



130-SMHR

STRONG MOTION ACCELEROGRAPH

REF TEK® strong motion and earthquake engineering products combine the 3rd generation Broadband Seismic Recorder (REF TEK 130S) and advanced low-noise force-balance accelerometers.

The 130-SMHR Strong Motion Accelerographs provide accurate and timely data and information for seismic events, including their effects on buildings and structures by employing modern monitoring methods and technologies. Both models are made for continuous monitoring of earthquakes and other seismic events, and the recording of strong earthquake shaking at ground sites, in buildings and critical structures.

The 130-SMHR advanced communications features include TCP/IP over Ethernet and Asynchronous Serial. An LCD continuously displays state-of-health and status information.

The 130-SMHR has three channels connected to an internal triaxial accelerometer. When ordered as a six-channel unit, the three additional channels can be connected to an external sensor.

The 130-SMHR family:

- ▶ has provision for an optional internal V.90 modem for communication over standard telephone lines;
- ▶ includes a battery charger for maintaining a lead-acid battery;
- ▶ is housed in an anodized aluminum instrument case with single point mounting and 3-point leveling.

The instrument case size allows the installation of an internal battery to provide backup power for more than 48 hours. An external battery can also be used.

The 130-SMHR is available in an optional command line firmware version, which was specifically designed for structural monitoring applications. Setup and control is accomplished using the strong motion command and control program SMCC, that runs on multiple platforms. This firmware allows control of three relay closure contacts for external alarm activation and can automatically dial the optional modem for remote notification of events and alarms.

The 130-SMHR can also run the standard REF TEK 130 firmware. The standard firmware provides more options for sampling rate and triggering than the command line firmware, but does not include relay control. Setup and control is accomplished with either the iFSC Controller or a desktop computer running RTI. These interfaces allow the user to program the instrument's operating parameters and perform diagnostic functions.

The accelerometer in the 130-SMHR has a full-scale range of greater than $\pm 4g$ with a dynamic range of 155 dB from DC to 2 Hz.

Key Features

- ▶ State-of-the-Art 24-Bit ADC
- ▶ Wide Dynamic Range
- ▶ Low Noise, Force-Balance accelerometer
- ▶ Simultaneous Telemetry/Self Recording
- ▶ IP over Ethernet and Asynchronous Serial
- ▶ Embedded / Removable Mass Storage
- ▶ Low Power

Applications:

- ▶ Free Field Recording
- ▶ Structural Monitoring
- ▶ Dam Monitoring
- ▶ Building Arrays
- ▶ Telemetry Networks
- ▶ Aftershock Studies



Specifications

Full Featured Accelerograph, Model 130-SMHR (Standard)

Mechanical:

Size:	• 9.25" high x 8.0" wide x 13.25" long (23.5 cm x 20.3 cm x 33.7 cm)
Weight:	• 10.5 lbs (4.8 kg), without internal battery
Watertight Integrity:	• IP 67
Shock:	• Survives a 1 meter drop on any axis
Operating Temperature:	• -20 °C to +70 °C

Power:

Input Voltage:	• 10 to 16 VDC
Operating Power:	• 2 W (3-ch. @ 125 sps)
Peak Power:	• 3 W (DAS & GPS active, writing to CF)
Battery Charger:	• 15 V, 800 mA (internal)
Battery:	• 12 VDC, sealed lead-acid, 12 AmpHr (optional, internal)

A/D Converter:

Type:	• Δ - Σ modulation, 24-bit resolution
Channels:	• 3 or 6 channels
Input Impedance:	• Matched to accelerometer
Input Full Scale:	• Matched to accelerometer
Bit Weight:	• 1.589 μ V
Self Noise Level:	• 2 counts RMS @ 200 sps
Sample Rates (user selectable):	• 1000, 500, 250, 200, 125, 100, 50, 40, 20, 10, 5, 1 sps
Dynamic Range:	• >138 dB

Time Base:

Type:	• GPS Receiver/Clock plus a disciplined oscillator
Accuracy:	• ± 10 μ sec with GPS locked and a validated 3-D fix
Accuracy without GPS:	• 0.1 ppm from 0° to 60 °C, 0.2 ppm from -20° to 0 °C

Auxiliary Channels:

Inputs:	• Battery, Temperature, Backup Battery
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Calibration:

Enable:	• User Command
Type:	• Step applied to feedback

Communication:

Ethernet:	• 10-BaseT: TCP/IP, UDP/IP, FTP, RTP
Serial:	• Asynchronous RS-232: PPP, TCP/IP, UDP/IP, FTP, RTP
Modem:	• N/A

Recording Mode:

Trigger Type:	• Continuous, Event (STA/LTA), External, Level, Time, Time List, Cross, and Vote Trigger (0.0001 to 4g)
Media:	• Compact Flash, Ethernet
Format:	• PASSCAL Recording Format
Relay Closure:	• N/A

Recording Capacity:

Battery Backed SRAM:	• 8 MB
Flash Disk (2 per unit):	• 8GB or 16GB

Compliance:

- CE

Internal Accelerometer:

Type:	• Force-balance (internal)
Full Scale Range:	• > ± 4 g
Full Scale Output:	• ± 10 V, 20 VPP
Dynamic Range:	• >155 dB (DC to 2 Hz)
Sensitivity:	• 2.5 V/g nominal (exact value in EEPROM)
Linearity:	• < 0.03 % of full scale
Cross-axis Sensitivity:	• < 0.001 g/g
Frequency Response:	• Flat DC - >150 Hz

Accelerograph, Model 130-SMHR Command Line

- 9.25" high x 8.0" wide x 13.25" long (23.5 cm x 20.3 cm x 33.7 cm)
- 10.5 lbs (4.8 kg), without internal battery
- IP 67
- Survives a 1 meter drop on any axis
- -20 °C to +70 °C

- 10 to 16 VDC
- 2 W (3-ch. @ 125 sps)
- 3 W (DAS & GPS active, writing to CF)
- 15 V, 800 mAmp (internal)
- 12 VDC, sealed lead-acid, 12 AmpHr (optional, internal)

- Δ - Σ modulation, 24-bit resolution
- 3, 6 or 9 channels
- Matched to accelerometer
- Matched to accelerometer
- 1.589 μ V
- 2 counts RMS @ 200 sps
- 200, 100, 50 sps
- >138 dB

- GPS Receiver/Clock plus a disciplined oscillator
- ± 10 μ sec with GPS locked and a validated 3-D fix
- 0.1 ppm from 0 ° to 60 °C, 0.2 ppm from -20 ° to 0 °C

- Battery, Temperature, Backup Battery

- User Command
- Step applied to feedback

- 10-BaseT: TCP/IP, UDP/IP, FTP, RTP
- Asynchronous RS-232: PPP, TCP/IP, UDP/IP, FTP, RTP
- V.90 (internal)

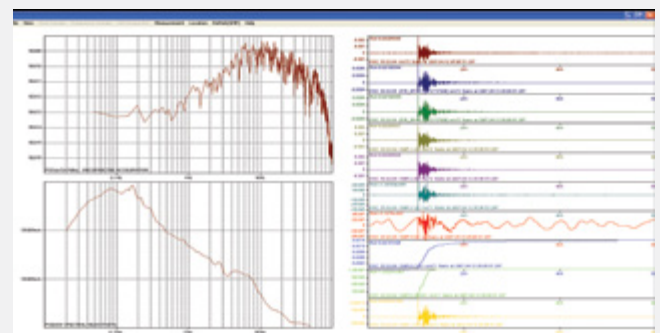
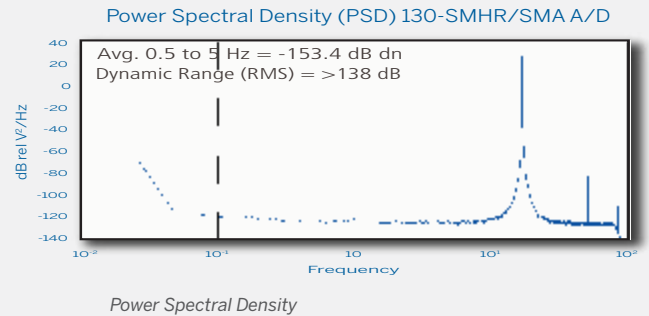
- Continuous, External, Level and Vote Trigger (0.0001 to 4g)

- Compact Flash, Ethernet
- PASSCAL Recording Format
- 3 independently programmable relay closures

- 8 MB
- 8 GB or 16 GB

- CE

- Force-balance (internal)
- > ± 4 g
- ± 10 V, 20 VPP
- >155 dB (DC to 2 Hz)
- 2.5 V/g nominal (exact value in EEPROM)
- < 0.03 % of full scale
- < 0.001 g/g
- Flat DC - >150 Hz



COMPASS: Strong Motion Processing Software



SMCC: Strong Motion Command & Control included in RTI Software

130-SMHR STRONG MOTION ACCELEROGRAPH

ORDERING INFORMATION	
Part No.	Description
130 STRONG MOTION HIGH RESOLUTION (SMHR) ACCELEROGRAPH	
Standard Firmware	
97112-00	130-SMHR: Strong Motion Accelerograph
97125-00	130-SMHR/6: Strong Motion Accelerograph 6 Ch.
Command Line Firmware	
97237-00	130-SMHR-C: Strong Motion Accelerograph 3 Ch.
97238-00	130-SMHR/6-C: Strong Motion Accelerograph 6 Ch.
98060-00	130-SMHR/9: Strong Motion Accelerograph 9 Ch.
ACCESSORIES	
97150-00	130-GPS: Receiver/Clock
97180-00	130-FLASH/8G: Disk, Compact Flash II
97181-00	130-FLASH/16G: Disk, Compact Flash II
97163-00	130-8015-33: Cable, 130 to GPS, 33 ft. (~10m)
97170-00	130-8019: Cable, NET, 130 to Ethernet RJ45 Hub, Ext.
97168-00	130-8039: Cable Power Supply, AC, Pin A
97169-00	130-8039A: Cable, Power Supply, AC w/ Batt. A&B
97172-00	130-8018: Cable, PC Command & Control
97151-01	130-GPS-Repeater: RS-485 for 130-GPS
97155-00	130-GPS-EXTENDER: RS-485 extender for 130-GPS
97192-00	130-Reader-USB: Reader, CF I/II, External (readers with other interfaces available on request)
97182-10	iFSC/W-KIT: Includes WiFi Serial Adaptor, iFSC 16GB Controller, CD
97134-00	SW-RTI-NC: Software, REF TEK Interface
97131-00	SW-COMPASS: Software, Seismic Signal Data Processing, Interactive

RELATED REF TEK SUB-SYSTEMS:

3rd Generation Seismic Recorders, 130S-01
 Accelerometers, 147A
 Broadband Seismometers, 151B-120

Specifications subject to change without notice.

Contact your local dealer today

NORTH AMERICA
 Trimble Inc.
 10368 Westmoor Dr
 Westminster, CO 80021
 USA
 MonSol_Sales@Trimble.com

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