REF TEK
SYSTEMS INC.

WRANGLER-HDR

HIGH DYNAMIC RANGE SEISMIC RECORDER



Extreme Data Quality

The Wrangler-HDR is REF TEK's highest dynamic range broadband seismic recorder featuring a high-performance 32-bit A/D.

This enhanced dynamic range enables the Wrangler-HDR to record very small vibrations from seismic sensors, providing detailed data for scientific analysis. Available with 3 or 6 input channels, battery-backed RAM and IP68 sealing the Wrangler-HDR is a universal seismic recorder that works with most seismic sensors available today.

The Wrangler-HDR features new-generation sensor control functionality which is compatible across the entire Wrangler series of seismic recorders. This includes six digital sensor control lines and an analog output for sensor calibration signals. The Wrangler-HDR includes an additional 32-bit A/D which is dedicated for recording the output calibration signal.

With years of field deployments, the Wrangler-HDR is a mature, proven product that is environmentally rugged and easily carried in a backpack for rapid deployment.

Communications

Featuring a Seedlink server, you can set up your system to automatically import MiniSEED data straight into your analysis software. The REF TEK Wrangler-HDR recorder has a large non-volatile internal memory providing a substantial data buffer for when the connection is not available, or for when you require historical data from the recorder.

With smart setup options, the REF TEK Wrangler-HDR gives you a choice between automatic data transfer of Seedlink data or the option to transmit ultra low latency data for Earthquake Early Warning applications (EEW). For EEW applications simply set up your Wrangler-HDR so that it sends data via REF TEK's RTPD software in near real-time to your EEW software resulting in quick decision making when it's necessary.

Simple Web UI

The Wrangler-HDR comes with the latest in network technology including a built-in Web user interface (WebUI), which allows you to have fully secured command-and-control of the unit either in the field or when you are back in the office, without requiring additional software. Local connection is easily established using Wrangler-HDR's integrated WiFi, enabling you to manage the unit directly with a phone or tablet.

BENEFITS

- ~143 dB typical (wideband) dynamic range delivers detailed event data, for high-quality scientific analysis
- Ultra low-latency data suited for Earthquake Early Warning systems
- Built-in Seedlink server provides robust data transmission
- 8 GB of dedicated non-volatile memory means a large data transmission ring buffer, just in case a communication outage occurs
- Environmentally protected removable mass storage, makes swapping USB drives effortless
- Small and lightweight for easy backpack deployments
- Precise and accurate timing
- High-precision TCXO disciplined by an external GNSS receiver
- PTP and NTP compatible.

RELIABLE PERFORMANCE FOR:

- Earthquake Early Warning
- Local and regional broadband seismic networks
- Induced seismicity monitoring
- Aftershock and portable deployments
- Microzonation surveys
- Site noise surveys

SPECIFICATIONS

A/D CONVERTER	
Type	32-bit SAR A/D converters Configurable 24 and 30 bit output resolutions
Dynamic Range	~143 dB typical (wideband) @100 sps
Input Channels	3 or 6
Gain Selection	x1, x4, x16 and x64 (Optional x1, x2, x16 and x32)
Input Full Scale	40 Vpp @ x1 gain, 0.625 Vpp @ x64 gain
Input Impendance	26 Kohms, 0.002 uFd, differential @ x1 2 Mohms, 0.002 uFd, differential @ x64
Sample Rates	4000, 1000, 500, 250, 200, 125, 100, 50, 40, 20, 10, 5, 1, 0.1 sps
Multiple Sample Rates	Supported for rates in the group 1000, 200, 100, 50, 40, 20, 10, 5, 1, 0.1
Sampling	Simultaneous on all channels
FIR Filter	~140 dB down in the stopband

TIME BASE	
Type	GNSS Receiver with Internal Disciplined Oscillator
Accuracy with GNSS	<±5 µsec after validated 3-D Fix and Locked
Free-Running Accuracy	0.1 ppm over the temp. range of 0°C to 50°C 0.2 ppm from –20 °C to 0 °C
Alternate Time Sources	PTP or NTP

POWER	
Input Voltage	9–30 VDC
Average Power (3 channels, no communication, GNSS duty cycle)	1.4 Watts
Average Power (3 channels, with communication, GNSS duty cycle)	1.7 Watts
Average Power (6 channels, no communication, GNSS duty cycle)	2.0 Watts
Average Power (6 channels, with communication, GNSS duty cycle)	2.3 Watts
Low Voltage Disconnect	User-programmable. Additional hardware cut-off fixed at 9.0 Volts
Reset	Resettable via WebUI, Magnet Wand, or external connector pin.

RECORDING	
Format	Miniseed, MRF
Transmission	SeedLink Server, RTP, Jopens 6.0 (Simulcasting)
Trigger Types	Continuous, STA/LTA, Time, External, Cross, Level and Vote (0.0001 to 4g)
Data Products	On-board Calculation of: PGA, PGV, PGD, MMI, PEIS, JMA (email notifications available)
Internal Capacity	8 GB internal Flash memory data buffer
External Capacity	Removable 8, 16, 32 or 64 GB USB drive

COMMUNICATIONS	
Ethernet	10/100 Base-T, TCP/IP, UDP/IP, FTP, RTP DHCP, Static, Link-Local
WiFi	Access-point mode for local command and control
WebUI	Accessible via WiFi or Ethernet

AUXILIARY CHANNELS	
Inputs	6 per Channel Connector (3 for Mass Position and 3 auxiliary inputs)
Resolution	16-bit A/D Converter
Full Scale	±10 V Single-ended input mode, ±10 V Differential input mode
Sampling Rate	10, 1, or 0.1 sps

SENSOR CONTROL	
Cal Signal	16-bit DAC
Cal Waveforms	Pre-defined waveforms including Sine, Step, Noise, Swept Sine signals. Custom waveforms can be uploaded bythe user.
Cal Signal Recording	Additional 32-bit ADC dedicated to recording the calibration output signal
Control Signals	6 per channel connector: Including Lock, Unlock, Center, Calibration Enable, Damping, UVW
Automatic Mass Recentering	User settable thresholds, interval & retries
Sensor ID	One-wire interface to Reftek Sensors. Externally adaptable to RS232 communication for third party sensors.

MECHANICAL	
LEDs	16 status LEDs including Input Power, GNSS/Time, USB, Acquisition and Link status
Switch	Magnetic Switch for WiFi & LED wakeup
Size	5.2" W x 8.4" L x 3.5" H
Weight	3 lbs
Watertight Integrity	IP68
Humidity	0 to 100%
Shock	Survives a 1 meter drop on any axis
Transportation	Survives MIL-STD-810G transportation test
Operating Temp	–30°C to 70°C (Standard) –40°C to 70°C (LT Option)
Storage Temp	–40°C to 70°C

CERTIFICATIONS	
Compliance	CE, FCC, RoHS