

# 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. User configurable output resolution options of 24 and 30 bits per channel allows for bandwidth optimization with no loss of 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	
<b>Type</b>	32-bit SAR A/D converters Configurable 24 and 30 bit output resolutions
<b>Dynamic Range</b>	-143 dB typical (wideband) @100 sps
<b>Input Channels</b>	3 or 6
<b>Gain Selection</b>	x1, x4, x16 and x64 (Optional x1, x2, x16 and x32)
<b>Input Full Scale</b>	40 Vpp @ x1 gain, 0.625 Vpp @ x64 gain
<b>Input Impedance</b>	26 Kohms, 0.002 uFd, differential @ x1 2 Mohms, 0.002 uFd, differential @ x64
<b>Sample Rates</b>	4000, 1000, 500, 250, 200, 125, 100, 50, 40, 20, 10, 5, 1, 0.1 sps
<b>Multiple Sample Rates</b>	Supported for rates in the group 1000, 200, 100, 50, 40, 20, 10, 5, 1, 0.1
<b>Sampling</b>	Simultaneous on all channels
<b>FIR Filter</b>	-140 dB down in the stopband
TIME BASE	
<b>Type</b>	GNSS Receiver with Internal Disciplined Oscillator
<b>Accuracy with GNSS</b>	±10 µsec after validated 3-D Fix and Locked
<b>Free-Running Accuracy</b>	0.1 ppm over the temp. range of 0°C to 50°C 0.2 ppm from -20 °C to 0 °C
<b>Alternate Time Sources</b>	PTP or NTP
POWER	
<b>Input Voltage</b>	9–30 VDC
<b>Average Power (3 channels, no communication, GNSS duty cycle)</b>	1.4 Watts
<b>Average Power (3 channels, with communication, GNSS duty cycle)</b>	1.7 Watts
<b>Average Power (6 channels, no communication, GNSS duty cycle)</b>	2.0 Watts
<b>Average Power (6 channels, with communication, GNSS duty cycle)</b>	2.3 Watts
<b>Low Voltage Disconnect</b>	User-programmable. Additional hardware cut-off fixed at 9.0 Volts
<b>Reset</b>	Resettable via WebUI, Magnet Wand, or external connector pin.
RECORDING	
<b>Format</b>	Miniseed, MRF
<b>Transmission</b>	SeedLink Server, RTP, Jopens 6.0 (Simulcasting)
<b>Trigger Types</b>	Continuous, STA/LTA, Time, External, Cross, Level and Vote (0.0001 to 4g)
<b>Data Products</b>	On-board Calculation of: PGA, PGV, PGD, MMI, PEIS, JMA (email notifications available)
<b>Internal Capacity</b>	8 Gb internal Flash memory data buffer
<b>External Capacity</b>	Removable 8, 16, 32 or 64 GB USB drive
COMMUNICATIONS	
<b>Ethernet</b>	10/100 Base-T, TCP/IP, UDP/IP, FTP, RTP DHCP, Static, Link-Local
<b>WiFi</b>	Access-point mode for local command and control
<b>WebUI</b>	Accessible via WiFi or Ethernet
AUXILIARY CHANNELS	
<b>Inputs</b>	6 per Channel Connector (3 for Mass Position and 3 auxiliary inputs)
<b>Resolution</b>	16-bit A/D Converter
<b>Full Scale</b>	±10 V Single-ended input mode, ±10 V Differential input mode
<b>Sampling Rate</b>	10, 1, or 0.1 sps
SENSOR CONTROL	
<b>Cal Signal</b>	16-bit DAC
<b>Cal Waveforms</b>	Pre-defined waveforms including Sine, Step, Noise, Swept Sine signals. Custom waveforms can be uploaded by the user.
<b>Cal Signal Recording</b>	Additional 32-bit ADC dedicated to recording the calibration output signal
<b>Control Signals</b>	6 per channel connector: Including Lock, Unlock, Center, Calibration Enable, Damping, UVW
<b>Automatic Mass Recentering</b>	User settable thresholds, interval & retries
<b>Sensor ID</b>	One-wire interface to Reftek Sensors. Externally adaptable to RS232 communication for third party sensors.
MECHANICAL	
<b>LEDs</b>	16 status LEDs including Input Power, GNSS/Time, USB, Acquisition and Link status
<b>Switch</b>	Magnetic Switch for WiFi & LED wakeup
<b>Size</b>	5.2" W x 8.4" L x 3.5" H
<b>Weight</b>	3 lbs
<b>Watertight Integrity</b>	IP68
<b>Humidity</b>	0 to 100%
<b>Shock</b>	Survives a 1 meter drop on any axis
<b>Transportation</b>	Survives MIL-STD-810G transportation test
<b>Operating Temp</b>	-30°C to 70°C (Standard) -40°C to 70°C (LT Option)
<b>Storage Temp</b>	-40°C to 70°C
CERTIFICATIONS	
<b>Compliance</b>	CE, FCC, RoHS