# vb7 Portable Data Collector, Analyzer and Balancer

## Datasheet

Bently Nevada Machinery Condition Monitoring

116M5255 Rev. K

## Description

Thevb7 Portable Data Collector, Analyzer and Balancerinstrument is a dual channel vibration data collector, analyzer and balancer. You can use this device for on-route and off-route data collection, machine-side analysis and diagnosis as well as on-site dynamic balance correction.

Thevb7 Portable Data Collector, Analyzer and Balanceris certified for Class 1 Division 2 hazardous areas. It is ergonomically designed and lightweight for all day comfort.

Thevb7provides recordings with up to 6,400 lines of resolution and up to 40 kHz $F_{max}$. Our patented adaptive settling algorithm and 6Pack recording system offer quick, one-step data recording.

Thevb7 Portable Data Collector, Analyzer and Balancerhas plenty of storage and long battery life, and is backed by a five year warranty.

Thevb7 Portable Data Collector, Analyzer and Balanceris one of Bently Nevada hardware monitoring assets that work with System 1 software.

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a Baker Hughes business

**Thevb7 Portable Data Collector, Analyzer and Balanceroffers the following features:**

- Dual channel simultaneous recordings
- 6,400 lines FFT resolution
- Supports 40 kHz $F_{max}$
- Two-plane balancing
- Laser speed sensor for automatic capture of machine running speed
- Keyphasor tach mode
- 1 GB memory
- ≥ 95 dB dynamic range
- Spectrum and waveform recordings
- Demodulation for early detection of rotating machinery problems such as bearing faults
- Unique 6Pack recording system
- Full analysis capabilities such as time synchronous averaging, coastdown and runup, bump test, cross-channel phase, orbit plot, and long time waveform
- DC-coupled sensor support
- Numeric parameter input via keypad with trend and alarm capability
- Sensor cable self-test feature
- Option to add flex features such as modal analysis and Remote Comms
- USB host port for data transfer to external USB drive
- Upgradable Proflash system and free firmware updates for 5 years
- Five-year warranty on the instrument hardware

# Specifications

## Sensors

| | |
|---|---|
| Sensor Input | Two channels simultaneous sampling |
| Compatible Sensor Types | Accelerometer, velocity, displacement, current |
| AC Coupled Range | 16 V peak-peak Allows for ± 8 V sensor output swing (± 80 g) |
| DC Coupled Ranges | 0 V to 20 V, -10 V to 10 V, -20 V to 0 V<br>E.g. For reading prox-probe gap |
| Connectors | 2 x BNC (CH1/CH2)<br>Safety feature: Break-free inline connector |
| Analog to Digital Conversion | 24-bit ADC |
| Sensor Excitation Current | 0 mA or 2.2 mA (configurable), 24 V maximum<br>2.2 mA required power for IEPE/ICP type accelerometer |
| Sensor Detection | Warns if short circuit or not connected |

## Tachometer Sensor

| | |
|---|---|
| Sensor Type | Laser sensor with reflective tape Sensor triggers on beam reflection |
| Laser Sensor Range | 10 cm to 2 m nominal Range depends on size of reflective tape |

## Tachometer Input

| | |
|---|---|
| Supported Sensor Types | Laser Tach, Contact, TTL Pulse, Keyphasor Instrument has optically isolated input |
| Power Supply to Sensor | 5 V, 50 mA |
| TTL Pulse Rating | 3.5 V (4 mA) min 28 V (5 mA) max Off-state 0.8 V |
| Keyphasor Thresholds | 7.7 ± 0.5 V, 13.2 ± 0.8 V, 18.5 ± 1 V<br>Nominally 8 V, 13 V, 18 V |
| Speed Range | 10 RPM to 300,000 RPM (0.2 Hz to 5 kHz)<br>Pulse width at least 0.1 ms |
| Accuracy | ± 0.1 % |
| Output to Drive Strobe | Up to 140 Hz (8400 CPM)<br>Typical Depends on strobe type Special cable required |

## Parameter Indication

| | |
|---|---|
| Maximum Levels (peak) | > 1000 g (10,000 m/s2) > 1000 in/sec (25,000 mm/s) > 20 in (500 mm) > 10,000 amps<br>Effective limit is sensor sensitivity and output voltage. |
| Dynamic Signal Range | > 95 dB<br>typical at 400 line resolution |
| Harmonic Distortion | Less than -70 dB typical<br>Other distortions and noise are lower |

| | |
|---|---|
| Units | g or m/s2 or adB in/s or mm/s or vdB mil or mm or µm adB, vdB, amps, user defined<br>0-peak, peak-peak or RMS Auto-scale by 1000x when required<br>US and SI options for adB and vdB |
| Magnitude and Cursors | Overall RMS value Waveform True pk-pk Dual cursors Harmonics<br>Digital readouts on chart |
| Base Accuracy | ± 1% of readings approximately 0.1 dB<br>For AC signal: % of reading For DC signal: % of full scale |
| High Frequency Attenuation | ≤ 0.1 dB 100 Hz to 10 kHz<br>≤ 3 dB > 10 kHz to 40 kHz<br>Attenuation tolerances are in addition to base accuracy. |
| AC Coupling Attenuation | ≤ 0.1 dB 10 Hz to < 100 Hz<br>≤ 3 dB 1 Hz to < 10 Hz |
| Attenuation Due to Integration (normal mode) | ≤ 0.1 dB 10 Hz to < 100 Hz<br>≤ 1.5 dB 1 Hz to < 10 Hz<br>Values apply to single integration. (Acceleration to velocity)<br>Double the values for double integration (Acceleration to displacement) |
| Attenuation Due to Integration (low frequency mode) | ≤ 0.1 dB 1 Hz to <100 Hz<br>≤ 1.5 dB 0.2 Hz to <1 Hz<br>Applies when coupling = DC and $F_{max}$ ≤ 100 Hz |

## Spectrum Display

| | |
|---|---|
| $F_{max}$ Ranges | 25, 50, 100, 125, 150, 200, 300, 400, 500, 600, 800, 1000, 1200, 1600, 2000, 2500, 3000, 4000, 5000, 6000, 8000, 10,000, 15,000, 20,000, 30,000, 40,000 Hz Or equivalent CPM values Or orders-based from 1X to 999X |
| $F_{min}$ Possible Range | 0 to $F_{max}$<br>Instrument zeroes all spectral lines below Fmin. |
| Resolution | 400, 800, 1600, 3200, 6400 lines |

| | |
|---|---|
| Frequency Scale | Hz, CPM, Orders Linear scale with zooming |
| Amplitude Scale | Acceleration, velocity, displacement, current, voltage Linear or log scales, auto or manual scaling |
| Window Shapes | Hanning Rectangular |
| Overlap | (0, 12.5, 25, 37.5, 50, 62.5, 75, 87.5) %<br>Depends on Fmax and number of lines |
| Number of Averages | 1, 2, 4, 8, 16, 32, 64, 128 Increases sampling time proportionally |
| Averaging Types | Linear, exponential, peak hold, synchronous |
| Demodulation Bandwidths | 23 bandwidth options From 125 Hz to 1250 Hz Up to 16 kHz to 20 kHz |
| 6Pack | Up to 40 kHz and 3200 lines (1 channel) Up to 20 kHz and 1600 lines (2 channels) Spectrum and waveform for low-frequency, high-frequency and demodulation |

| | |
|---|---|
| Order Tracking | Up to 6 kHz Fmax Orders-based<br>Tachometer required Mounted on high-speed shaft |
| Order Tracking-Distortion | < -65 dB<br>Within 50% to 200% speed variation during recording |

## Waveform Display

| | |
|---|---|
| Number of Samples | 1024, 2048, 4096, 8192, 16,384 |
| Time Scale | 10 ms to 256 seconds or orders based from 1 to 999 revs |
| Time Synchronous Averages | 1, 2, 4, 8, 16, 32, 64, 128<br>Only available when tachometer triggered |
| Long Time Waveform $F_{max}$ | 25 Hz to 40 kHz<br>20 kHz dual channel |
| Long Time Waveform Duration | 14.7 million samples (total over channels)<br>E.g. for $F_{max}$ 1 kHz, Fsample = 2.56 kHz and Duration = 1.6 hrs |

## Logging and Analysis

| | |
|---|---|
| Output Formats | Instrument screen, transfer to Ascent or System 1, XML |
| Data Storage | Dual 1 GB non-volatile flash memories Database mirror copy on second flash memory |
| Data Storage Structure | Folders/machines/ points/locations/routes<br>No limits are applied 50 character names |
| Max Folder Size | 10,000 measurement locations |

## Balancing

| | |
|---|---|
| Planes | Up to 2 planes 2 sensors |
| Speed Range | 30 to 60 000 RPM |
| Measurement Type | Acceleration Velocity Displacement |
| Weight Modes | Angle 0° to 360° Fixed position Circumference arc<br>E.g. Weights on fan blades, linear dist. around circumference |
| Remove Trial Weights | Leave or remove trial weights for final balance<br>Automatic recalculation |
| Manual Data Entry | Yes<br>Allows re-entry of previous balance jobs |
| Storage of balancing jobs | In the data structure where machine vibration readings are stored<br>No limits applied |

## Display and Communication

| | |
|---|---|
| Display | Graphic Grayscale LCD LED Backlight |
| Resolution and Size | 480 x 320 (HVGA), 5.5" (140 mm)<br>Readable in direct sunlight |
| Supported Languages | English, Chinese, French, German, Japanese, Portuguese, Russian and Spanish |
| Communication with PC | USB and Ethernet<br>Use PROFLASH to upgrade instrument firmware |
| USB Host Port | USB 2.0, supplying 5V, 250mA Save folders to USB flash drive |

## Battery and Charger

| | |
|---|---|
| Battery Type | Custom Lithium Ion pack, 7.4 V, 5 Ah |
| Operating Time | 10 hours Backlight on — 60 second timeout |
| Charger Type | Internal charging, automatic control External power pack 12 V DC, 3 A output |
| Charge Rate | 3 A nominal 3 hours for complete charge |

## Mechanical

| | |
|---|---|
| Size | 9.9" W x 5.8" L x 2.4" H (252 x 148 x 60 mm) |
| Weight | 2.7 lb (1.2 kg) Including battery and strap |

## Environmental Limits

| | |
|---|---|
| Operating Temperature | 14 °F to 122 °F (-10 to 50 °C) |
| Storage Temperature and Humidity | -4 °F to 140 °F (-20 to 60 °C), 95% RH<br>Up to 95 F (35 C), 85% RH if storage exceeds 1 month |
| Ruggedness | IP65 sealed 4′ (1.2 m) drop onto concrete Procedure: 26 drops following MIL-STD-810F-516.5-IV |

# Compliance and Certifications

## FCC

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

## EMC

EN 61326-1: 2012

EN 61326-2-3: 2012

EMC Directive 2014/30/EU

## Electrical Safety

EN 62133: 2002

LV Directive 2014/35/EU

## RoHS

RoHS Directive 2011/65/EU

## India-Battery EPR Marking

GE Oil & Gas India Private Limited

EPR Certificate No.: 1.1595372902047E+20

# Hazardous Area Approvals

For the detailed listing of country and product-specific approvals, refer to the *Approvals Quick Reference Guide (108M1756)*.

For additional technical documentation, please log in to bntechsupport.com and access the Bently Nevada Media Library.

| | |
|---|---|
| CSA/NRTL/C (Approval Option 01) | Class I, Division 2, Groups A, B, C, D |

# Ordering Information

For the detailed listing of country and product-specific approvals, refer to the *Approvals Quick Reference Guide (108M1756)*.

For additional technical documentation, please log in to bntechsupport.com and access the Bently Nevada Media Library.

## VB7-AA

| A: Agency Approval | |
|---|---|
| **01** | CSA / NRTL / C (Class 1, Division 2) |

## Basic Kit

We offer thevb7 Portable Data Collector, Analyzer and Balancerinstrument in a basic kit with the option to purchase System 1 or Ascent software and license separately.

* Kit items below with multiple part numbers listed have limited regional availability due to certification requirements.

| Part Number | Description | Qty |
|---|---|---|
| | vb7Portable Data Collector, Analyzer and Balancersingle channel portable data collector | 1 |
| ACCL0547 or 200350 * | Straight accelerometer | 1 |
| ACCL0561 or 200350 * | Right-angled accelerometer or straight accelerometer | 1 |
| 138M7748 | Transducer cable, 4 ft. straight | 2 |
| MAGF0104 | Accelerometer magnetic base | 2 |
| CABB0560 | BNC to BNC cable, 1m | 2 |
| CABU0213 | USB data transfer cable | 1 |
| 110M8172-012 | LEMO-BNC TTL Tach/Keyphasor cable | 1 |
| PLUS0230 | Category A power plug, USA / Canada | 1 |
| PLSA0241 | Category D power plug, South Africa / India | 1 |
| PLAU0228 | Category M power plug, Australia / New Zealand / China | 1 |
| PLHK0245 | Category G power plug, Hong Kong / UK | 1 |
| PLEU0229 | Category C Power plug, Europe | 1 |
| CBVB0552 | vbx instrument carry bag | 1 |
| 109M2384-02 | Neck strap with Sensor Keeper | 1 |
| 108M4044 | AC power adapter | 1 |
| 108M3536 | SCOUT100_Series and vbSeries Quick_Start_ Guide | 1 |
| MVBX0250 | Instrument Reference guide | 1 |

Metrology certification can be requested when an order is placed, however this service is charged. Standard test data can be requested for free, but is not evidence of calibration.

To request a periodic metrology calibration, contact **Bently Nevada Tech Suppport**.

# Accessory Kits

## Balancing Kit-108M4050-02

| Part Number | Description | Qty |
|---|---|---|
| 113M5529-01 | Reflective tape One roll, 60 cm | 1 |
| LASA0315 | Laser Tach Kit Zone 2 rated | 1 |
| CBL50216 | Laser cable Five meters | 1 |
| MAGA0063 | Laser magnetic stand | 1 |
| CB5G0024 | Sensor Cable Five meters, green | 1 |
| CB5R0025 | Sensor Cable Five meters, red | 1 |
| CBBL0026 | Carrying case for the kit | 1 |

## Zone 2 Laser Tach Kit-LASA0315

| Part Number | Description | Qty |
|---|---|---|
| 108M4064 | Laser Tacho Holder | 1 |
| 108M4066 | Circlips-20Mm Stainless | 1 |
| 108M4067 | Arp115 Oring | 2 |
| 108M4069 | Laser Tach Zone 2 rated | 1 |

## Miscellaneous Parts

| Part Number | Description |
|---|---|
| MAGM0064 | Accelerometer magnetic base Male connection |
| KEY70258 | Keyphasor cable BNC to LEMO |
| VBMR0222 | Stainless safety rings (1 pair) |
| 100M5828 | The vbSeries hard case |
| DTC70262 | The vbSeries dust cover |
| BATT0575 | Replacement battery pack, Li-Ion 7.4 V 5 Ah |

All accessories included in the basic kit, balancing kit and Laser Tach kit may also be ordered separately.

# Additional Accessories

## Software

| Part Number | Description |
|---|---|
| 108M4051 | ASCENT Level 1 |
| 108M4052 | ASCENT Level 2 |
| 3071/01 | System 1 |



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