

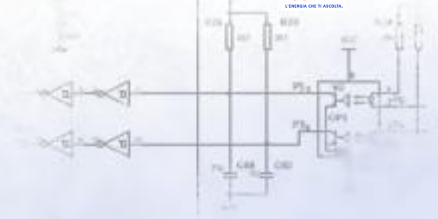


## Fault Recorder

FR947-M

# PowerProbe

ENEL\* device certified 



## PowerProbe On-line

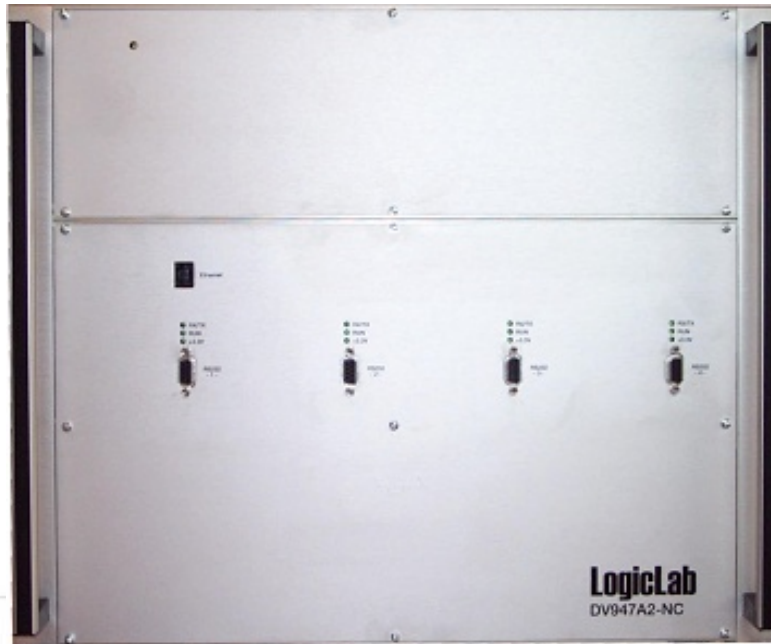
Contact us! We will provide the communication SW and, through ADSL connection, you can connect to our devices, see the signal waveforms in real-time, download recordings, configure the devices as if it was in front of you. Our devices are always on-line giving you a chance to enjoy a unique experience that no one else is able to assure.



# Fault recorder FR947-M PowerProbe

## High Performance fault and events recorder

- High performance fault recorder
- Serial RS232 – RS485 and Ethernet 10/100 BASE-TX
- Three RS232 for custom operation on client demand
- Isolated communication ports
- Multiprocessor Systems with Real Time operating system RTEMS based
- Self Diagnostic
- Setup and RealTime visualization software
- Recordings and events analysis software
- Multi-trigger
- 32 analog inputs
- Resolution: 16 bit *noise-free* (SNR 92 dB)
- Wide Band: 3.5 KHz
- 128 digital inputs (events)
- 2 Alarms Relays
- Single channel isolation
- 32 MByte Flash memory
- 128 MByte DRAM
- Up to 250s of total recording time
- 32 bit Multi processor
- GPS time synchronization
- Event tag with 1 ms resolution



### Foreword

FR947-M PowerProbe born with the name of DV947A2-NC to meet digital fault recorder ENEL specification. LogicLab develops a high-performance device, achieving a fault recorder without comparisons with the others ones on the market.

With up to 32 analog inputs (voltage and current) noise-free and 128 digital inputs provides great potential with high levels of precision and accuracy. Each channel (analog or digital) is isolated from all other channels, to power supply and ground.

The device is intended for power distribution medium and high voltage substations, and is used for records currents, voltages and digitals following the occurrence of a trigger condition. This condition can be set as desired both the analog input and digital inputs. The digital fault recorder PowerProbe uses the GPS signal to time synchronization and events timestamp, this feature provides a time value with the resolution of ms and a us accuracy. The GPS receiver is integrated into the device and the fault recorder is equipped with external antenna. Other synchronization source, as NTP server or IRIG-B, can be required.

Equipped with an ethernet 10/100 BASE-TX (100 BASE-FX on demand) and RS232 connection, the user, via a common PC, can run a fully parameterization, remote control over VPN network, and records downloading from remotely. The automatic download of recordings can also extend the device capability to those available on mass storage device on the computer. FR947-M is equipped with a flash memory that can record up to 250 seconds.

FR947-M PowerProbe is delivered with two user-friendly software. SpyDV947 that allows a complete management of the device by providing realtime tools, records management tool, parameterization tool; LogOscillo that incorporates a complete set of tools for a effective, powerful and precise record analysis.



# Fault recorder FR947-M PowerProbe

Analog and digital acquisition unprecedented

## Analog inputs

PowerProbe is equipped with 32 analog inputs, typically configured as 24 current inputs and 8 voltage channels (different configurations are available on customer request).

Each channel allows the measurement of a wide range of values in band pass (-3 dB) DC ÷ 3.5 KHz and the architecture of the system ensure flat band ( $\pm 0005$  dB) between DC ÷ 3.25KHz with an attenuation for frequencies greater than 3.5 KHz exceeding 100 dB. For all analog inputs, the sampling frequency is 7.2KHz.

Each analog inputs is converted to obtain a resolution of 16 bits without noise (noise-free), the only visible noise is quantization. This noise, amounting to a bit ( $\pm \frac{1}{2}$  LSB), is inherently present in any analog-digital conversion.

For the current inputs is possible to measure  $150A_{rms}$  for one second without loss of accuracy and up to  $40A_{rms}$  permanently with a resolution (worst case) that is  $4.6 mA_{rms}$ .

For the voltage inputs is possible to measure up to  $700V_{rms}$  permanently with a resolution, in the worst case, that is  $21mV_{rms}$ . With this fault recorder, it is possible to obtain excellent values of signal-noise ratio up to 92dB regardless of the used full-scale range.

The user is able to set different full-scale range to obtain a better precision on signs of small amplitude, both for the voltage channel than for the current one. This can be performed through a software command that setup the system in accordance with the needs of the user. Each change of full-scale range is reversible and carried out at any time.

The use of purely resistive full-scale range also ensures signals without delay, phase error and distortion.

Evaluate the waveform of real acquisition, reported in the following paragraph "examples of analog capture".

Each channel is finally isolated from all other inputs, to the power supply and ground (3000V DC).

## Digital inputs

The fault recorder FR947-M is equipped with 128 digital inputs that allow you to record events, alarms and commutations of signals with voltage from 18V to 150V.

PowerProbe perform a scan of every digital input with a frequency of 1KHz.

Each channel is finally isolated from all other inputs, to the power supply and ground (3000V DC).

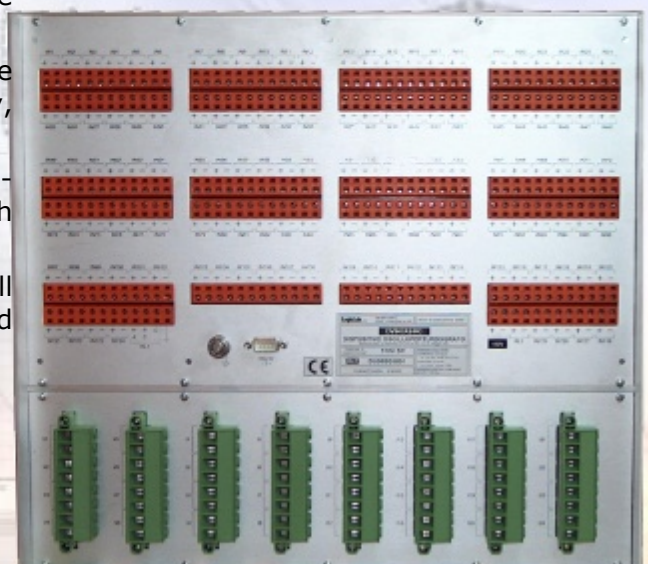
## Recordings

The recordings are triggered by a condition that can be a threshold, on an analog input (maximum, minimum, rate) or transition on a digital input (on falling edge, on rising edge, on rising and falling edge).

Each record consists of three "times" of varying lengths and set freely by user: pre-fault time, fault time, post-fault time. The total duration of the registration of a failure may be up to 62 (1 + 60 + 1) second with possibility of extension up to 150 seconds in case of a new trigger condition during recording (user configurable).

The record of all inputs, analog and digital, are stored in flash memory (or other optional mass storage device) and is dated with the precision of the GPS time signal (1  $\mu$ s).

The use of hard memory (Flash EPROM) preserves the memory of recordings even in conditions of power supply fault.



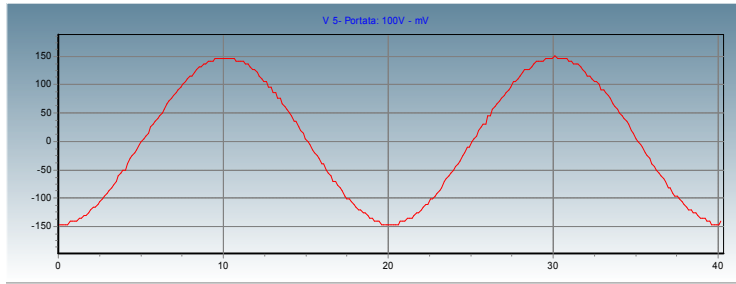
# LOGICLAB



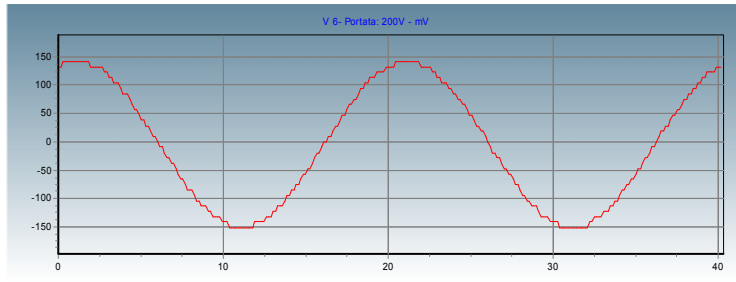
# Fault recorder FR947-M PowerProbe

## High accuracy noise-free analog inputs

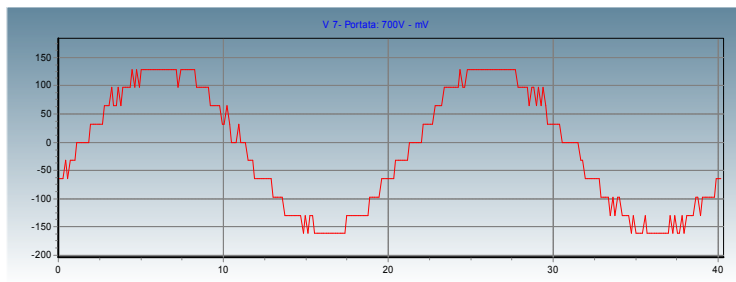
### Esempi di acquisizione analogica



Here on the left, it shows a voltage sinusoidal signal with amplitude  $100\text{mV}_{\text{rms}}$  ( $282\text{mV}_{\text{pp}}$ ) read through a channel of tension with full-scale of  $100\text{V}_{\text{rms}}$  ( $282\text{V}_{\text{pp}}$ )



Here on the left, it shows a voltage sinusoidal signal with amplitude  $100\text{mV}_{\text{rms}}$  ( $282\text{mV}_{\text{pp}}$ ) read through a channel of tension with full-scale of  $200\text{V}_{\text{rms}}$  ( $564\text{V}_{\text{pp}}$ )

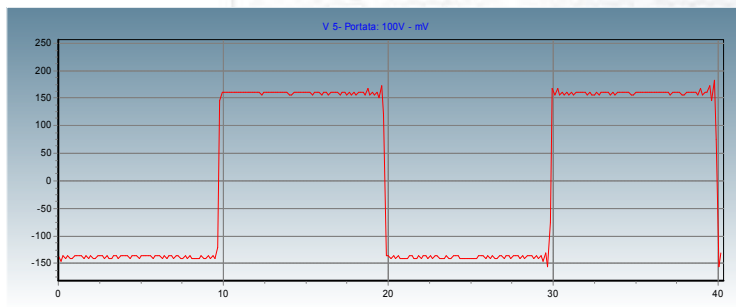


Here on the left, it shows a voltage sinusoidal signal with amplitude  $100\text{mV}_{\text{rms}}$  ( $282\text{mV}_{\text{pp}}$ ) read through a channel of tension with full-scale of  $700\text{V}_{\text{rms}}$  ( $1974\text{V}_{\text{pp}}$ )

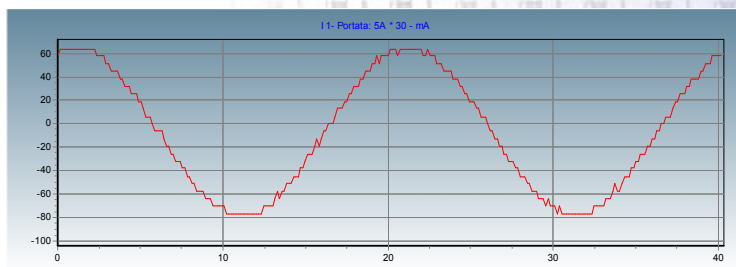
Here you can see that the channel is noise-free: the only noise is quantization ( $\pm \frac{1}{2}$  LSB), intrinsic in analog to digital conversions.

$$\text{LSB} = 1974\text{V}/2^{16} = 30\text{mV}$$

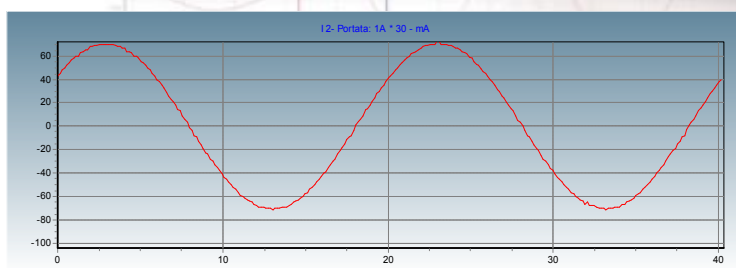
$$\text{Noise} = \pm 15\text{mV}$$



Here on the left, it shows a square wave voltage signal with amplitude  $100\text{mV}_{\text{rms}}$  ( $282\text{mV}_{\text{pp}}$ ) read through a channel of tension with full-scale of  $100\text{V}_{\text{rms}}$  ( $282\text{V}_{\text{pp}}$ )



Here on the left, it shows a current sinusoidal signal with amplitude  $50\text{mA}_{\text{rms}}$  ( $28.2\text{mA}_{\text{pp}}$ ) read through a channel of tension with full-scale of  $150\text{A}_{\text{rms}}$  ( $I_{\text{MAX}}=424\text{A}_{\text{pp}}$ )



Here on the left, it shows a current sinusoidal signal with amplitude  $50\text{mA}_{\text{rms}}$  ( $28.2\text{mA}_{\text{pp}}$ ) read through a channel of tension with full-scale of  $30\text{A}_{\text{rms}}$  ( $I_{\text{MAX}}=84\text{A}_{\text{pp}}$ )



# Fault recorder FR947-M PowerProbe

## SpyDV947: Local and remote management for PowerProbe

### SpyDV947

The LogicLab software SpyDV947, usable on a common PC, is provided with the FR947-M PowerProbe and allows the user to perform a setup and analysis functions.

- Communication setting;
- Analog full-scale range setup;
- Editing inputs (labeling);
- Parameterization;
- RealTime visualization of digital inputs;
- RealTime visualization of analog waveform;
- RealTime spectrum analysis of analog input;
- RealTime RMS measures;
- Self diagnostic;
- Recordings management;
- Manual recordings download;
- Scheduler for automatic download;
- Firmware upload.

The communication settings allow you to choose between a RS232 communication or a 10/100 Ethernet communication (EDP or TCP/IP).

The analog full-scale setup and editing inputs allow you to customize the device, setting the full-scale range for best acquisition, assigning a label to each channel for easy identification.

The parameterization of FR947-M PowerProbe allow you set times and trigger for the recordings.



All parameterization functions can be performed *off-line* and then uploaded using any communication mean.

The window that show digital inputs provides useful information during maintenance while the window that show the analog inputs allow you to use the FR947-M PowerProbe as an oscilloscope; spectrum analysis in RealTime provide the first powerful tools of analysis .

The self diagnostic function allows you to keep under control the state and the healthy of the device.

Recordings can be manually downloaded, selecting only those who want to download or all of those present in memory, or setting the scheduler: the expiration of a set time start automatic download and all new recordings from the last download are saved on your hard disk.

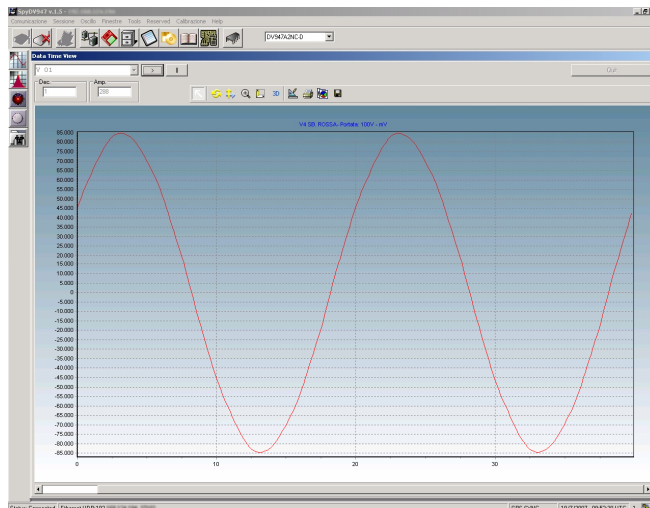
Finally, it is possible to upload firmware for any updates.

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Stato anomalie generale	ASSENTE	
Anomalia programma	ASSENTE	
Anomalia data-base allo startup	ASSENTE	
Anomalia data-base run-time	ASSENTE	
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Anomalia allo startup	ASSENTE	
Anomalia run-time	ASSENTE	
Scheda CPU slave 2 (adr 13)		
Anomalia allo startup	ASSENTE	
Anomalia run-time	ASSENTE	
Scheda CPU slave 3 (adr 14)		
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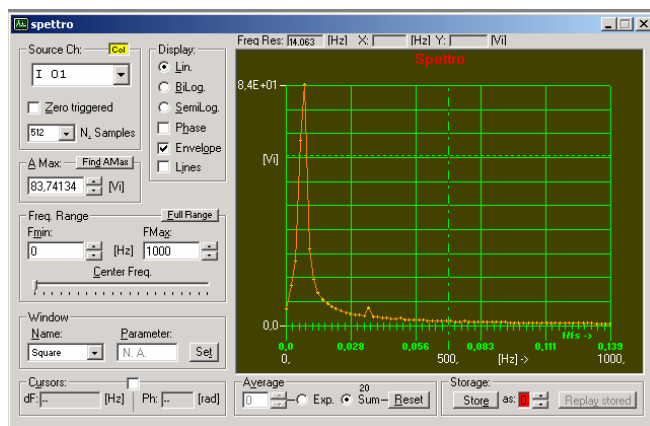


# Fault recorder FR947-M PowerProbe

## Exploring SpyDV947 in pictures



Here in the left, RealTime window for voltage V4 visualization through a remote connection access to PowerProbe. This valuable tool allows you to show the input signals at any time.



You can run the RealTime spectrum analysis of an analog signal. With this tool, with many features, you can assess the presence of harmonics in real time.

Measure	Value	Unit	Measure	Value	Unit	Measure	Value	Unit	Measure	Value	Unit
I1 (A)	0.531	A	I9 (A)	0.495	A	I17 (A)	0.000	A	V1 (V)	59.980	V
I2 (A)	0.598	A	I10 (A)	0.500	A	I18 (A)	0.000	A	V2 (V)	59.656	V
I3 (A)	0.000	A	I11 (A)	0.505	A	I19 (A)	0.000	A	V3 (V)	59.980	V
I4 (A)	0.000	A	I12 (A)	0.000	A	I20 (A)	0.000	A	V4 (V)	0.264	V
I5 (A)	0.000	A	I13 (A)	0.314	A	I21 (A)	0.231	A	V5 (V)	58.592	V
I6 (A)	0.000	A	I14 (A)	0.320	A	I22 (A)	0.208	A	V6 (V)	59.024	V
I7 (A)	0.000	A	I15 (A)	0.000	A	I23 (A)	0.238	A	V7 (V)	58.608	V
I8 (A)	0.000	A	I16 (A)	0.000	A	I24 (A)	0.000	A	V8 (V)	0.500	V

The RealTime measures window provides an indispensable tool for monitoring the substation

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# Fault recorder FR947-M PowerProbe

## LogOscillo: the analysis software powerfull and easy to use

### LogOscillo

The LogicLab software LogOscillo, usable on a common PC, is provided with the FR947-M and allows the user to view, to printing and to analyze recordings previously downloaded with SpyDV947.

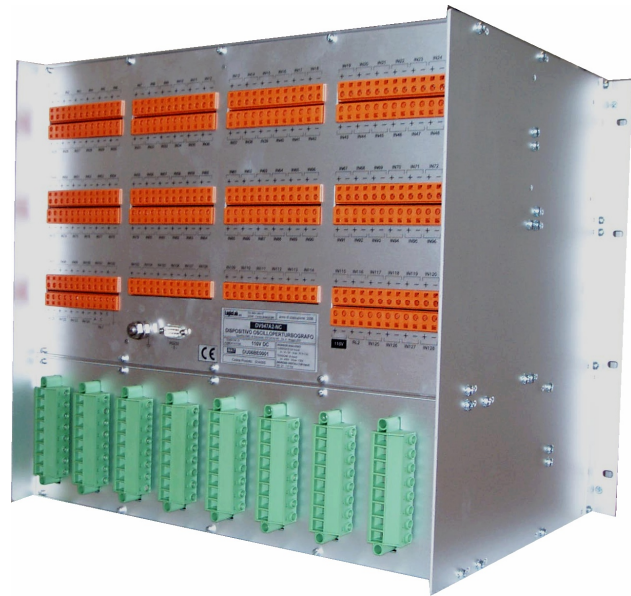
Each recording collects all the digital channels and all the analog channels; the user can choose which signal must be showed and the color of the related waveform.

Some screens filter make easy and immediate the waveform selection; user can choose only channels that meet certain conditions (signals above a threshold, only current inputs, only voltage inputs, etc.).

Each analog signal you can run a variety of operations that provide a deeper analysis of the waveform. Using the right mouse button can be obtained quickly rms value, the true rms value, thd and spectral analysis. You can see the evolution of rms value and true rms as a waveform overlapped to the signal selected.

You are helped by simple analysis tools, including:

- Vertical and horizontal zoom;
- Waveform overlapping;
- Time cursors;
- Amplitude and time value in mouse and cursor position;
- Decimation;
- Waveform printing;

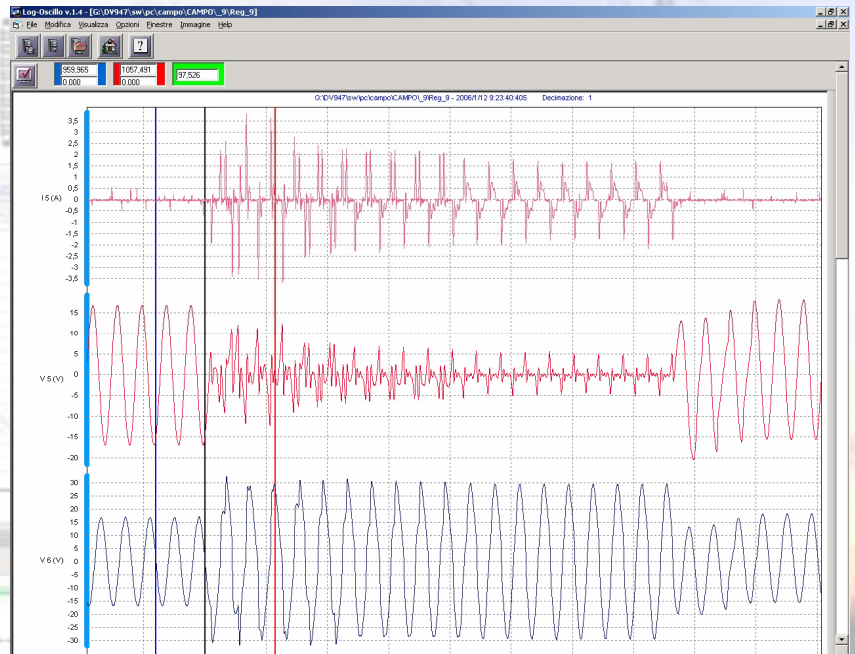
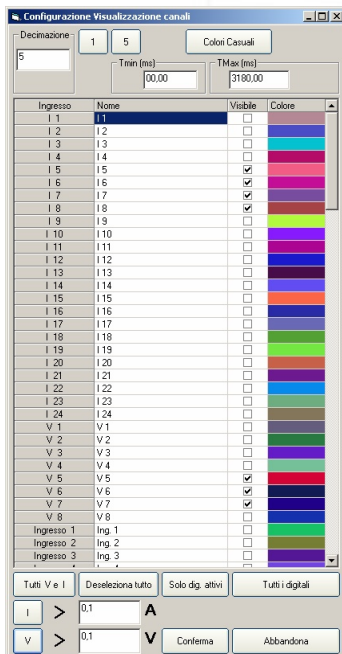


LogOscillo can perform the analysis of the phase between the different signals through vector graphics, and you can also view the symmetrical components.

LogOscillo also help you in preparing documents and reports through the export of recordings as images in the format that you prefer, or as a pdf document.

Comtrade Export function allows you to export recordings in the standard Comtrade both in ASCII format and in BINARY.

All software is supplied with online manual and run on Windows® NT, 2000, XP.

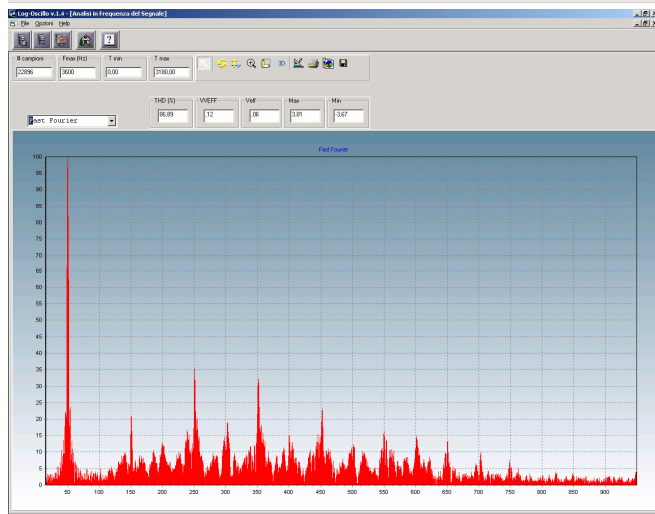


# Fault recorder FR947-M PowerProbe

Exploring LogOscillo in pictures



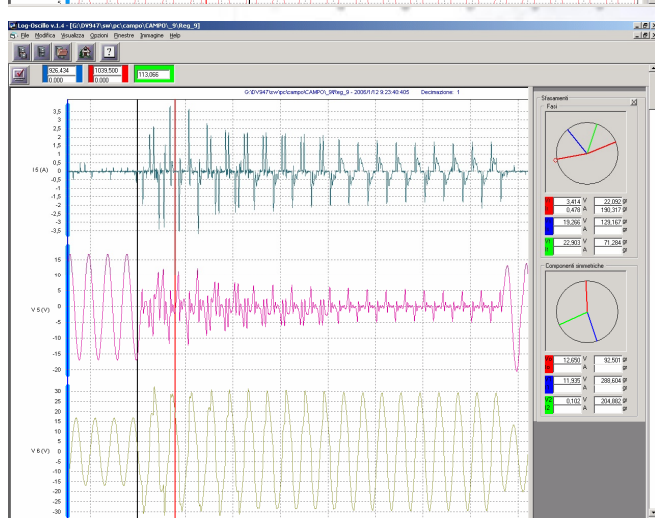
Here on the left, the rms waveform is overlapped on a voltage signal. With the two cursors, the user can read the amplitude value in a precise time position.



You can perform spectral analysis of a signal, even if only a small portion for a deeper analysis. The value of THD and rms are presented in a box and provide information about the "quality" of the signal.



Each signal, analog or digital, can be moved, allowing the overlap with any other signal, simply by clicking and dragging the mouse. Alarm trip analysis in fault condition will be so



The vector diagrams of the phase and symmetrical components allow an accurate analysis in fault condition. The phase is evaluated on time and you can evaluate the evolution simply by moving the cursor

# LogicLab



# Fault recorder FR947-M PowerProbe

All local and remote connections that you need

## Communication

FR947-M PowerProbe is designed to interface with modern communication technologies and is designed to meet all the requirements for monitoring and remote management.

With a serial port on the front, an ethernet port and a serial port used for communication backside, PowerProbe can connect locally or remotely through multiple solutions. The communication ports, both serial and ethernet, are also isolated (Ethernet: 1500Vrms - RS232: 2500Vrms), ideal for applications with high safety standards.

Through the serial port backside is possible to connect an analog modem or GSM modem, which allows connection to a remote simply by entering the phone number.

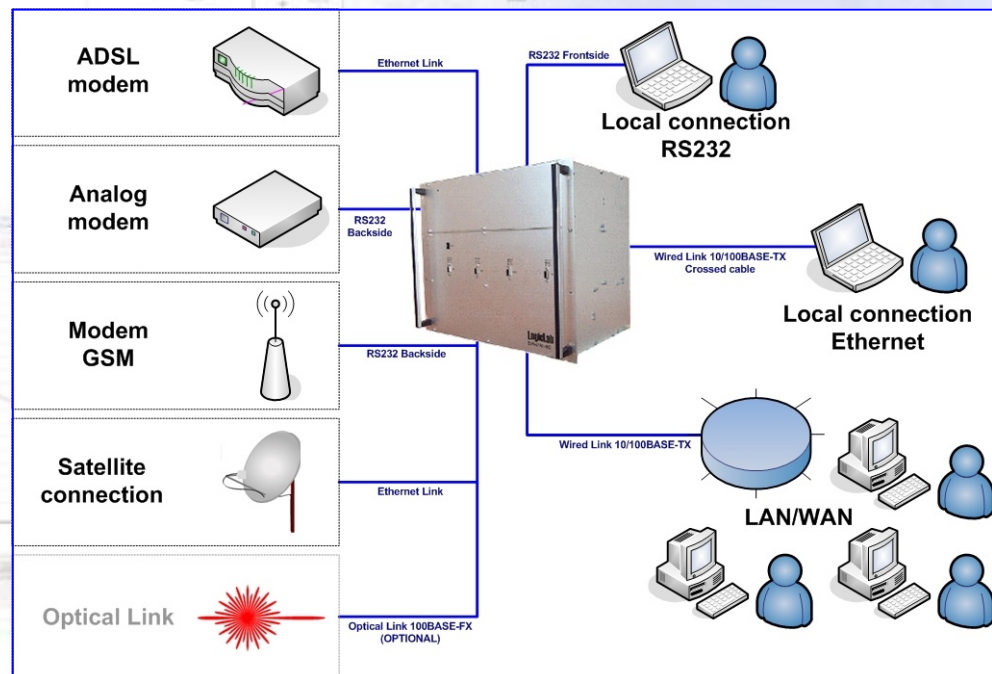
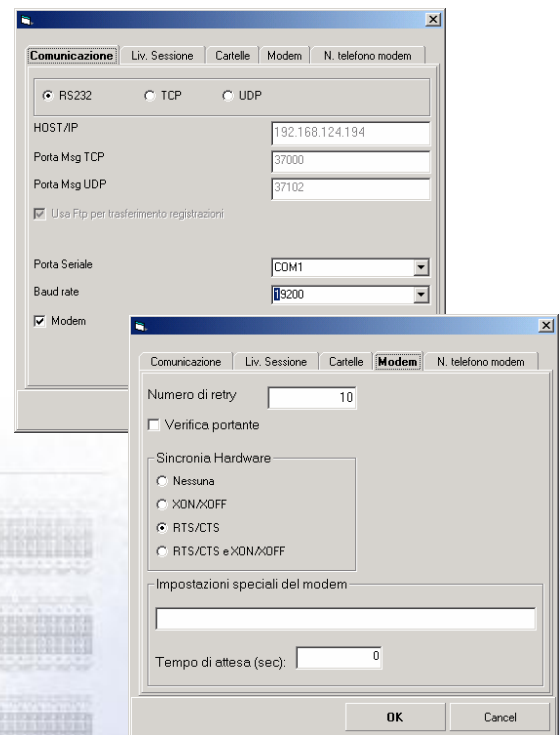
The Ethernet port allows to take advantage of all modern broadband connections. PowerProbe can be configured as a knot of a LAN/WAN network using TCP-IP or UDP transmission protocols. Once assigned the IP address and networked, any PC on the LAN can access the device using SpyDV947.

The Ethernet port can be used to connect an ADSL modem or a satellite modem where the land connection is a problem. Through these two communication means, you can use a remote connection quickly. It is also possible to create a VPN (Virtual Private Network). With the VPN remote device will be seen as if it were connected to the network.

For the operator in the control center will be like having PowerProbe on his desk and work remotely as if it were local.

The connection allows you to remotely make the best without any limitation from all RealTime analysis tools that are available on SpyDV947. In addition, with the automatic download feature, you can use a common remote PC for the functions of concentration and storage.

By any communication means, the connection with PowerProbe is always a direct and automatic with no need for intermediate devices such as PCs or industrial units.



# Fault recorder FR947-M PowerProbe

Endless customizations

## Customizations and options

FR947-M PowerProbe was designed with a modular architecture that allows you to configure the equipment according to customer requirements.

In particular, can be changed the number of:

### Current inputs

you can configure any 4 to 32 channels in 4 channel modules.

### Voltage inputs

you can configure any 4 to 32 channels in 4 channel modules.

*In any case, the voltage and current inputs together can not exceed 32.*

### Digital inputs

you can configure any 4 to 128 inputs in 8 inputs modules (24VDC,110VDC, 220AC).

Also available are the following optional boards:

### Ethernet board

This board add to the 10/100 TX Ethernet port, always present on the device, 2 auxiliary Ethernet ports: a fiber optic link 100 BASE-FX (SC or ST connector) and a 10/100 BASE-TX.

### Serial board

This board add to the two serial ports available on the device other serial ports with fiber optic output or RS232 (DB9) standard or in standard 485 (D + D-).

### Current loop transmitter

Each board has two isolated channels with current output of -20 to 20mA or 4 to 20mA software configurable.

### Synchronization board

This board is able to receive a synchronization signal (1PPS) from an external source and then synchronize the fault recorder device. The sync signal can be received on a BNC connector or fiber optic link. Should be noted that this card makes it virtually unlimited opportunities for LogicLab fault recorder expansion, as it allows you to use a device to synchronize another one, with an accuracy of the order of microseconds, making different devices in one with unlimited configuration of analog and digital inputs.

### Relays board

This board allows you to add eight relays to the two normally present in basic configuration thus expanding the capabilities of alarm output.

### MMI board

This board is equipped with an LCD 4 lines display, 16-LED for alarm lights and a membrane keyboard. The adoption of this board allows you to monitor the status of the device and to configure the operation parameters.

### Mechanical

The device FR947-M is available in different settings.

The full equipped is provided in a rack 19" 9HE, while the intermediate configurations are supplied in 19" rack 3HE or 6HE.

# LogicLab



# Fault recorder FR947-M PowerProbe

Power, accuracy and reliability at an affordable price

## Technical data — PowerProbe full equipped

### Power supply

Power supply voltage: 110V DC  $\pm$  20%  
 Medium power: 40W  
 Voltage dips and short interruptions  
   Insensitive to 100% of Vaux for 50 ms (min)  
   Insensitive to 50% of Vaux for 100ms (min)

### Dimensions

Height / Width / Depth: 9U / 19" / 31cm

### Current analog input *noise-free isolated input*

Dielectric strength 3000V DC (1 min)  
 Sample rate: 7,2 KHz  
 Bandwidth (-3 dB): DC (0 Hz)  $\div$  3,5 KHz  
 Flat bandwidth( $\pm$ 0,005 dB): DC (0 Hz)  $\div$  3,25 KHz  
 Stop band attenuation: >100 dB  
 Rated current ( $I_n$ ): 1A<sub>rms</sub> / 5A<sub>rms</sub> (software selected)  
   Full-scale range: 30· $I_n$   
   Accuracy guaranteed range: 0,01· $I_n$   $\div$  30· $I_n$   
 Rated current setup by software command  
 Accuracy: <0,1%  $\pm$  1 mA  
 Permanent overload: 40A  
 Maximum overload: 150A (1 second)  
 Input impedance: 1,5 mohm (purely resistive)  
 Power dissipation (1A): 1,5 mVA @  $I_n$   
 Power dissipation (5A): 37,5 mVA @  $I_n$   
 Resolution (ENOB): 16 bit *noise-free*  
 SNR (Signal to noise ratio): 92 dB  
 Cross-over: < -92 dB

### Voltage analog input *noise-free isolated input*

Dielectric strength 3000V DC (1 min)  
 Sample rate: 7,2 KHz  
 Bandwidth (-3 dB): DC (0 Hz)  $\div$  3,5 KHz  
 Flat bandwidth( $\pm$ 0,005 dB): DC (0 Hz)  $\div$  3,25 KHz  
 Stop band attenuation: >100 dB  
 Full-scale range: 100V<sub>rms</sub> / 200V<sub>rms</sub> / 700V<sub>rms</sub> (software selected)  
 Accuracy guaranteed range:  
 14mV<sub>rms</sub>  $\div$  100V<sub>rms</sub> @  $P_n=100V_{rms}$   
 28mV<sub>rms</sub>  $\div$  200V<sub>rms</sub> @  $P_n=200V_{rms}$   
 0,1V<sub>rms</sub>  $\div$  700V<sub>rms</sub> @  $P_n=700V_{rms}$   
 Rated current setup by software command  
 Accuracy: <0,1%  $\pm$  5 mV  
 Input impedance: 330 kohm (puramente resistiva)  
 Power dissipation: 480 mVA @ 400V  
 Resolution (ENOB): 16 bit *noise-free*  
 SNR (Signal to noise ratio): 92 dB  
 Cross-over: -86 dB

### Digital input 128 isolated input

Dielectric strength 3000V DC (1 min)  
 Threshold (min): 18V  
 Maximum voltage (max): 140V  
 Time resolution: 1 ms

### Communication

Ethernet 10/100 BASE-TX  
 Configurable as knot of a net LAN/WAN  
 1 RS232 front side (19.200 baud fixed)  
 1 RS232 back side (up to 115.200 baud)  
 Remote connection with analog modem (not included)  
 3 RS232 for custom application  
 Isolated communication port  
   (Ethernet: 1500Vrms – Serials: 2500 Vrms)  
 GPS satellite connection

### Signal output

Out of order relay  
 Recording in progress relay

### Elaboration

Multiprocessor architecture with 32 bit CPUs  
 Real Time Operation System RTEMS  
 32 MByte Flash memory  
 128 Mbyte DRAM  
 RTC with GPS synchronization

### Fault recording

Flash memory saving  
 Maximum recording time: 250 s  
 Pre-trigger time: 50 ms  $\div$  1 s  
 Fault time: 100 ms  $\div$  60 s  
 Post fault time: 100 ms  $\div$  1 s  
 Record timeout (max): 150 s  
 Trigger on analog threshold (max, min, rate)  
 Trigger on digital edge (falling, rising, both)  
 Events timestamp  
   Accuracy: 1  $\mu$ s (1pps GPS)  
   Resolution: 1ms

### Customizing

Backside RS232 configurable as RS485  
 Different full-scales on analog input on client demand  
 24 bit resolution available on analog input  
 Different configuration of current/voltage analog input  
   Available options:  
   32V, 28V+4I, 24V+8I, 20V+12I, 16V+16I, 12V+20I, 8V+24I, 4V+28I, 32I  
   Under-equipped configuration for cost-saving solution  
 Integrated WebServer for parameterization with Internet Browser  
 FTPServer for record download  
 Power Supply with different input voltage  
 Different range for recording time  
 Custom solution on 3 front RS232  
 AC digital input  
 100BASE-FX and Serial optical link  
 IRIG-B synchronization  
 -20mA/20mA current output with configurable range  
 Optional relay outputs (alarm)  
 HMI (Human-Machine Interface) with display and keypad

### Standards and specifications compliance

IEC 61000 – 4 – 2 (Level 3)  
 IEC 61000 – 4 – 3 (Level 3)  
 IEC 61000 – 4 – 4 (Level 3)  
 IEC 61000 – 4 – 5 (Level 4)  
 IEC 61000 – 4 – 6 (Level 3)  
 IEC 61000 – 4 – 8 (Level 5)  
 IEC 61000 – 4 – 10 (Level 3)  
 IEC 61000 – 4 – 12 (Level 3)  
 IEC 61000 – 4 – 16 (Level 4)  
 IEC 61000 – 4 – 17 (Level 3)  
 IEC 61000 – 4 – 29 (Level 3)  
 ENEL DV1047A2-NC  
 ENEL REMC01  
 ENEL REMC02  
 ENEL RMCE01  
 ENEL RCL101  
 CEI 45-5  
 CEI 70-1 IP30 (front) IP20 (case)  
 COMTRADE standard IEEE Std C37.111-1991

### Parameterization and device management software

#### SpyDV947

Communication interface selection (RS232, UDP, TCP, modem setup)  
 Software access configuration and folder management  
 Analog input setup - fullscales and triggers (max, min, rate)  
 Digital input trigger setup (rising edge, falling edge, any edge)  
 Device, Substation, Analog and digital input labelling  
 Full TCP/IP Ethernet configuration parameters  
 Backside RS232 throughput configuration  
 Fault recording monitor (enabling, recording status, memory available)  
 Recording time setup (Pre-trigger time, fault time, post-fault time)  
 Memory configuration setup (circular buffer or full-fill buffer)  
 Recording extension setup (disable, on fault time, on post-fault time)  
 Self-diagnostic device state  
 Reset and trigger command from PC  
 Realtime viewing tools (analog waveform, spectrum analysis, rms measure, digital input status)  
 Automatic download scheduler  
 Firmware update wizard  
 Recording management (Id, Date and time, Length, Trigger condition with user label)  
 Easy-To-Use Recording management (single, selected, all recordings)  
 Recordings saved in directory with substation label, date and time, recording id  
 Device parameterization file management tools (off-line editing, default file, download file)

### Recordings analysis software

#### LogOscillo

Waveform selection wizard with colours assignment  
 Automatic selection filters for analog and digital inputs  
 Decimation value for waveform preview  
 Dual time cursor  
 Time and amplitude value in time cursor position  
 Cursor time difference  
 Time and amplitude value in mouse cursor position  
 Windows zoom tool  
 Vertical zoom tool  
 Drag-and-Drop capability for waveform overlapping  
 Signal processing and rms waveform visualization  
 Signal processing and true rms waveform visualization  
 Signal processing and spectrum visualization  
 Spectrum analysis with THD  
 Waveform export tool for image (JPG, BMP, MetaFile, PCX, PostScript, SVG)  
 Waveform export tool for Acrobat Reader (pdf)  
 Samples waveform export tool for Excel  
 ComTrade waveform export (ASCII/Binary, rel. 1.0 or 2.0)  
 Waveform print management

# LOGICLAB





FR947-M

Fault recorder

# PowerProbe

*Noise-free power*

<http://www.logiclab.it/en/DV947.htm>

*Contact us for more information.  
The LogicLab staff will be happy to assist you.*

*the images in the document are from software in italian version,  
english version have the same features*

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