



Power System Monitoring Recorder

TESLA LITE

Product Overview

The TESLA LITE is an economical yet complete power system recorder for applications in smaller substations. This easy-to-use multi-time frame recording system records 12 ac currents, 6 voltage channels and 38 digital (status) channels and stores 150 recordings in on board memory. The TESLA LITE records data simultaneously in three time domains: high speed transient fault (seconds), low speed dynamic swing (minutes), and continuous trend (10 second to 1 hour intervals). A wide variety of triggers are available to initiate recording.

The intuitive TESLA Control Panel user interface software configures the recorder, retrieves and manages records and displays real time measured values. Control Panel also includes RecordGraph, a graphical record display and analysis software tool.

These features make TESLA LITE a cost effective independent and complete recording solution for small substations.

- Easy-to-use settings and analysis software
- 96 samples/cycle transient fault recording – captures up to the 25th harmonic
- Dynamic swing recording of disturbances.
- User-configurable trend recording
- Control logic statements to create user definable triggers
- Fault location, power factor detectors among many calculated channels
- DNP3 and Modbus SCADA support
- IRIG-B clock synchronization
- Data compression for fast file transfer
- 100 BASE-T Fast Ethernet front and rear ports and front USB COM port
- Real-time metering of all input and calculated quantities
- Cross triggering and database management with RecordBase Central Station Software



Applications

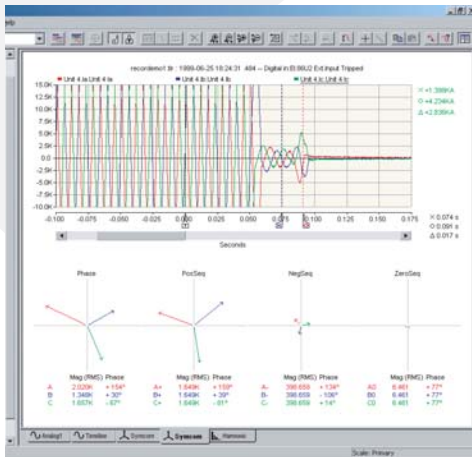
As a Multi-Timeframe Power System Recorder and Monitor

Use transient fault (fast) records to:

- Verify operation of relays and breakers
- Improve relay settings
- Confirm system and device models and improve coordination

Use up to 45 user-defined trends to:

- Monitor seasonal variations of load
- Analyze and model system component



Use dynamic swing (slow) records to:

- Review loading and stability criteria
- Verify power swing damping to improve stability
- Study SVC and PSS performance
- Detect sub-harmonic oscillations
- Understand out-of-step tripping

As a PQR:

- Monitor single harmonic and THD
- Understand voltage sag/swell conditions
- Analyze and tune filter performance

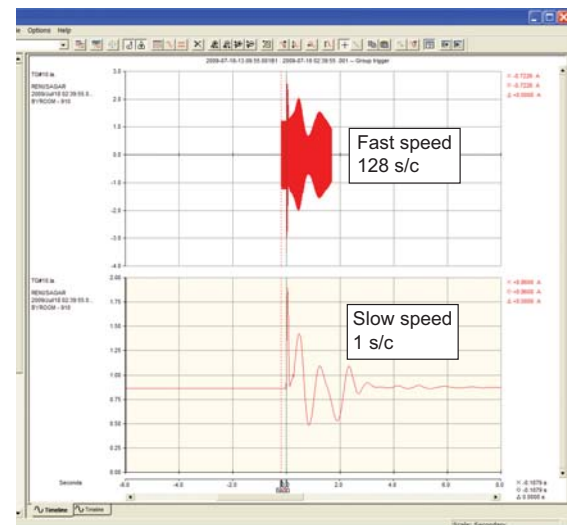
Features and Benefits

Simultaneous Multi-Functional Recording and Event Logging

- Transient fault recording:
 - 96 samples/cycle (5760/4899) Hz
 - 0.2 to 10 second auto extend records
- Dynamic swing (disturbance) recording:
 - 1 sample/cycle (60 Hz)
 - 10 to 900 seconds records
- Trend logging:
 - 10 to 3600 seconds for 45 channels
 - Daily event logging up to 1000 events per day
- Sequence of events: 250 events

52 Calculated Channels

- Summation: 10 channels
- Sequence: 6 channels,
- Watts/Vars: 5 channels
- Impedance: 5 channels
- Logic: 15 channels
- Power Factor: 5 channels
- Fault Locator: 5 channels
- Frequency: 1 channel

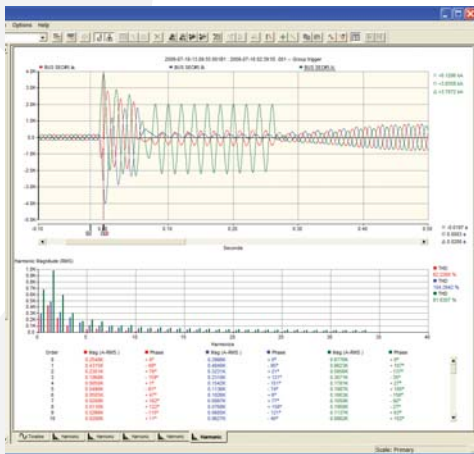


RecordBase Central Station

- Automated record transfer from on a scheduled call-out or by recorder initiation
- Supports COMTRADE, PTI and Excel output formats
- Company-wide access on existing Windows® computers through the corporate LAN

Easy-to-Use, Intuitive Windows-Based Setting and Analysis Software

- Lossless data compression for fast file transfer
- Offline mode to view records and set configurations
- Many user-definable triggers
- User-assigned trigger priorities
- User-programmable control logic
- User-configurable report templates

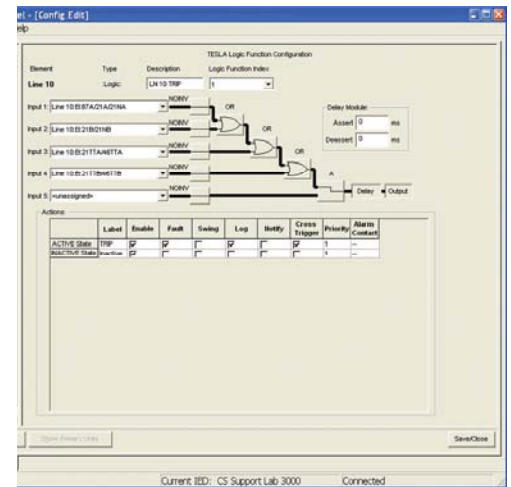


Advanced Communications

- SCADA support with DNP3 and Modbus
- User-configurable DNP3 point list mapping
- IRIG-B time sync, modulated or un-modulated

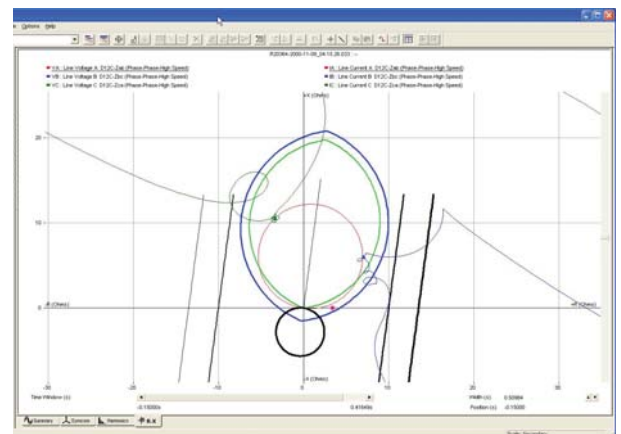
Cost effective Architecture for custom requirements

- Easy one time calibration



RecordGraph™ and RecordBase View™ Waveform Analysis Software

- Display multiple channels simultaneously and combine records
- Display multiple component voltage, current or summed channels
- Display THD, harmonic magnitude
- Zoom, alignment, scaling, unit functions
- Record summaries including event lists
- COMTRADE, PTI and MS Excel export



Detailed Specifications

TESLA LITE Power System Monitoring Recorder

Item	Quantity/Specs	Notes
General		
Nominal Frequency	50 or 60 Hz	
Sampling Rate	96 samples/cycle	
Power Supply	Supply Range: 43 – 275 Vdc, 90 – 265 Vac	
Recording Rate:		
Transient Fault	96 samples/cycle	Up to 10 seconds per record
Dynamic Swing	1 sample/cycle	Up to 15 minutes per record
Trend	User-configurable, up to 45 trending channels 5 mode - Damped, Undamped, Avg, Min, Max	10 to 3600 seconds sample rate
Event	Daily event log recording	Daily logging limit of 250 events
Analog Input Accuracy	+/- 0.1% of FS amplitude +/- 0.5 degree phase	
Record Storage	150 fault, swing or combined records	
A/D Resolution	16 bits, 65536 counts full scale	
Channels and Triggers		
Analog Inputs	High and low threshold, positive and negative rate of change, harmonic level, THD level and sag/swell.	All triggers have independent controls for delay, logging, transient or swing record initiation, alarm contact activation and cross triggering
Summations	High/low threshold, +/- rate of change	
Positive Sequence	High/low threshold, +/- rate of change	
Negative Sequence	High level	
Zero Sequence	High level	
Watts/VARs	High/low threshold, +/- rate of change	
Frequency	High/low threshold, +/- rate of change	
Impedance	Positive sequence circle combined with absolute rate of change	
Power Factor	Low capacitive, low inductive	
External Inputs	Rising edge, falling edge or both	
Logic	Rising edge, falling edge or both	
Fault Locator	Triggered by internal or external events	
Physical		
Weight	12.25 kg (4U)	
Dimensions	17.6 cm height x 48.26 cm width x 32.8 cm depth	
Input & Output		
Analog Voltage Inputs	Nominal voltage	Vn = 69 Vrms
2 sets of 3-phase voltage inputs (6 voltage channels)	Continuous rating over voltage Maximum over-scale thermal rating Burden	2x Vn = 138 Vrms 3x Vn = 207 Vrms for 10 seconds <0.15 VA @ 69 Vrms
Analog Current Inputs	Nominal current	In = 5 or 1 Arms
4 sets of 3-phase current inputs	Full scale/continuous Maximum full-scale rating Thermal Rating Burden	3x In = 15 or 3 Arms 40x In = 200 Arms or 40 Arms symmetrical 400 Arms for 1 second <0.25 VA @ 5 Arms

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Item	Quantity/Specs	Notes
Input & Output		
External Inputs (digital)	38 inputs	Optional 48/125/250 Vdc nominal, externally wetted
Output Contacts	5 programmable outputs and 1 cross trigger contact, 1 recorder inoperative output	Externally wetted Make: 30 A as per IEEE C37.90 Carry: 8 A Break: 0.9 A @ 125 Vdc 0.35 A @ 250 Vdc
Interface & Communication		
Front Panel Indicators	6 LEDs	Recorder Functional, IRIG-B Functional, Recorder Triggered, Records Stored, Test Mode, Alarm
Front User Interfaces	USB port and 100BASE-T Ethernet port	
Rear User Interfaces	LAN Port 1 : 100BASE – copper Two Serial RS-232 ports to 115 kbd	Copper: RJ-45, 100BASE-T Com port can support an external modem
Internal Modem	38.4 Kbps, V.32 bis	Optional feature
SCADA Interface	DNP3 or Modbus	Ethernet: DNP3 RS: 232: DNP3 or Modbus
Configurable Alarms	5 contacts per unit	Normally open
Cross-Trigger	1 contact per unit	Normally open
Time Sync	IRIG-B, BNC connector/unit	Modulated or un-modulated auto-detect
Self Checking/Recorder Inoperative	1 contact	Normally closed
Environmental		
Ambient Temperature Range	-40°C to 85°C for 16 hours -40°C to 70°C continuous	IEC 60068-2-1, 2
Humidity	Up to 95% without condensation	IEC 60068-2-30
Insulation Test (Hi-Pot)	Power supply, analog inputs, external inputs, output contacts at 2.0 kV rms, 50/60 Hz, 1 minute	IEC 60255-5, ANSI/IEEE C37.90
Electrical Fast Transient	Tested to level 4 – 4.0 kV 2.5/5 kHz on power and I/O lines	IEEE C37.90.1: 4kV / IEC 60255-22-4 Class 3 / IEC 61000-4-4: Level 4
Oscillatory Transient	Test level = 2.5 kV	IEEE C37.90.1: 2.5 kV / IEC 60255-22-1: Level 3 / IEC 61000-4-12): Level 3
RFI Susceptibility	10 V/m modulated, 35 V/unmodulated	IEEE C37.90.2:35 V/m / (IEC 60255-22-3/ IEC61000-4-3): Level 3
Vibration, Shock and Bump	5 g and 15 g	(IEC 60255-21-1,2 / IEC60068 2-6, 27): Class 1
Conducted RF Immunity		(IEC 60255-22-6 / IEC 61000-4-6): Level 3
Voltage Interruptions	200 ms interrupt	IEC 60255-11 / IEC 61000-4-11

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The specifications and product information contained in this document are subject to change without notice.
In case of inconsistencies between documents, the version at www.erlphase.com will be considered correct. (D02769R12)

