

KEY FEATURES

Combines seismic recording with Global Navigation Satellite System (GNSS) Geodetic Measurements

220 Channel GNSS Receiver

GNSS Precise Point Positioning (PPP) Correction

Advanced National Seismic System (ANSS) Class A Triaxial Accelerometer

The Trimble Kestrel SeismoGeodetic System (Model SG160-09) combines the innovation, reliability and data integrity of both the Trimble and REF TEK brands into a single instrument.

The Trimble Kestrel System provides the user with high rate GNSS and accelerometer data, full epoch-by-epoch measurement integrity and, using the Trimble Pivot™ SeismoGeodetic App, the ability to create combined GNSS and accelerometer high-rate (200 Hz) displacement time series in real-time.

The Trimble Kestrel System combines seismic recording with GNSS geodetic measurement in a single compact, ruggedized package. The system includes a low-power, 220-channel GNSS receiver powered by the latest Trimble-precise Maxwell™ 6 technology and supports tracking of both GPS and GLONASS signals plus the Galileo E1 frequency. The receiver incorporates on-board GNSS Precise Point Positioning (PPP) using Trimble CenterPoint™ RTX™ technology with satellite clock and orbit corrections delivered over IP.



The seismic recording element includes an Advanced National Seismic System (ANSS) Class A, force balance triaxial accelerometer with the latest, low power, 24-bit A/D converter, which produces high resolution seismic data.



The Trimble Kestrel System processor acquires and packetizes both seismic and geodetic data and transmits it to the central station using an advanced, error correction protocol with back fill capability providing integrity between the field and the processing center.

The true benefit of the Trimble Kestrel System is the ability to combine both GNSS and acceleration measurements using the Kalman filter algorithm to create a high-rate (200 Hz), real-time displacement with sufficient accuracy and very low latency for earthquake characteristic analysis.

Small size, lightweight, low power, implemented Trimble CenterPoint RTX technology and rapid data delivery algorithm make the Trimble Kestrel System an ideal instrument for real-time earthquake characterization and hazard mitigation.

A/D CONVERTER

Type. Delta-Sigma Modulation, 24-bit Output Resolution
 Dynamic Range >138 dB @ 200 sps (200 Hz)
 Input Channels 3 (internal 3-component accelerometer)
 Input Impedance Matched to internal accelerometer
 Sample Rates 200 sps (200 Hz) Accelerometer
 Synchronous Sampling Simultaneous on all channels
 to within $\pm 5 \mu\text{s}$ of the mean sampling time
 Anti-Alias Filter FIR
 Common Mode Rejection Greater than 70 dB within $\pm 2.5 \text{ VDC}$
 Gain Stability and Accuracy $\leq 0.5\%$ over 32 °F to 104 °F
 (0 °C to 40 °C)
 $\leq 1\%$ over full operating temperature range
 Full Scale Offset $\leq 0.5\%$ FS from 32 °F to 104 °F
 (0 °C to 40 °C)
 Internal Timekeeping Oscillator 0.1 ppm from 32 °F to 104 °F
 (0 °C to 40 °C)

DATA STORAGE

Type. USB (external, industrial) 8, 16, or 32 GB
 Data Format MRF, Bytestream
 Telemetry Protocol RTP REN with backfill algorithm
 Backfill data stored on USB drive

ACCELEROMETER

Type. ANSS Class A force-balance accelerometer, triaxial (internal)
 Dynamic Range >145 dB (DC to 2 Hz)
 Full Scale Range $\pm 4\text{g}$
 Full Scale Output $\pm 10\text{V}$, 20 VPP
 Frequency Response DC – 150 Hz flat response ($\pm 3 \text{ dB}$)
 Self-noise $< 1 \mu\text{m/s/s}$
 Cross Axis Sensitivity $\leq -40 \text{ dB}$ due to misalignment
 of active axis to case reference
 Hysteresis $\leq -70 \text{ dB}$ over a $\pm 1\text{g}$ range
 Sensitivity 2.5 V/g
 Linearity $\leq -70 \text{ dB}$ over a $\pm 1\text{g}$ range
 Damping 0.7
 Clip Recovery Hard clip recovery $< 10\text{s}$

GNSS RECEIVER

Type. GPS, GLONASS, Galileo (E1)
 Position Corrections Trimble CenterPoint RTX technology
 Data Output Type (GNSS) RT27 @ 15 secs, 1 Hz, 10 Hz
 Data Output Type (Displacement) 6 (X, Y, Z displacement
 and Ex, Ey, Ez error) @ 10 sps (10 Hz)
 GNSS Antenna TNC connector: Tornado, Zephyr Geodetic 2,
 GNSS Choke Ring Antennas

* IP68 version (submerged up to 3m depth for 24 hours in fresh water) is available as an option at customer request. Consult your Trimble sales engineer on availability and price.

Specifications subject to change without notice

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ENVIRONMENTAL

Input Voltage 9-24 VDC
 Power Consumption 4 watts
 Material Aluminum A380, Clear Alodine, Powder Coated
 Weight 15.5 lb (7 kg)
 Dimensions 7.42 x 7.66 x 11.43 inches (18.8 x 19.5 x 29 cm)
 Ingress Protection IP67*
 Shock and Vibration MIL-STD-810G transportation test
 Temperature:
 Operating -4 °F to 158 °F (-20 °C to 70 °C)
 Storage -58 °F to 176 °F (-50 °C to 80 °C)

ORDERING INFORMATION

97333-00 SG160-09: Integrated High Res. SeismoGeodetic System,
 GNSS Receiver, Int. Accelerometer, RTX Enabled, IP67*

Power Cable (options):

101421-00 Cable, AC Power Supply, 6' (2m)
 101419-00 Cable, Battery Power Supply, 6' (2m)

USB Flash Memory (options):

97321-00 Disk, Flash Memory, 8GB, USB, -49 °F to 185 °F
 (-45 °C to 85 °C), SLC
 97321-16 Disk, Flash Memory, 16GB, USB, -49 °F to 185 °F
 (-45 °C to 85 °C), SLC
 97321-32 Disk, Flash Memory, 32GB, USB, -49 °F to 185 °F
 (-45 °C to 85 °C), SLC

GPS Antenna (options):

97333-13 Tornado Antenna, w/o magnetic inserts
 (includes mounting bracket)
 58295-50 Zephyr Geodetic Model 2 Antenna
 29487-20 GNSS-DM Choke Ring Antenna
 29587-20 GNSS-Ti Choke Ring Antenna

Coax Cable (options):

101425-30 Tornado/Zephyr Antenna Cable – GPS, 33 ft (10 m)
 64922-30 Tornado/Zephyr Antenna Cable – GPS, 100 ft (30 m)
 101426-30 Choke Ring Antenna Cable – 33 ft (10 m)
 47019-30 Choke Ring Antenna Cable – 100 ft (30 m)

Network Cable (options):

101422-00 Cable, NET, Ethernet Hub, 14 ft (4.3 m)
 102582-00 Cable, NET, Ethernet PC (crossover), 14 ft (4.3 m)
 101423-00 Cable, NET, Ethernet Hub, w/ Relay for GPRS,
 14 ft (4.3 m)

Ancillaries:

101132-00 Kit, Mounting and Leveling Plate
 102248-00 Transit Case for SG160-09 and Tornado Antenna
 100959-00 Controller, 160F5C

Software:

96811-20 Trimble SG160-09 System S/W Bundle License
 96811-25 License for 1 Additional SG160-09 Unit
 96813-12 T4D – License for 1 additional Geotech Sensor

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