



Kestrel

SEISMOGEODETTIC SYSTEM

UNIQUELY COMBINING GNSS AND SEISMIC DATA COLLECTION

The Trimble® Kestrel™ seismogeodetic system innovatively combines high quality GNSS data and accelerometer data into a compact, rugged instrument. This delivers the data required to monitor earthen or structural assets, and scientific data for seismologists, in near real-time.

Monitoring Movement Accurately

By measuring GNSS full epoch-by-epoch integrity data and accelerometer data, then using the Trimble 4D Control software Kalman filter algorithm, the Kestrel delivers combined GNSS and accelerometer high rate (200 Hz) displacement time series data in near real-time. This one-of-a-kind high-quality data, is optimal for movement analysis required in monitoring applications and seismology.

Rugged and Powerful

Incorporated in a compact, ruggedized housing the Kestrel contains:

- ▶ a low-power, 336 channel GNSS receiver powered by the latest Trimble Maxwell™ 7 Technology, that supports tracking of GPS, GLONASS, Galileo, BeiDou and QZSS signals
- ▶ an Advanced National Seismic System (ANSS) Class A, forced balanced triaxial accelerometer with a low power, 24-bit A/D converter which produces high resolution seismic data.

Now monitoring engineers and scientists can have GNSS and accelerometer data from one simple to install instrument.

Trimble RTX on Board

The receiver has on-board GNSS Precise Point Positioning (PPP) using Trimble Centerpoint™ RTX™ technology with satellite clock and orbit corrections delivered over IP or Mobile Satellite Services (MSS) L-Band signal. Trimble RTX remains locked onto the real world absolute position, important when analyzing movement data.

Robust Data Communications

Ensuring that you have all your data, all the time, the Kestrel system processor transmits ultra-low latency seismic and geodetic data to a central server using an advanced, error correcting protocol, including backfill capability to provide robust data integrity between the field site and the processing center.

RELIABLE PERFORMANCE FOR:

- ▶ Monitoring civil structures
- ▶ Monitoring earthen structures
- ▶ Earthquake Early Warning (EEW) Networks
- ▶ Volcano monitoring
- ▶ Seismic Hazard Mitigation

Key Features

- ▶ Combines Global Navigation Satellite System (GNSS) and accelerometer measurements using Trimble 4D Control software in near real-time
- ▶ 336 Channel GNSS Receiver featuring Trimble's latest Maxwell 7 technology provides the ultimate in processing power
- ▶ GNSS Precise Point Positioning (PPP) technology using Trimble Centerpoint RTX corrections
- ▶ Advanced National Seismic System (ANSS) Class A Triaxial Accelerometer
- ▶ Ultra-low latency data transmission for EEW



Model	Kestrel
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 rapid data transmission 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, BeiDou, QZSS
Position Corrections	Trimble CenterPoint RTX technology (L-Band or IP)
Data Output Type (GNSS)	RT27 @ 15 secs, 1 Hz or 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 3 Geodetic, GNSS Choke Ring Antennas

ENVIRONMENTAL	
Input Voltage	9-24 VDC
Power Consumption	4 watts
Material	Powder Coated Aluminum
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

Part No.	Description
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)
158295-50	Zephyr 3 Geodetic 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)
Ancillaries:	
101132-00	Kit, Mounting and Leveling Plate
102248-00	Transit Case for SG160-09 and Tornado Antenna
100959-00	Controller, 160FSC
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

Specifications subject to change without notice.

ПФ «ГЕОКОМ»
61001 м. Харків, вул. Молочна 3, 3 пов.
(057) 732-53-12 факс. (057) 732-53-12
geocom.trimble@gmail.com
kh@geocom.com.ua
geocom.in.ua
trimble.org.ua

Contact your local dealer today

NORTH AMERICA

Trimble Navigation Limited
10368 Westmoor Drive
Westminster, CO
USA
MonSol_Sales@Trimble.com