



FR100

**Fault Recorder
Fault Analysis**

Fault Recorder

Introduction



Weis is a specialist company with over 40 years of experience in the commissioning, testing & maintenance of switchgear and power network fault monitoring within the Power Utility Industry.

The Fault Recorder (FR100) is an essential substation preventative maintenance tool and aid for power utilities with ever increasing demands for more reliable low cost energy and on-time maintenance.

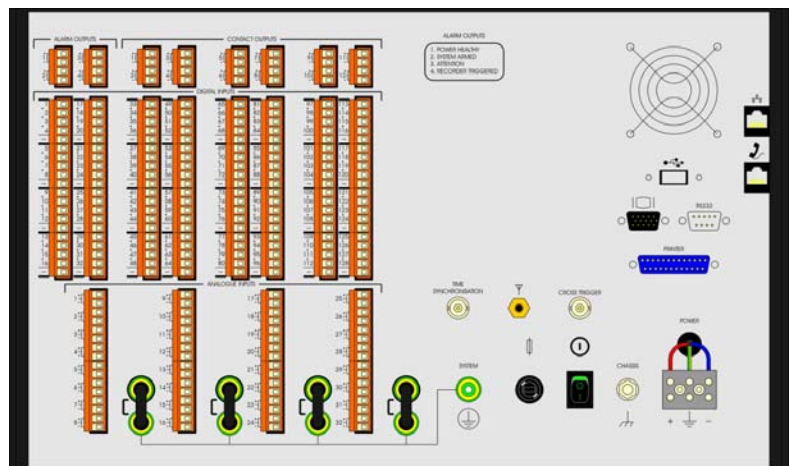
The high speed, high resolution recording and flexible triggering modes make the Weis Fault Recorder ideal for capturing power network faults / disturbances. It can be used for verifying protection / breaker operation as well as monitoring power quality.

The FR100 is typically part of an integrated monitoring network with multiple Fault Recorders located within substations over a region, and a Windows™ based Master Evaluation Station normally located at the regional control centre running Weis Communication, Configuration and Analysis software. Communications between the Master Evaluation Station and the Fault

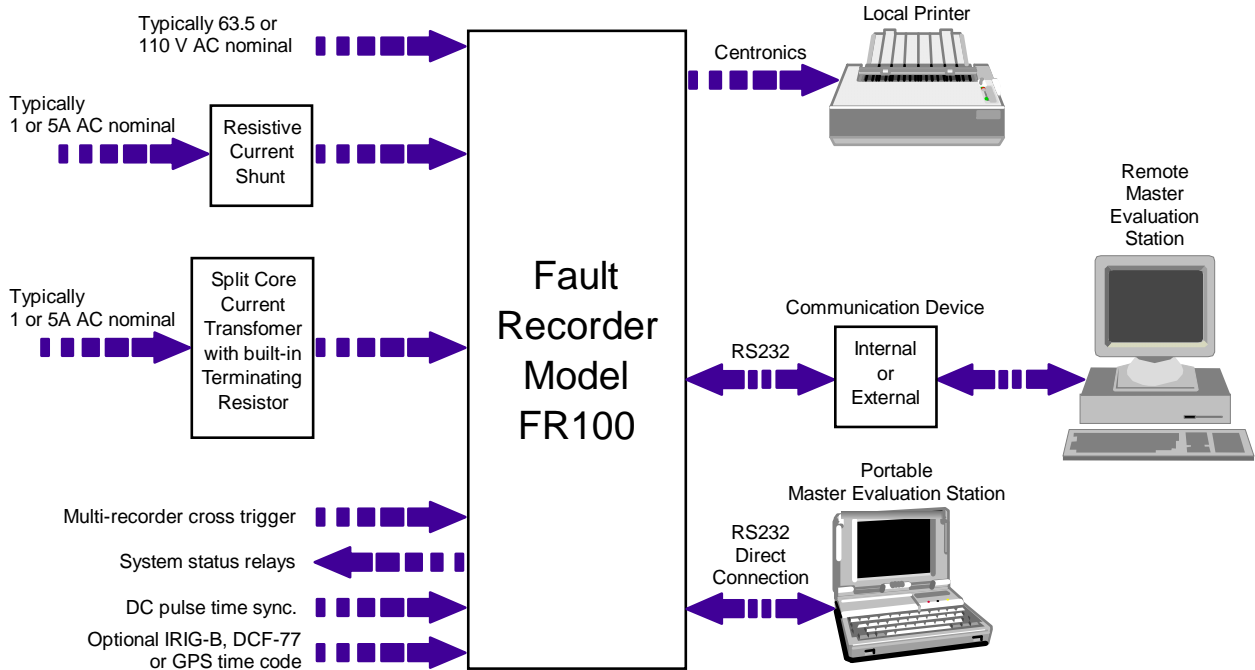
Recorders is normally by plug-in data modems using the local telephone exchange, but other networks can be supported.

Features

- ◆ 8 TO 32 ANALOGUE CHANNELS
- ◆ 16 TO 128 DIGITAL CHANNELS
- ◆ MULTI-RECORDER CROSS-TRIGGERING TO FORM LARGER SYSTEMS
- ◆ SIMULTANEOUS SAMPLING UP TO 192 SAMPLES PER CYCLE ON ALL CHANNELS
- ◆ 12-BIT A/D RESOLUTION
- ◆ FAULT RECORDER VIEWER 32-BIT SOFTWARE FOR COMMUNICATION, CONFIGURATION AND ANALYSIS
- ◆ SOFTWARE TRIGGERS AVAILABLE ON ALL CHANNELS SIMULTANEOUSLY
ANALOGUE: OVER, UNDER, RATE OF CHANGE, SINEWAVE QUALITY
DIGITAL: ON ALARM WITH RETURN TO NORMAL OPTION
- ◆ ADDITIONAL SOFTWARE ANALOGUE TRIGGERS AVAILABLE
ONE SET OF ZERO SEQUENCE & NEGATIVE SEQUENCE PER 4 CHANNELS
ONE SET OF FREQUENCY OVER, UNDER & RATE OF CHANGE PER CHASSIS
- ◆ DC PULSE OR OPTIONAL IRIG-B (TIME CODE), DCF77 (RADIO) OR GPS (SATELLITE) TIME SYNCHRONISATION
- ◆ 6U HIGH 19" RACK MOUNTING
SUITABLE FOR PORTABLE APPLICATIONS WITH OPTIONAL CARRY CASE



Architecture

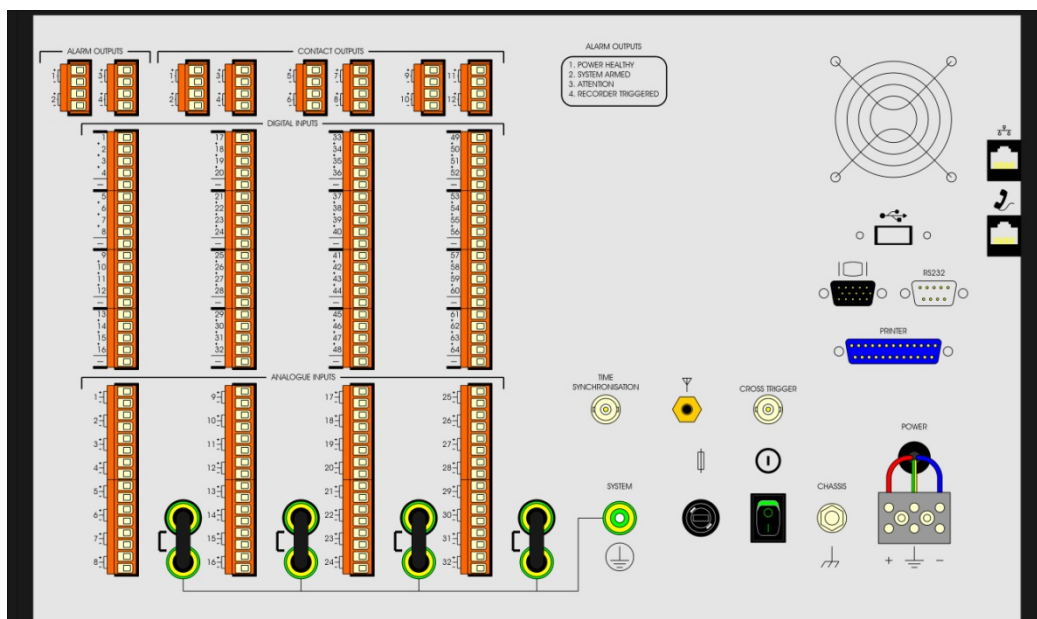


Hardware

The FR100 is supplied in a 6U rack mounting format with the option of a portable case.

Systems can be specified to have from 8 analogue & 16 digital inputs up to 32 analogue & 128 digital inputs in a single 6U chassis. Input capacity is expanded in groups of 8 analogue and 16 or 32 digital. Larger capacity systems are formed by cross-triggering multiple FR100 chassis.

All input and output channel connections are via removable blocks with screw terminals at the rear of the case. Communications, power, printer and other auxiliary connectors are also on the rear panel.



Rear Panel Connections—Chassis with 32A & 64 Digital Input Channels

Fault Recorder

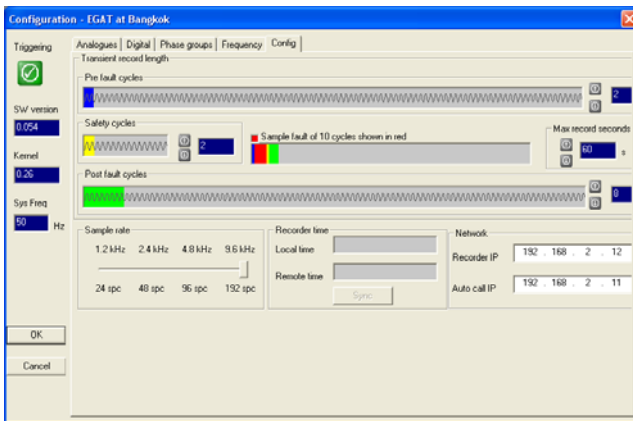
Software

Fault Recorder Viewer software is an essential 32-bit Windows™ program that provides an easy to use operator interface for configuring, displaying & analysing FR100 fault records.

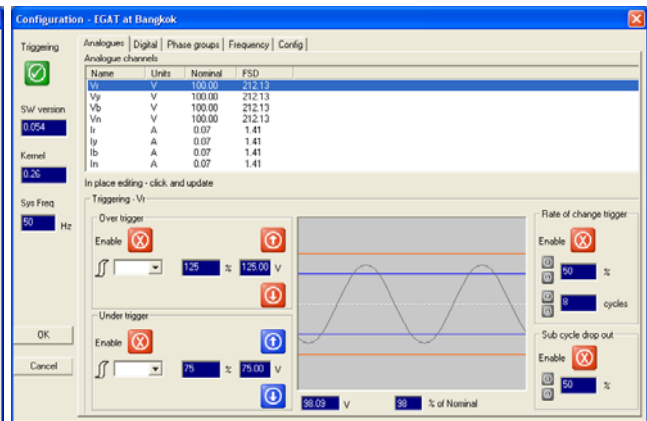
Features:-

- ◆ Communication, configuration and data retrieval
- ◆ Graphical display of captured waveforms with measurement cursors
- ◆ Storage of all fault records and fault recorder configurations
- ◆ Data analysis tools

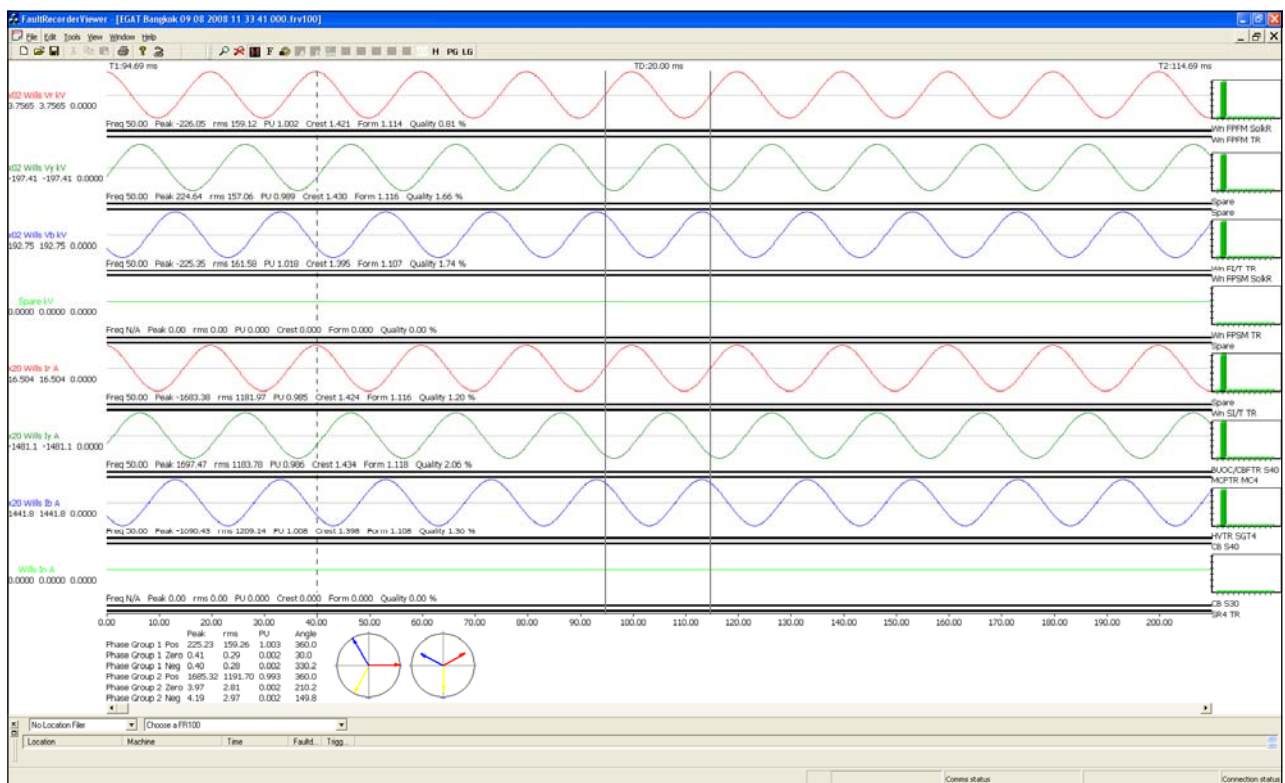
FR100 software runs on a standard IBM compatible PC with a 32-bit Windows™ operating system. This permits the transportation of test records to regular office based or portable computers.



Configuration



Analogue Triggers

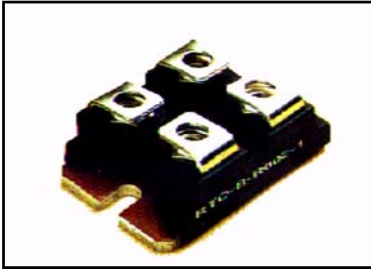


Graphical Display with Analysis Tools

Optional Items

Resistive Current Shunts

The Resistive Current Shunt is designed for permanent applications as a interface from the CT secondary wiring to a Weis **FR100** series **F**ault **R**ecorder.



The shunts compact design makes it ideal for mounting within fault recorder panels. It also offers an excellent level of overload withstand at 150A continuous and 300A pulsed.

Being resistive rather than inductive, greater levels of accuracy in terms of phase angle and magnitude are possible, particularly in applications where Distance to Fault calculations are to be made.

Ranges: Customer specified. All ranges available.

FR100 Internal Hardware

Modem.
Network interface.
IRIG-B time decoder.
DCF77 real time clock card.
GPS real time clock card.



Transportation Case

Robust purpose made transportation cases are available for the **FR100** Fault Recorder.



Panels

Wide range of enclosures.



Fault Recorder

Specifications

INPUTS

Number of Channels:	8 Analogue and 16 or 32 Digital. (per FR100) 16 Analogue and 32 or 64 Digital. 24 Analogue and 48 or 96 Digital. 32 Analogue and 64 or 128 Digital. Larger systems can be supplied by cross triggering multiple FR100 Fault Recorders. Analogue channels selectable for voltage or current measurement.
Voltage Channel:	300Vpk measurement range with 63.5 or 110V AC nominal (other ranges such as 0 to 10V DC available).
Current Channel:	2Vpk measurement range, 70.7mV AC nominal (typically 1 or 5A AC nominal via optional external resistive shunt - other ranges available).
Measurement Range:	Typically nominal AC voltage x1.9, nominal AC current x20 (other ranges available).
Analogue Bandwidth:	DC to 3kHz.
A/D Resolution:	12 bits.
Analogue Accuracy:	Better than 0.5% of measurement range.
Digital Channel:	24 - 250V DC normally open or closed wet contacts with adjustable debounce filtering.

FAULT RECORDING

Sample Rate:	Up to 192 samples per cycle - 9.6kHz on a 50Hz system, 11.52kHz on a 60Hz system.
Pre-Fault Time:	2 to 300 cycles.
Post Fault Time:	8 to 120 cycles.
Fault Time:	Recording can be extended with a programmable 'Trigger Condition Clear Window' up to maximum record length of 60s on longer fault / trigger conditions.
Synchronisation:	All inputs sampled simultaneously.
Data Storage:	Buffer memory (RAM) with auto-transfer to non-volatile mass memory device.

FAULT TRIGGERING

Analogue:	Over and Under limit violation equipped with hysteresis on each channel. Rate of Change on each channel. Zero and Negative Sequence available for each group of 4 analogue channels. Quality (based on purity of sinewave) on each channel. Over, Under and Rate of Change Frequency available per FR100.
Trigger Accuracy:	Better than 2%.
Digital:	On alarm with option for return to normal.
Multiple Recorders:	FR100 Fault Recorders can be cross triggered to form larger systems.

REAL TIME CLOCK

Range:	Time, date, leap year and day of the year with internal battery backup.
Resolution:	1ms.
Accuracy:	Better than 0.1s per day (free running internal clock).
Synchronisation:	1 pulse per second, minute or hour. IRIG-B time code (optional). GPS satellite signal (optional).

COMMUNICATIONS

Local:	RS232 direct connection to local PC.
Remote:	Modem connection to remotely located PC (optional).
Network:	Ethernet connection using TCP/IP protocol to PC (optional).

FR100

LOCAL PRINTOUT (Optional)

Connection: USB or Parallel printer port.
Compatibility: Wide range of printer types possible. Check for compatibility.

GENERAL

Visual Indication: Front panel LED's for POWER ON, ONLINE, NEW RECORDS, COMMUNICATIONS and ATTENTION (Diagnostics).
Alarm diagnostics to the optional Local Printout.

System

Configuration: All settings and functions can be accessed with a local or remotely (optional Modem or Network interface required) located PC.

Contact Outputs: Front panel pushbutton to switch the FR100 OFFLINE, ONLINE and perform a system TEST.
4 Volt-free normally open or closed system status contacts for remote indication for Power Healthy, System Armed, Recorder Triggered (auto reset) and Attention (Common Diagnostics Alarm).

OPERATING VOLTAGES

Prime Power: 100 to 350V DC, 88 to 264V AC auto-sensing.
Optional 24 or 48V DC.
Burden: <60 VA load.

ENVIRONMENTAL

Operating Temperature: -20°C to +60°C (-4°F to +140°F)
Humidity: 0 to 97% RH non-condensing.
Isolation: 2kV rms for 1 minute (channel to channel, channel to earth).
Surge Withstand Transient: To IEC 801-5. 1.2/50µS.
Common Mode: Severity level class 4.
Series Mode: Severity level class 3.
Fast Transient Burst: To IEC 801-4 level 3.
RFI Immunity: To IEC801-3 level 3. 10V/m 26-1000MHz.
Emissions: To EN50081-1: 1992.

MECHANICAL DETAILS

Enclosure: 6U steel enclosure suitable for Euro 19" wide rack mounting or free standing (tabletop).
Ventilation: Fan assisted.
Terminals: Rear access screw compression type - up to 2.5sq mm.
Weight: <15kg.



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