

# WRANGLER

## SEISMIC RECORDER



### Extreme Data Quality

The Wrangler is REF TEK's latest generation universal broadband seismic recorder featuring a high-performance 32-bit A/D and boasting a large dynamic range.

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

The Wrangler features new generation sensor control functionality, including six digital sensor control lines and an analog output for sensor calibration signals. The Wrangler includes an additional 32-bit A/D which is dedicated to recording the output calibration signal.

### Communications

Featuring a Seedlink server, you can set up your system so that it will automatically import Miniseed data straight into your analysis software. The REF TEK Wrangler 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 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 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 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'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		COMMUNICATIONS	
Type	32-bit SAR A/D converters	Ethernet	10/100 Base-T, TCP/IP, UDP/IP, FTP, RTP DHCP, Static, Link-Local
Dynamic Range	~143 dB typical (wideband) @100 sps	WiFi	Access-point mode for local command and control
Input Channels	3 or 6	WebUI	Accessible via WiFi or Ethernet
Gain Selection	x1, x4, x16 and x64 (Optional x1, x2, x16 and x32)	AUXILIARY CHANNELS	
Input Full Scale	40 Vpp @ x1 gain, 0.625 Vpp @ x64 gain	Inputs	6 per Channel Connector (3 for Mass Position and 3 auxiliary inputs)
Input Impedance	26 Kohms, 0.002 uFd, differential @ x1 2 Mohms, 0.002 uFd, differential @ x64	Resolution	16-bit A/D Converter
Common Mode Rejection	>90 dB	Full Scale	±10 V Single-ended input mode, ±10 V Differential input mode
Sample Rates	4000, 1000, 500, 250, 200, 125, 100, 50, 40, 20, 10, 5, 1, 0.1 sps	Sampling Rate	10, 1, or 0.1 sps
Multiple Sample Rates	Supported for rates in the group 1000, 200, 100, 50, 40, 20, 10, 5, 1, 0.1	SENSOR CONTROL	
Sampling	Simultaneous on all channels	Cal Signal	16-bit DAC
FIR Filter	140 dB down in the stopband	Cal Waveforms	Pre-defined waveforms including Sine, Step, Noise, Swept Sine signals. Custom waveforms can be uploaded by the user.
TIME BASE		Cal Signal Recording	Additional 32-bit ADC dedicated to recording the calibration output signal
Type	GNSS Receiver with Internal Disciplined Oscillator	Control Signals	6 per channel connector: Including Lock, Unlock, Center, Calibration Enable, Damping, UVW
Accuracy with GNSS	±10 µsec after validated 3-D Fix and Locked	Automatic Mass Recentering	User settable thresholds, interval & retries
Free-Running Accuracy	0.1 ppm over the temp. range of 0°C to 70°C 0.2 ppm from -30 °C to 0 °C	Sensor ID	One-wire interface to Reftek Sensors. Externally adaptable to RS232 communication for third party sensors.
Alternate Time Sources	PTP or NTP	MECHANICAL	
POWER		LEDs	16 status LEDs including Input Power, GNSS/Time, USB, Acquisition and Link status
Input Voltage	9–30 VDC	Switch	Magnetic Switch for WiFi & LED wakeup
Average Power (3 channels, no communication, GNSS duty cycle)	1.4 Watts	Size	5.2" W x 8.4" L x 3.5" H
Average Power (3 channels, with communication, GNSS duty cycle)	1.7 Watts	Weight	3 lbs
Average Power (6 channels, no communication, GNSS duty cycle)	2.0 Watts	Watertight Integrity	IP68
Average Power (6 channels, with communication, GNSS duty cycle)	2.3 Watts	Humidity	0 to 100%
Low Voltage Disconnect	User-programmable. Additional hardware cut-off fixed at 9.0 Volts	Shock	Survives a 1 meter drop on any axis
Reset	Resettable via WebUI, Magnet Wand, or external connector pin.	Transportation	Survives MIL-STD-810G transportation test
RECORDING		Operating Temp	-30°C to 70°C
Format	Miniseed, MRF	Storage Temp	-30°C to 70°C
Transmission	SeedLink Server, RTP, Jopens 6.0 (Simulcasting)	CERTIFICATIONS	
Trigger Types	Continuous, STA/LTA, Time, External, Cross, Level and Vote (0.0001 to 4g)	Compliance	CE, FCC, RoHS
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		