

## 151 Observer Data Sheet

The 151B-120 Observer is a force-balance feedback sensor which collects high precision data with improved acceleration and performance. It is regarded to be one of the most precise broadband seismometers available for passive seismic studies and is commonly used to monitor and observe seismic activity which occurs within or near tectonically active zones.

This seismometer has a wide frequency bandwidth of 0.0083Hz (120sec) - 50Hz and 0.016Hz (60 sec) - 50Hz, in which the response is flat to velocity. However, depending on your application, a slightly narrower frequency bandwidth of 0.033Hz (30secs) - 50Hz is available upon request.

The instruments internal structure, contains three independent mechanical sensors, one vertical and two horizontal (Vertical, N-S and E-W orientations), which are orthogonally mounted on the circular base. The Observer has facilities which allow you to mass lock/ unlock the sensor without opening the seismometer, and a built-in levelling system. The instrument can be levelled using the two external bubble levels, three adjustable feet and three locknuts, which are located on the seismometer's chassis (Fig. 1).



151B with carry handle. Image courtesy of RefTek, a Trimble Brand.

The sensor is easy to install and use as it contains built in electronic feedback, control and power conversion circuits, which allow the instrument to collect data over a large dynamic range with a low self-noise value (below the NLNM range of 80sec to 10Hz). In order to ensure that background "microseim" noise is eliminated from your dataset and you retain a low self-noise value, you must check that the sensor is properly aligned (i.e. good vertical alignment and N-S / E-W perfect orthogonal alignment  $0.42^{\circ} \pm 0.03^{\circ}$ ) (Passmore et.al, 2008; Gerner and Bokelmann, 2013).

High quality and reliable datasets can be obtained in the field because the sensor has automatic zero mass adjustment and takes rapid high-resolution measurements (40-200 samples per second) within a wide temperature range (Gerner and Bokelmann, 2013). Once the 151B-120 is powered (only takes a few minutes to warm up and stabilise), the observer identifies the component mass zero position and automatically adjusts for mass changes using the zero-positioning adjustment mechanism. If required, the mass adjustment can also be determined using the 130 high resolution family recorder – RT527-B01 Sensor Control Board.

Inside the sensor vault there maybe concern over the airflow or temperature fluctuation, in order to resolve this issue

a thermal cover/insulation bag is provided by RefTek to ensure the instrument produces high quality results, as it increases insulation.

This low noise, reliable and stable broadband seismometer can produce and record clear datasets for a wide variety of regional, local and global seismicity studies in different installation configurations which include, but are not limited to observatory, portable surface and posthole applications.

## References

Gerner, A and Bokelmann, G. (2013) *Instrument self-noise and sensor misalignment*. Advances in Geosciences (Open Access), **36**, 17-20

Passmore, P., Zimakov, L. and Razcka, J. (2008) *RefTek Broadband Seismometer: Advanced Features and Test Results*. Refraction Technology Inc. **1**

## Product Dimensions

Physical	Dimensions (L x W x H)	Weight
(instrument only)	24cm x 24cm x 27cm	12kg

## Technical Specifications

<b>Sensor Type:</b>	Triaxial, Orthogonal.
<b>Feedback:</b>	Force-balance with Capacitive Displacement Transducer.
<b>Frequency Bandwidth:</b>	151B-120 0.0083 Hz (120 sec.) – 50 Hz. 151B-60 0.0166 Hz (60 sec.) – 50 Hz.
<b>Sensitivity:</b>	2000 V/m/s.
<b>Full Scale Output:</b>	±20 V Peak-to-Peak Differential.
<b>Dynamic Range:</b>	>140 dB @ 5 Hz
<b>Self-Noise:</b>	Below NLNM from 145 sec. to 10Hz.
<b>Output Impedance:</b>	

## Gallery



*151B features and controls. Image courtesy of RefTek, a Trimble Brand.*