	0.00 A	0.02%	0.08 A					01:30:00 PM
Harmonic 11:	0.18%	0.60 A	0.03%	0.28 A	0.09%	1.44 A					53.488 kW
Harmonic 12:	0.02%	0.08 A	0.02%	0.04 A	0.01%	0.00 A					
Harmonic 13:	0.10%	0.64 A	0.15%	0.24 A	0.11%	1.08 A					
Harmonic 14:	0.02%	0.00 A	0.01%	0.04 A	0.01%	0.04 A					
Harmonic 15:	0.22%	0.56 A	0.21%	0.20 A	0.18%	0.60 A					
Harmonic 16:	0.00%	0.00 A	0.03%	0.00 A	0.01%	0.04 A					
Harmonic 17:	0.08%	0.28 A	0.06%	0.08 A	0.04%	0.48 A					
Harmonic 18:	0.01%	0.04 A	0.02%	0.04 A	0.01%	0.04 A					
Harmonic 19:	0.08%	0.20 A	0.07%	0.04 A	0.05%	0.32 A					
Harmonic 20:	0.01%	0.04 A	0.01%	0.04 A	0.01%	0.04 A					
Harmonic 21:	0.06%	0.24 A	0.07%	0.08 A	0.06%	0.20 A					
Harmonic 22:	0.02%	0.04 A	0.01%	0.00 A	0.01%	0.04 A					
Harmonic 23:	0.11%	0.24 A	0.07%	0.04 A	0.02%	0.16 A					
Harmonic 24:	0.01%	0.08 A	0.03%	0.04 A	0.01%	0.08 A					
Harmonic 25:	0.06%	0.16 A	0.05%	0.04 A	0.08%	0.20 A					
Last PQ Event:	Phase A		Phase B		Phase C						
Event Duration:	08/06/03 17:36:56.917		08/06/03 15:45:00.183		08/06/03 15:45:00.183						
	0.017 secs		0.100 secs		0.100 secs						

Real-Time Readings Screen

## PowerScape Software

Enetics' PowerScape Software is provided with each LM-5400-family recorder. Key features of PowerScape Software include:

- Full SQL Database With Built-In Query Dialogue
- For Those Who'd Rather Use Files, A File-Based Data Archive
- Ethernet/Internet-based Real-Time Data Access
- Browser-based Internet Access To Trended Data
- Microsoft Excel™ Analysis Engine
- Auto-Formatting of Data Reports for Simplified Analysis With Full User Customization Supported
- Drag-Zoom Into A Specific Portion Of A Chart



**Trigger #3 Setup (PQ Alert)**

Trigger Criteria

Voltage Sag or Swell Event Occurred

Custom Criteria

Phase A: Harmonic Amps > 3.6 Or

Phase B: PF < .75 Or

Phase C: kW > 45

Minimum Duration: .25 second(s)

Delay Before Clear

Clear condition: 2 minute(s) after criteria is no longer met

Assert condition for at least 15 minute(s)

Trigger Notifications & Actions

Notify system when condition active

Notify system when condition cleared

Activate Relay 1 (High Demand)

Activate Relay 2 (Low PF)

Activate Relay 3 (PQ Events)

NOTE: The PowerScape system phone number or IP address must be programmed in the 'Calls' setup tab.

**Notification and Load Management Trigger Criteria - One of Four**

## Interval Data - Parameter Selection Setup

**Recorder Setup**

General | Interval | Events | Calls | Time Zone | Scaling | Notification

Interval Length: 15 Minutes

Recording Channels:  A  B  C  N-G

Individual Phase Parameters:

Voltage (V)  Current (A)

Real Power (W)

Reactive Power (VAR)

Apparent Power (VA)

Total PF

Displacement PF

Voltage THD (% Fund.)

Current THD (A)

Individual Phase Harmonics:

Voltage  Current

2nd  3rd

4th  5th

6th  7th

8th  9th

10th  11th

12th  13th

14th  15th

16th  17th

18th  19th

20th  21st

22nd  23rd

24th  25th

Totals from Phases A, B, & C

Total Real Power (W)

Total Reactive Power (VAR)

Total Apparent Power (VA)

Total PF

Note: N-G channel supports Voltage (V) and Current (A) recording only.

(88 columns) capacity: 168.4 days

## Specifications

### Channels:

Voltage 4  
Current 4 (simultaneous voltage and current sampling)

### Range:

Voltage 20-600 V RMS  
Current CT Dependent (1-10,000A)

### Memory

Non-volatile without battery backup

Typical Data Storage Time:

15 Min Interv/16 Parameters: 600 Days min

15 Min Interv/117 Parameters: 100 Days min

Software reports recording time at setup. Waveform and event capture storage is independent from interval data storage. Up to 3000 events are saved in non-volatile memory.

### Sample Rate/Response Time:

32 samples/cycle for interval data

128 samples/cycle for harmonic analysis

### End-to-End Accuracy:

Voltage  $\pm 0.1\%$  reading + 0.1% FS  
Current  $\pm 0.2\%$  reading + 0.2% FS  
Power  $\pm 0.5\%$  reading + 0.01% FS  
Power Factor  $\pm 1\%$   
THD  $\pm 1\%$   
Frequency  $\pm .1\%$  ; .01 Hz Resolution  
ANSI C12.16

### Power Configurations Supported

Single Phase, Split Phase, 4-Wire Wye, 4 Wire Delta Total Power  
3 Wire Delta.

### Recording Interval:

15 sec to 1 hour

**Flicker:** EN61000-4-15

**Harmonics:** V and I Up to 25<sup>th</sup>  
Voltage THD (% Fundamental)  
Current THD (% Fundamental or RMS Amps)

### Communications Options:

Internal Modem  
Ethernet  
Wireless/Cellular  
Serial Port up to 57.6 kbps Standard

### Power:

85—265 VAC, 47—440 Hz.  
Internally or Externally Powered  
Run-through time: 10 sec on Supercaps  
Real-Time Clock: 45 days on Supercaps  
No Battery Maintenance

### EMC:

EN55022 Class B Radiated

### Environmental/Physical: CE Certified

Operating Temp Range: -20°C to +70°C  
Size: 10.75" x 8.5" x 4.5"  
(27.4 x 21.6 x 11.5 cm)  
Non-conductive Case  
Weight: 4 lbs (1.9 kg)  
Weather: IP 65

(Specifications Subject To Change Without Notice)