

vbBalancer® & vbBalancer+®

Instrument Reference Guide

Revision 4 October 2013



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Section 1 – Introduction

Please read this guide thoroughly before operating your new vbBalancer instrument and retain for future reference.

Although this book makes use of common balancing and vibration analysis concepts, it is not intended as a comprehensive guide or training manual. Please ensure you have the relevant knowledge and experience to carry out the procedures described.

***IMPORTANT!** It is essential to follow all appropriate safety precautions when working near rotating machinery.*

Product and Support Feedback

If you have questions that are not answered by this reference guide, please contact help@commtest.com for assistance. Alternatively, visit our website at <http://www.commtest.com> for additional resources and telephone contact details.

Standard Features

Standard features for the instruments include:


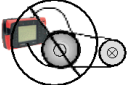




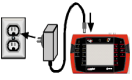
- Balancing capability: single and dual plane
- Tachometer and Keyphasor® (only on vbBalancer+ instrument model) input for speed and phase measurements
- DSP for fast, accurate calculations
- 24-bit A/D converter providing high-precision measurements
- Displacement, velocity and acceleration measurements
- Frequency and time domain measurements
- 1 GB non-volatile flash memory providing almost unlimited recording storage
- USB host port for transferring data to and from an external USB flash drive
- Time- and date-stamped recordings
- vb firmware — Upgradable using Commtest **PROFLASH**
- Temperature compensated graphical LCD (Liquid Crystal Display) with 480 x 320 pixels and white LED backlight
- 4500 mAh custom Lithium Ion battery pack
- Battery charger
- USB and Ethernet interfaces for PC communications


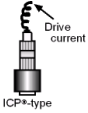
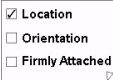



Instrument Capabilities

vbBalancer instrument capabilities vary according to model variant. For details of your specific instrument model's capabilities, see the [technical specifications](#) available on the Commtest website.

Precautions

Please read and understand this section before operating your instrument. Heed all warnings and recommendations to prevent data loss, data inaccuracy, damage to the instrument, or injury to yourself.

	<p>Do not attach sensors to any object with a high potential voltage i.e. a voltage that exceeds 50 V DC or 32 V AC or the 'safety extra low voltage' (SELV) defined by your local power authority.</p>
	<p>Ensure the cables and bootstrap cannot become entangled with any rotating or moving machinery.</p>
	<p>Do not bring any objects sensitive to magnetic fields near the magnetic mounting bases (e.g. cardiac pacemakers, credit cards, floppy disks, video tapes, audio cassette tapes, mechanical watches).</p>
	<p>Do not operate the instrument in an explosive environment.</p>
	<p>Do not detach the battery pack from the instrument for more than 10 minutes. This will cause the instrument's date/time to be lost. The instrument will retain all recordings and other information.</p>
	<p>Neck straps must be connected to the instrument via the 2.5 turn stainless steel rings provided. The strap must not be connected directly to the unit as this will defeat the 10 kg safety release provided by the rings. Replacement rings are available from GE Measurement & Control, Christchurch.</p>
	<p>Use only an approved power adapter 12 V 3 A output, center positive. Do not use the plug-pack transformers supplied with previous Commtest instrument models (such as the vb1000-3000 and Profiler) as these transformers will be damaged.</p>

	The cover over the comms and charger connectors provides an essential seal. It must be in place whenever using the instrument in an industrial environment.
	Ensure that the drive current is turned on when using an IEPE/ICP®-type accelerometer, otherwise the measurements will be incorrect.
	Mount the sensor properly before taking measurements to ensure their accuracy and consistency.
	Use a mild detergent diluted in warm water to clean the instrument. Do not use abrasive or polishing substances, hydrocarbons, petrochemicals or solvents, as they will degrade the plastic casing.
	Do not place the instrument or the magnetic mounting base anywhere that the temperature might exceed 140 °F (60 °C). This will degrade the battery pack and magnet.
	If the instrument malfunctions, return it to an authorized dealer. Do not attempt to repair the instrument yourself as this will void your warranty.

Hazardous Locations

Selected models of the vbBalancer range have been approved by the Canadian Standards Association (CSA) for use in hazardous locations meeting this classification: Class I, Division 2, Groups A, B, C and D.

Those models are clearly identified with the CSA logo and a Hazardous Location information panel.

IMPORTANT! *Models without those markings are NOT approved for operation in hazardous locations.*

The Class I Division 2 classification is officially defined in the Canadian Electrical Code part 1, but can be summarized as:

A location in which volatile flammable gases or vapors are present but confined within closed systems from which they can escape only in case of accidental rupture or abnormal operation; or in which ignitable concentrations of gases are normally prevented by positive pressure or mechanical ventilation, and which might become hazardous through abnormal operation of the ventilation equipment.

The approval specifically covers use in the United States of America and also any other countries which recognize the CSA certification.

When using a certified vbBalancer in a hazardous location, the installation must comply with the vbX Installation Control Drawing for Hazardous Locations, including all its footnotes and warnings. This drawing, number CIL2100VBX, is inserted on the following page.

The vbBalancer instrument will be supplied complete with appropriate sensors for use in Class I Division 2 environments. As indicated on the drawing, alternative sensors may be used, provided they are certified for use in these locations and their entity parameters meet the limits shown on the drawing.

vbX INSTALLATION CONTROL DRAWING FOR HAZARDOUS LOCATIONS

Drawing Number: CIL2100VBX

Entire drawing is for Hazardous Location (Class I, Division 2, Groups A, B, C, D)

Any loop-powered sensor (IEPE/ICP®) with certified input entity parameters:
 $V_{max}: \geq 26.4 \text{ V}$
 $I_{max}: \geq 47 \text{ mA}$
 $P_{max}: \geq 310 \text{ mW}$
 $L_i: \leq 28 \text{ mH} - L_{cable}$
 $C_i: \leq 360 \text{ nF} - C_{cable}$

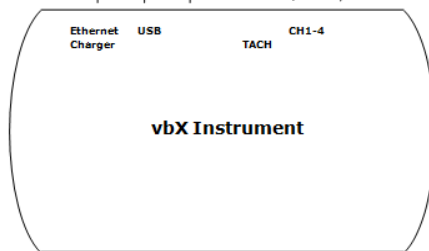
Any externally-powered sensor with certified output entity parameters:
 $V_{oc}: \leq 30 \text{ V}$
 $I_{sc}: \leq 25 \text{ mA}$
 $L_a: \geq L_{cable}$
 $C_a: \geq 2 \text{ nF} + C_{cable}$

Commtest/Bently sensor AM1-100-T2 or A32-100-S4 or A33-100-TM, with cable:
 Length: $\leq 10 \text{ m}$
 Capacitance: $\leq 200 \text{ pF/m}$
 Inductance: $\leq 1 \mu\text{H/m}$

Any sensor powered by the vbX with certified input entity parameters:
 $V_{max}: \geq 5.2 \text{ V}$
 $I_{max}: \geq 53.3 \text{ mA}$
 $P_{max}: \geq 277 \text{ mW}$
 $L_i: \leq 22.8 \text{ mH} - L_{cable}$
 $C_i: \leq 830 \mu\text{F} - C_{cable}$

Any externally-powered sensor with certified output entity parameters:
 $V_{oc}: \leq 30 \text{ V}$
 $I_{sc}: \leq 100 \text{ mA}$
 $L_a: \geq L_{cable}$
 $C_a: \geq 3 \text{ nF} + C_{cable}$

Not to be used in hazardous locations




Battery pack BATT0206 7.4 V 4500 mA Hr Li-Ion
Do not recharge or change in hazardous locations

Warnings:

1. Recharge or change battery only in a non-hazardous area.
2. Use USB or Ethernet only in a non-hazardous area.
3. Substitution of components may impair suitability for Class I, Division 2.

Notes:

1. No revisions of this drawing are permitted without CSA approval.
2. If the sensor model is not specified, any sensor certified for the location may be used provided that the sensor entity parameters meet the above conditions and the final installation meets also the individual installation requirements for each specified sensor.
3. CSA Master Contract: 150368

 PO Box 9257, Christchurch, New Zealand. Tel: (64-3) 9430-700 Fax: (64-3) 9430-727	Title: vbX INSTALLATION CONTROL DRAWING FOR HAZARDOUS LOCATIONS	
	Drawing No: CIL2100VBX	Date: 3 Jun 2013
	Approved by: NL (3 Jun, rev5)	Revision: 5

Installation Control Drawing for Hazardous Locations

Instrument Connections

The top panel of the instrument is equipped with the following connectors:



1. Ethernet port. Connects to a standard 8P8C ('RJ45') male plug terminator
2. USB host port. Connects to an external USB memory device for data import and export (see Export/Import Data via an External USB Flash Drive)

NOTE: vbBalancer instruments with serial numbers below 40800 are not equipped with USB host ports.

3. USB socket. Provides a data connection between the instrument and a host computer equipped with vbXManager software
4. Charger power socket (12 Volt 3 Amp input). This may be used to power the instrument and/or to charge the instrument's battery pack
5. BNC sensor input (Channel 1)
6. BNC sensor input (Channel 2) OR LEMO seven-pin input* (Channels 2 to 4)
7. LEMO four-pin tachometer input

NOTE: This feature is only available on vbBalancer+ instrument model

NOTE: The comms and charger area's protective rubber gasket must be kept closed and in place when collecting data in the field.








Failure to do so may void your warranty. IP65 rating (for instruments with serial number 40500 and higher) applies only while the gasket is securely in place.

Front Panel Buttons

The table outlines the functions of the buttons on the front panel of your instrument.



Instrument front panel

	Turn the instrument On/Off.
	Cancel/Go Back. A long press takes you back to the main menu.
	Accept/Go Forward to the next menu.
	Activate alternate functions for each key. In some menus the keys can perform several functions; to see what options are available press ALT to toggle the key functions.
	Help key: expand onscreen icons with easy to see hint labels. A long press displays detailed help text.
	Navigate up/down through a list. To move more rapidly through a list, press and hold.
	Navigate left/right. Also expands and collapses levels in the navigator and directs movement between split-screen menus e.g. the <i>Review Vibration</i> menu.

LED Indicators

Five LED indicators located on the instrument's front panel indicate the instrument's current state and warn of measurement problems.



Instrument LEDs

Power supply (GREEN)	Illuminates when power is supplied to the instrument from the power adapter.
Charging (RED)	Indicates that the instrument battery is charging.
Danger (RED)	Illuminates when a DSP or critical error occurs, or when the sensor bias voltage is outside the specified range.
Alert (AMBER)	Not used on vbBalancer instrument models.
OK (GREEN)	Indicates that a measurement is being, or has been, collected successfully (without an error or alert triggered).

Charge Battery Pack

To charge your battery pack:

1. Ensure the power adapter you are using is suitable (i.e. 12 Volt, 3 Amp output, center positive).

NOTE: The power adapter supplied with your instrument has the correct DC voltage.

2. Connect the AC power adapter included with your instrument to a powered outlet (100-240 Volt, 50/60 Hz).

NOTE: You can also use the optional car adapter charging lead to charge the battery pack in a vehicle with a 12 V negative-chassis power system.

3. Connect the adapter's DC output to your instrument's charger power socket — The instrument's *Power Supply* and *Charging* LED indicators illuminate to indicate that the instrument is charging.

NOTE: The battery will be fully charged in approximately 3 hours.

NOTE: Ensure you charge the fast-charge Lithium Ion battery pack for at least 1 hour before or during its initial use.

Battery Features

Your instrument is powered by a rechargeable custom Lithium Ion battery pack with a normal operating range of 6.5 - 8.4 V.

It is equipped with an internal backup energy source to protect your data and settings in case the battery pack is momentarily removed from the instrument. The backup remains charged by the battery pack, provided the battery is functioning correctly. Your instrument includes a number of features that help ensure the battery pack is always sufficiently charged.

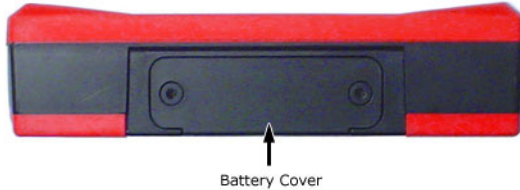
The table outlines the battery behavior in its different states.

Battery state	Behavior
Below 7 Volts	Instrument automatically switches off the back light to prevent further power drainage. It displays a flashing battery icon to indicate the battery needs to be recharged.
At 6.5 Volts	Instrument automatically powers down.
Charge of 25% or less	Instrument enters <i>Complete Powerdown</i> mode when powered off (rather than <i>Sleep</i> mode).

Remove Battery Pack

To remove the battery pack from your instrument:

1. Use a 2 x Phillips head to loosen the screws that attach the battery cover to the bottom panel of the instrument.
2. Set the battery cover aside and extract the battery.



WARNING! Do NOT detach the battery pack from the instrument for more than 10 minutes. This will cause the instrument date/time to be reset. Stored measurement data or recordings will NOT be lost.

WARNING! Ensure power is NOT supplied to the instrument when you remove the battery. Unplug any connected power adapters before removing the battery.

WARNING! You should NOT re-insert a damaged battery in your instrument. Dispose of damaged batteries responsibly and in accordance with local regulations. Do NOT disassemble the battery or use fire to dispose of it. Replacement batteries are available from authorized distributors (part number BATT0206).

Cable Test

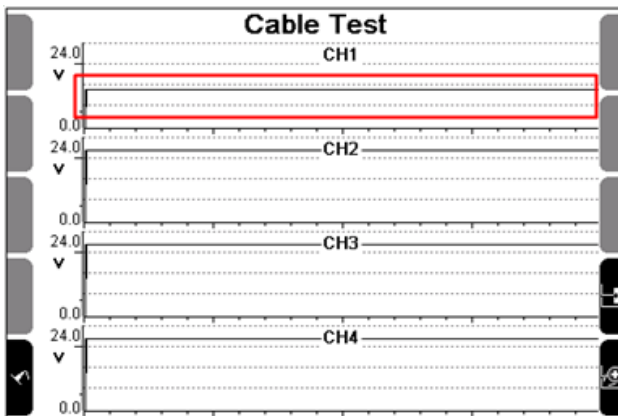
To display a live bias voltage graph of all connected channels and determine whether your sensors and cables are working correctly:

Press **2** or **7** **Measure**.

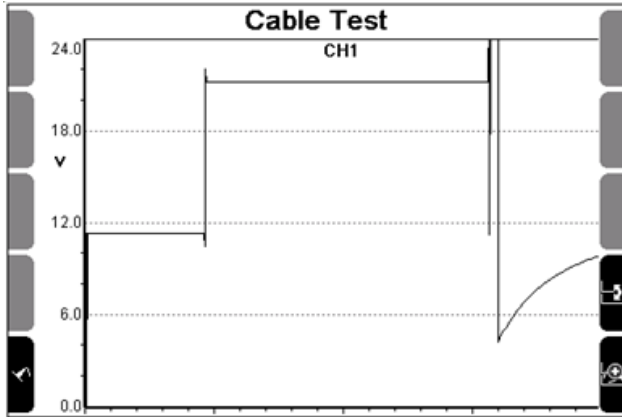
1. Use the navigation keys provided to scroll down and select Cable Test.
2. Press **✓** — The current voltage displays in real time.
3. Move the cable joints to determine whether there is an intermittent short:
 - Consistent data (e.g. a straight line) indicates the cable is working correctly.
 - Varying data (e.g. a varying line) indicates there is a problem with the cable.

*TIP: You can view the data that displays for a particular channel in more detail. To do this, press **9** to toggle and select the channel you wish to view > Press **0** to access an enlarged view of the data.*

NOTE: You can run a cable test for any standard sensor that is supported by your instrument, including accelerometers, velocity sensors, and proximity probes.



Cable test reveals sensor is functioning correctly



Enlarged view of selected channel reveals problematic sensor connection

Operating Overview

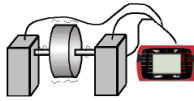
You can use the instrument to perform the following tasks:

- Balance machines using single and dual plane methods
- Take live, free run measurements for onsite analysis of vibration spectra and waveforms

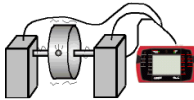
Balancing

Analyze and correct rotating mass imbalance problems in-situ. A rigid rotor can be balanced in one or two planes.

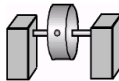
- Take an initial measurement of the imbalance.



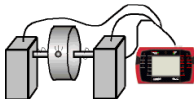
- Attach a trial weight to the balancing plane and take another measurement. For dual plane balancing, do the same for the second plane.



- Attach correction weights to the balancing planes as recommended by the instrument.



- Take a measurement in each plane to confirm that the rotor is balanced. Any residual imbalance can be removed via trim balancing.



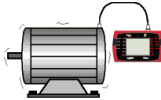
Onsite Analysis

Using your vbBalancer instrument you may measure vibration spectra and waveforms, and analyze them onsite immediately. This feature is suitable for one-off investigations.

- Set measurement parameters on the instrument.

Domain = frequency
Spectral lines = 800
Fmax = 1000Hz
... etc.

- Measure and analyze the spectrum or waveform.



- Record the data to memory (optional).




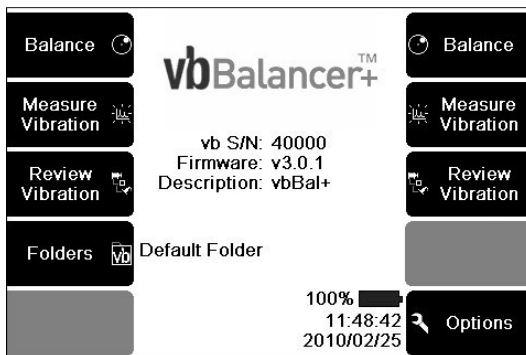
Section 2 – Instrument Fundamentals

This section describes how to perform basic functions on your instrument. You will learn to:

- Power up the instrument and turn it off
- Navigate menus and select options
- Enter and edit characters and punctuation
- Replace the onscreen icons with hint labels
- Display detailed help

Power On/Off


Press  to power up the instrument or turn it off. The following menu displays at power up.




Main menu

The main menu displays details such as the amount of charge remaining in the battery, today's date and time, the instrument serial number, firmware version, the instrument's user-defined description and the name of the currently selected folder.


A long key press on  will always return you to the main menu.

NOTE: Once powered up, and with a battery state above 25%, pressing the  button will place the instrument into Sleep Mode not Complete Powerdown Mode. If the battery state falls below 25% charge, the instrument will enter Complete Powerdown Mode immediately when turned off.


Navigate Menus

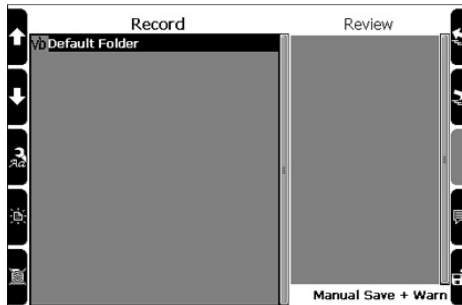
To navigate menus, press the key that displays the name of the task you want to perform e.g. to begin balancing, from the main menu press **1**  **Balance**.







Return to Previous Menu

To return to a previous menu press **X** . If you have opened several submenus, pressing this key will return you to the original menu. A long press will return you to the main menu.

Navigation Keys and Icons


Use the keypad and onscreen arrow icons to navigate backwards/forward through menus, move up/down and across lists, and expand/collapse structures containing other items. When you are working with large numbers of machines, press  to collapse the displayed machine structures. This will speed up navigation as you can move the selection bar from machine to machine, rather than having to scroll through each individual parameter set, location and point.







 	Move the selection bar in the direction indicated.
	Move the selection bar to the top of a single column list. Move one column to the left in a multi-column list.
	Move the selection bar to the bottom of a single column list. Move one column to the right in a multi-column list.
	Expand the highlighted machine structure to show its points, locations and parameter sets. Move to the right side of the screen in a split-screen menu.
	Collapse the highlighted machine structure so that only the top level is visible. Move to the left side of the screen in a split-screen menu.

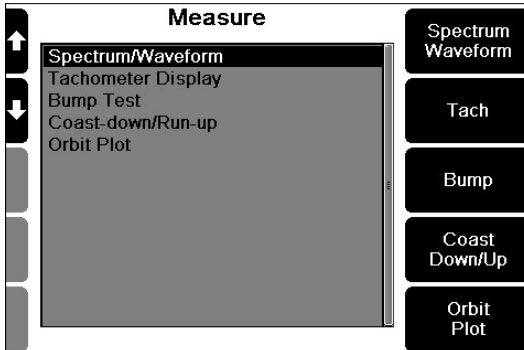
Select Option from List

When there are a large number of choices available they will display in list format. Onscreen arrows allow you to scroll up, down, or across a multi-column list by pressing the arrow keys.

To select an option from a list use the arrow keys to move the selection bar until your option is highlighted > Press  to select that option.

To select an option from a list:

1. From the main menu press  **Measure Vibration**.
2. To select **Tachometer Display** press  or  repeatedly to highlight this option.
3. Press  to select this option.

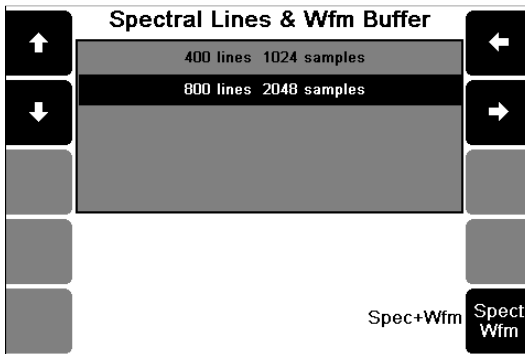


Jump to End of List

When there are a large number of options, left and right arrows will display on either side of the screen.

To jump directly to the end of a list:

1. From the main menu press **2** **Measure Vibration**. (A long key press on **X** will return you to the main menu if you have another menu open.)
2. Select **Spectrum Waveform** by pressing **6**.
3. Press **7** **Spectrum Waveform**. Left and right facing arrows will appear on the right side of the screen indicating that you can 'jump' to either end of this list.
4. To jump to the last entry in the list press **7**. Press **6** to jump to the first list entry.



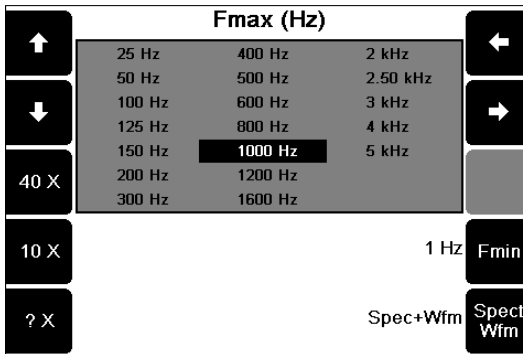
Jumping to the end of a list

Scroll through Multi-column List

You might find lengthy lists displayed in several columns. Where this happens, you can jump across columns and scroll up or down.

To scroll through a multi-column list:

1. Press **X** to return to the *Spectrum/Waveform* menu > Press **8** **Fmax Fmin**.
2. Press **6** or **7** To move to the next column in a multi-column list.



Scrolling through a multi-column list

Cancel

You can press the cancel **X** button to cancel an option and return you to the previous menu.

*TIP: You can press and hold the cancel **X** button to return to the main menu.*

Display Hint Labels and Detailed Help

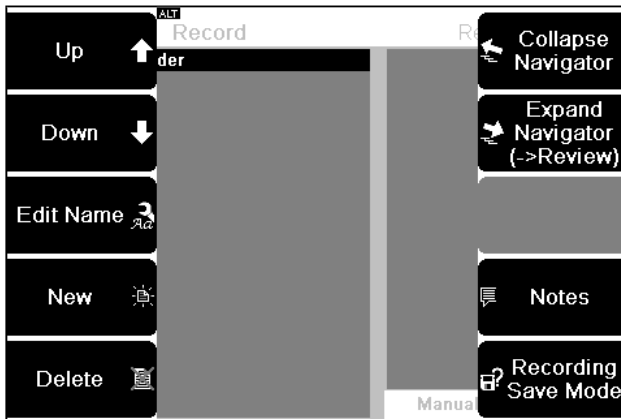
The functions on your screen have hidden hint labels and more detailed snippets of help attached to them. To give you more screen space, the help is hidden by default.

To access the hint labels and more detailed snippets of help:










1. Open the main menu.

*TIP: Press and hold the cancel **X** button to return to the main menu from a submenu you have open.*

2. Open the required menu (e.g. press button **3** to open the *Record Review* menu).
3. Press the help **?** key to display the associated hint labels.
4. Press and hold the help **?** key to display more detailed help.
5. Press the help **?** key again to hide the detailed help text.
6. Press any key to hide the hint labels.



Viewing hint labels

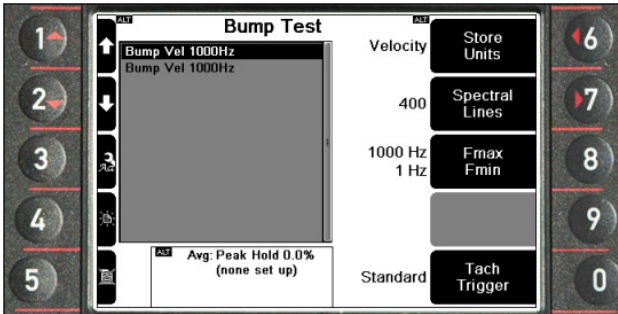
Route 	<p style="text-align: center;">Welcome to HELP!</p> <p>Route Efficient data collection via Routes configured in Ascent.</p> <p>Measure Set Parameters and take Vibration Measurements.</p> <p>Record Review Navigate Machine structure and Review recordings.</p> <p>Folders Add, Edit or Delete Folders and Clear recordings.</p> <p>Balance Use the Initial, Trial, Trim procedure to Balance rotors.</p> <p>Options Config Units, Sensors, Screen, Battery, Time etc.</p>	 Route
Measure 		 Measure
Record Review 		 Record Review
Folders 		
Balance 		 Options

Accessing more detailed help

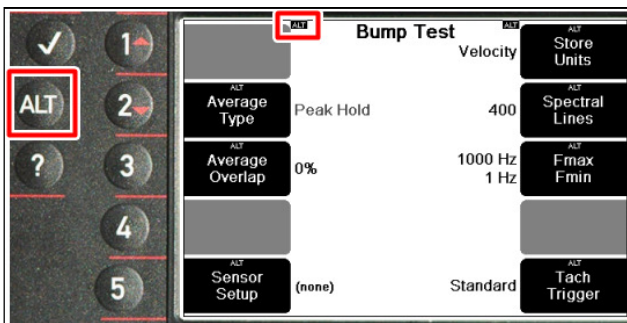
Display Alternative Options

For several of the menu options, one key can perform more than one function. When an additional menu option is available, an **ALT** icon will display at the top of the screen.

You can press the **ALT** key to access a different set of options.



View of menu before pressing **ALT**




View of menu after pressing **ALT**


Enter Characters

The names you enter can be up to 50 characters long. These can contain a mixture of upper and lower case letters, spaces, numbers, and punctuation.


To enter letters and numbers, press the keys repeatedly to cycle through the characters until you reach the one you want to use.

EG: To enter the number 7, press  four times.

You can insert spaces between words, change from upper to lower case, and delete or insert special characters as required.

Pressing  to display hint labels will help you use the various editing commands.

TIP: If you press a different key, the cursor will jump to the next space. If you need to use a character that is on the same key as the previous character, pause for a moment until the cursor moves forward. This will ensure you do NOT overwrite your text.

TIP: Press  if you make a mistake and wish to delete a character.

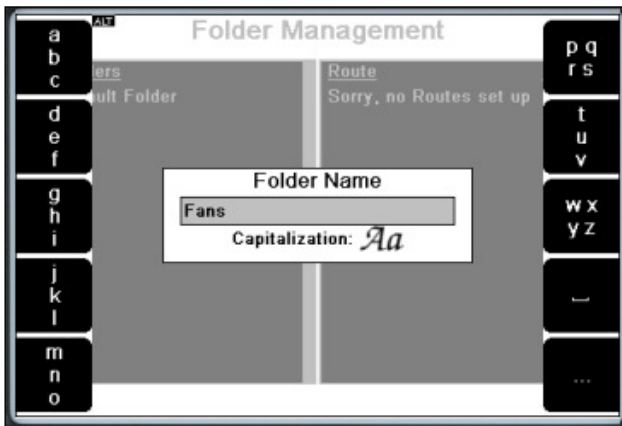
Example – Rename Folder

This example explains how to rename a folder:

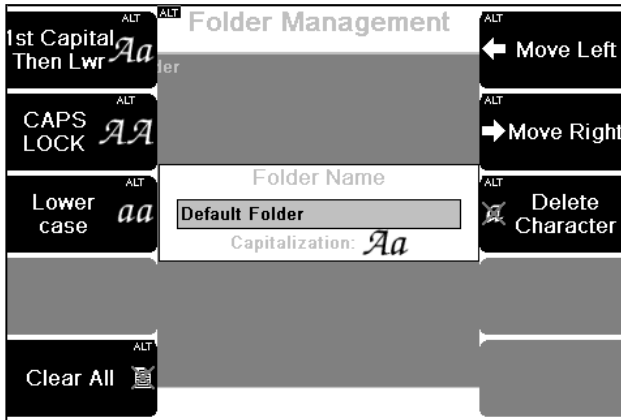
1. Open the main menu.
2. Press **4** **Folders & USB Export.**
3. Press **3** to change the folder name.
4. Press **ALT** > Press **5** to clear the current folder name.
5. Press the buttons provided to select the required letter.

EG: Press **2** three times to enter the letter F.

6. Press **9** to enter a space between words.
7. Press **0** to access the punctuation options
8. Press **ALT** > Press **?** to display the advanced editing menu – You can use this to change case, delete characters, and more.
9. Press **✓** to save your changes once you have finished entering text.



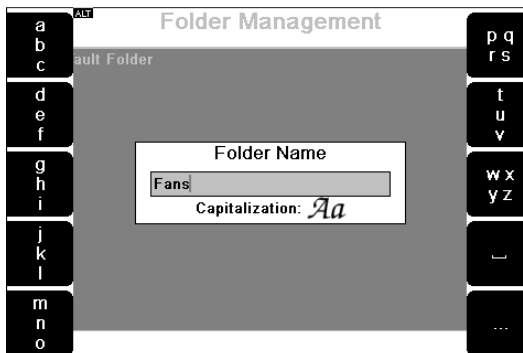
Entering characters



Using the advanced options

Punctuation, Spaces, Special Characters

To add punctuation, from the alphabetic character screen press **0** to display the punctuation menu.



To use a punctuation character press the corresponding key. The instrument will then redisplay alphabetic characters.

Spaces and special characters

You can insert spaces between words, change from upper to lower case and delete or insert special characters as required. Pressing **?** to display hint labels will help you use the various editing commands.


Example

1. From the main menu press **4** **Folders & USB Export**.
2. Press **3** **Edit Name**.
3. Press **ALT** to activate alternative functions then **?** to display the advanced editing menu containing options for lower case letters, deleting characters etc.







Additional Icons






There are additional icons you can use to manage your machines and other items.

TIP: Press  to display the hint labels for a function.

The table lists the additional icons you can use to manage your machines.

Icon	Function
	Create a new machine
	Create a new point
	Create a new location
	Create a new parameter set

The table lists the additional icons you can use to manage any item.

Icon	Function
	Create a new item
	Edit the selected item
	Delete the selected item
	Copy the selected item into memory
	Paste the copied item to the highlighted position

Section 3 – Sensors

This section explains which sensors are compatible with your instrument and describes how to use them.

You will learn:

- What sensors may be used with your instrument
- How to use the supplied accelerometer and tachometer
- How to correctly mount a sensor

Supported Sensor Types

The following tables summarize the sensitivities and types of measurements that can be taken by each sensor supported on each instrument model.

vbBalancer		
Sensor Type	Sensitivity	Measurement Types
Accelerometer	mV/g 0.1-10 000	Acceleration Velocity Displacement

vbBalancer+		
Sensor Type	Sensitivity	Measurement Types
Accelerometer	mV/g 0.1-10 000	Acceleration Velocity Displacement
Velocity Sensor	mV/in/s 0.1-10 000 mV/mm/s 0.34-90.55	Velocity Displacement
Displacement Sensor (or prox probe)	mV/mil 0.1-10 000 mV/μm 0.34-90.55	Displacement

Connect Sensor to Instrument

Sensors are connected to the instrument via BNC and, in the case of the vbBalancer+ instrument, seven-pin LEMO socket. Use the provided triple BNC adapter (LEMO breakout cable) to connect channels 2 through 4 if using these channels on a vbBalancer+ instrument.



BNC (left), seven-pin LEMO (right)

NOTE: The triple BNC adapter's three BNC inputs are numbered to indicate channel.

BNC — Attach the sensor cable plug to the BNC connector(s) by inserting and gently turning clockwise. Remove by turning in an anti-clockwise direction then pulling up

LEMO — To attach a LEMO triple BNC adapter, line up the red dot on the LEMO connector with the red line on the instrument socket and insert. Remove by firmly gripping the connector and pulling away from the instrument without twisting.

WARNING! Do not remove the LEMO connector by pulling the sensor cable. This may damage the cable. Always remove by gripping the end connector.

Sensor Inputs

The table lists the sensor inputs for the balancer instruments.

Input	vbBalancer	vbBalancer+
BNC 1 (Channel 1)	√	√
BNC 2 (Channel 2)	√	
LEMO 1 (Channels 2-4)		√
LEMO 2 (TACH)	√	√

Mount Sensor

The sensor mounting you choose will affect the accuracy (and therefore repeatability) of your vibration measurements.

For walkathon data collection, accelerometers are usually mounted using the supplied magnetic base. However, for optimal high frequency results, you can stud-mount these (see Permanent Mounting).

NOTE: Ensure you mount tachometers, displacement sensors, proximity probes, and current sensors according to the manufacturer's instructions.

Set up Accelerometer

To set up your accelerometer:

1. Plug the accelerometer connector into the BNC sensor input of your instrument.
2. Screw the accelerometer into the magnetic base.
3. Attach the accelerometer to the measurement point using these guidelines:
 - Attach the accelerometer to a sturdy, rigidly mounted, non-flexible structure, where vibration from the rotating part of the machine will be accurately transmitted.
 - Do NOT attach sensors to sheet metal, guards, or any machine structure that is NOT closely coupled to the source of vibration in the spinning rotor. The vibration of this kind of structure will be different to the vibration source.
 - The attachment structure must be at least 10 times heavier than the accelerometer itself. Do NOT mount the accelerometer on lightweight motors or similar parts as the weight of the accelerometer will distort the vibration signal. Use a smaller accelerometer for small structures.
 - To avoid distorted signals, attach the accelerometer as closely as possible to, and in line with, the centerline of the bearings.
 - The mounting surface should be flat and smooth where the accelerometer makes contact. Attach the accelerometer using the magnetic accelerometer base supplied or a threaded stud on the machine surface. The accelerometer should NOT move independently of the machine part it is attached to.
 - Ensure the accelerometer is oriented correctly. Vibration can vary significantly with direction.
 - If you are undertaking an ongoing study of a particular measurement point, always attach the accelerometer at exactly the same position you used for previous measurements

TIP: Mark the position if necessary.

 - Keep the accelerometer clear from other cables to ensure it is NOT twisted, kinked, or tangled.

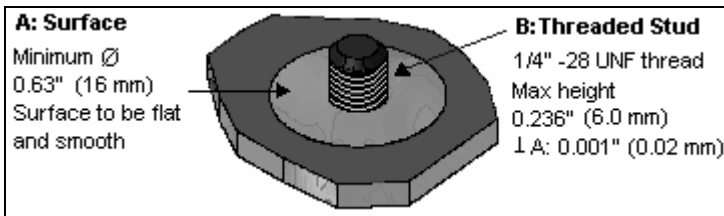
Permanent Mounting

To mount a sensor using the stud method:

1. Follow the specifications shown in the diagram below to prepare a mounting spot on the machine.
2. Unscrew the magnetic base from the sensor.
3. Screw the sensor onto the threaded stud.

TIP: We recommend you use a thread locking compound.

CAUTION! Do NOT use a wrench to tighten the accelerometer. This may damage the sensor.



Stud Mounting Spot

Set up Tachometer

A tachometer collects information about a machine's rotation speed. It provides you with an exact reading of machine speed as a measurement is taken. This is more accurate than using a default RPM because a machine's speed can vary significantly under different loads.




The tachometer also provides information on the angle at which the rotor is vibrating. The angle is measured from a fixed reference mark on the rotor called the phase angle. To balance a rotor, you need to consider the amplitude of vibration and the phase angle. The amplitude shows the severity of the imbalance. The phase angle indicates the geometry of the imbalance.

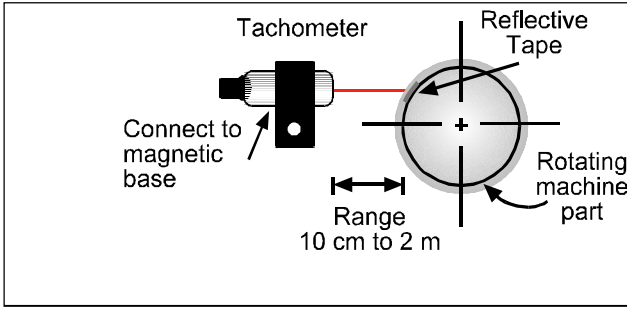
WARNING! The laser tachometer is a class 2 laser product. Do NOT stare into the laser beam.

To set up your tachometer:

1. Screw the block grip extension of the tachometer into the end of the mounting base articulated arm.
2. Plug the cable socket into the tachometer connecting pins > Turn the locking ring to make the connection secure.
3. Locate the *TACH* input on your instrument > Attach the other end of the cable to this (the *LEMO* end).
4. Stop the rotor.
5. Cut out a small strip of the reflective tape supplied (approximately 5 mm x 15 mm (0.2" x 0.5")).
6. Stick this piece of reflective tape to a machine part that rotates at the rotor speed (e.g. the shaft).

NOTE: This trigger spot should provide a pronounced increase in reflection as it passes under the tachometer light beam. The tape width must be at least double the diameter of the light beam spot.

7. Mount the tachometer magnetic base to a stationary portion of the machine, close to the trigger spot.
8. Position the tachometer slightly away from the center line of the rotating machine part so that reflections from the surface of the machine part do NOT interfere with it.
9. Start the rotor > Wait until it is running at normal running speed.
10. Open the main menu on your instrument.
11. Press  to access the *Measure* menu.
12. Press  to access the *Tach* menu.
13. Press  to access the **Tach Type** > Toggle this setting to **Standard** (if you are using the supplied tachometer). — The screen will display the rotor running speed in RPM and Hz. These values will continuously update but should stabilize, indicating that the tachometer is triggering reliably. If the RPM does NOT stabilize, adjust the position of the tachometer.



Ideal sensor positioning

Tachometer Reading

0 RPM 0 Hz	Tach + Vibration
	Tach Type

Standard

The diagram shows a tachometer reading interface. On the left, a box displays "0 RPM" and "0 Hz". On the right, there are four stacked buttons. The top button is labeled "Tach + Vibration" and is highlighted in black. The second and third buttons are grey. The bottom button is labeled "Tach Type" and is highlighted in black. The word "Standard" is positioned to the left of the bottom button.

Preparing to take a tachometer reading

Tachometer Signal from Keyphasor®

If your machine has a proximity-probe based tachometer sensor (e.g. Keyphasor®), this can be used as the tach signal for your vbBalancer+ instrument. The sensor should have a buffered front-panel BNC output, to ensure the instrument's measurements can't interfere with pre-existing speed measurements. Keyphasor LEMO connector tach cables can be purchased through your local Commtest reseller for this purpose.

The Keyphasor proximity sensor gap should be adjusted so the driver box output is $-8\text{ V} \pm 2\text{ V}$ (i.e. -6 V to -10 V) when the sensor is over the shaft. This is the normal mid-range position for these sensors. When the sensor is over the keyway its output will be -14 V to -22 V , depending on its make and model.

A number of enhancements are available for instruments with serial numbers 45000 and higher when taking recordings with a Keyphasor tachometer:

- There are two additional Keyphasor voltage threshold levels, making it easier to choose an appropriate threshold for the machine's Keyphasor probe gap. The previous single threshold level was found to be incompatible with some Keyphasors that had non-standard gap settings. When you take a recording using a Keyphasor tachometer, your instrument will let you know if a recording is tach-triggered but no pulses are detected. You will then be shown the RPM measurements obtained at each threshold level and be prompted to select the one that provides the best measurement of the machine's speed. When the recording is received into Ascent, your new Keyphasor threshold level selection will be retained for future recordings on that machine.
- The Tachometer input of these instruments is also sensitive to both positive and negative signal pulses. Consequently there is no longer a requirement to use the special Keyphasor Tach cable (black strain relief, product code KEY70258). Instead you can use either that cable or the TTL Tach cable (red strain relief, product code TTL70259).

- In addition to the existing *Tach Trigger* and *Off* tachometer modes, it is possible to set the mode to *RPM Only* for all instruments and threshold levels (standard and Keyphasor). You can use the *RPM* mode when you need the tachometer to record machine running speed, but do not require tach triggering (e.g. when you take coast-down recordings on a machine with rolling element bearings). The disadvantage of selecting *Tach Triggering* is that spectral averaging will average away the non-synchronous peaks. This is not ideal when you are trying to find rolling-element bearing faults. Additionally, in *Tach Trigger* mode, the tach signal must be present. This means the recording cannot be completed if the tach is disconnected or faulty. In contrast, *RPM Only* mode records the speed if this is available. Consequently, if the tach signal is not present, the recording is still completed and its RPM value is set to the machine's default speed.

The additional Keyphasor thresholds are available for the following measurement types:

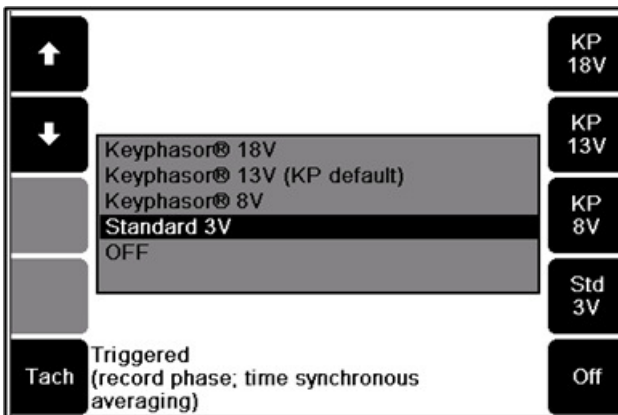
- Spectrum/Waveform
- Demodulation
- Time synchronous Averaging
- Bump Test
- Coast Down/Run-up
- Long Time Waveform
- Orbit Plot

Manual Keyphasor Threshold settings

If a recording is tach-triggered but no pulses are detected, your instrument will prompt you to [select the appropriate Keyphasor threshold settings](#). However, you can also access these settings manually if required. To do this:

1. Use the KEY70258 or TTL70259 cable to connect the TACH input of your instrument to the buffered output of the Keyphasor proximator.
2. Press **2** or **7** **Measure**.
3. Select the required measurement type > Press **✓**.
4. Press **0** **Tach**.
5. Select the required threshold.
6. Press **5** **Tach** to select ONE of these options:
 - **RPM only** – If you only want to record the machine speed (if available) and do NOT require phase data, tach triggering, or time synchronous averaging.
 - **Triggered** – If you want to capture phase and/or perform time synchronous averaging. You can also select this option if you are recording an Orbit plot and require revolution markers.
7. Use the keys provided to select the required threshold.

*TIP: Use the default 13V setting if you are using a Keyphasor but are unsure which threshold to select. Press **0** **Off** if you will NOT be using any form of tachometer. Press **?** for help.*



Selecting the appropriate voltage for your tachometer and machine

Semi-automatic Keyphasor Threshold Selection

If a recording is tach-triggered but no pulses are being detected, your instrument will prompt you to select the appropriate Keyphasor threshold.

If you are performing a Tachometer Display measurement, you can also bring up the same semi-automatic selection screen. To do this:

1. Press **2** or **7** **Measure**.
2. Select **Tachometer Display** > Press **✓**.
3. Press **9** **Tach Threshold** — Your instrument scans through the 3V, 8V, 13V, and 18V threshold levels, displaying the RPM value detected at each one.
4. Use the keys provided to select the threshold that delivers a stable RPM reading and matches the expected speed of the machine you are testing — The threshold value you selected will be used for all subsequent recordings on the machine you are measuring.

NOTE: Your instrument will increase the duration between thresholds to find lower RPM values. This process can take just over a minute. A value of zero will display if there is no RPM value.

Scanning	Threshold	RPM
>	KP 18V	0
	KP 13V	0
	KP 8V	508
	Std 3V	467

Correcting the threshold setting for your tachometer and machine

Section 4 – Measurement Types

This section describes how to setup and take different measurements types.

You will learn:

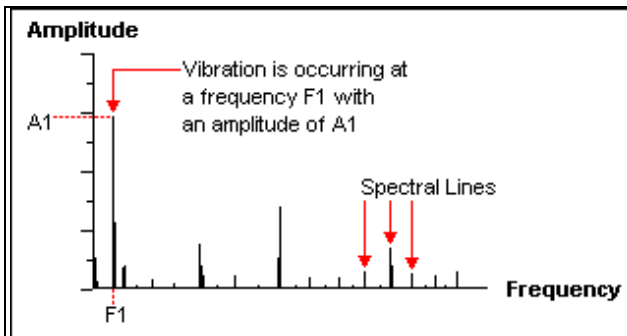
- How to take different types of measurements
- The uses of different measurement types

Spectrum

A vibration spectrum is a chart of vibration amplitude versus vibration frequency. The vibration spectrum of a machine component shows the frequencies at which the component is vibrating and the amplitude of vibration for each of these frequencies.





Spectra consist of discrete spectral lines displayed at fixed frequency intervals. The height of each spectral line represents the amplitude of vibration at that frequency. The more spectral lines in a spectrum, the higher the resolution of the spectrum.

NOTE: Higher spectrum resolutions use more memory.



Simplified version of discrete vibration spectrum

The key parameters you need to set are the number of spectral lines and the Fmax. Doing so will ensure all crucial information is captured. To set these parameters:

1. Open the main menu.
2. Press  to access the *Measure* menu.
3. Press  to access the Spectrum Waveform.
4. Use the arrow keys on the left to select an existing parameter set or press  to create a new set > Set the parameters as required.
5. Press  to start measuring.

Waveform






Waveforms show how vibration levels change over time. A vibration waveform chart represents a series of equally spaced discrete sample points connected by straight lines. The chart shows the vibration level (amplitude) at each time interval during the measurement period. The more sample points in a spectrum, the higher the resolution of the waveform (but the more memory used).

The key parameters you need to set are the duration and number of samples.

The duration determines the equivalent Fmax value. If you later transfer the waveform to Ascent and display it as a spectrum, the Fmax value will be used on the chart.

The number of samples controls the number of spectral lines used when you transfer the waveform to Ascent and display it as a spectrum.

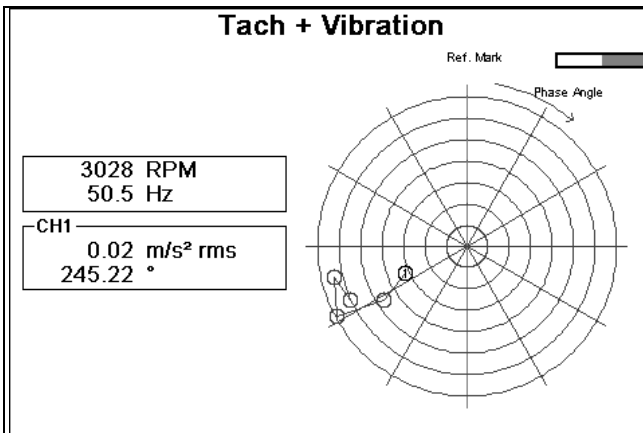
To access this measurement type:

1. Press  or  **Measure**.
2. Press  **Spectrum Waveform**.
3. Press the arrow keys on the left to select an existing parameter set
(or press  to create a new set).
4. Set the parameters as required.
5. Press  to start measuring.

Tachometer Display

Tachometer Display shows an updating readout of the machine speed. It can also display the amplitude and phase angle of the 1X vibration the instrument. This can be used to:

- Verify the machine running speed.
 - View the phase angle of the vibration relative to the tach signal.
 - Take a quick preview of the *out of balance* level.
 - Connect the tachometer that will be used to measure the RPM
 - Attach a vibration sensor if you wish to see the vibration amplitude.
1. Press **2** or **7** **Measure**.
 2. Press **9** **Tach**.
 3. Press **0** to select the standard tachometer or Keyphasor® sensor — The *Tachometer Reading* menu will display a continuously updating RPM and the equivalent value in Hz.
 4. To see the amplitude and phase angle relative to the tachometer signal:
 - a. Press **6** **Tach + Vibration** > Change any parameters as required.
 - b. Press **✓** to take the reading.








Comparing the amplitude and phase angle with the tachometer signal

Bump Test

The bump test is a useful vibration analysis technique. You can use it to help identify resonance frequencies in a machine's structure. This test requires *bumping* (i.e. hitting) the machine structure when the machine is stopped, while taking a peak hold measurement. Careful selection of the mallet or hammer is required, along with the strength and direction of the bump to ensure that suitable frequencies are injected into the structure without causing damage.

Bump test measurements are taken in free run mode and use peak hold averaging. Your instrument will take continuous samples and update the peak value for each spectral line whenever a line exceeds its previous value.

To perform a bump test:

1. Press  or  **Measure**.
2. Use the arrow keys on the left to select **Bump Test** > Press .
3. Use the arrow keys on the left to select a parameter set or press  to create a new set.
4. Set the parameters as required.
5. Press  to begin sampling and bump the machine with a hammer.
6. Repeat step 5 several times.

Coast-down/Run up

Coast-down and run-up measuring involves taking a series of recordings with a short delay between them. You can use this technique to study the resonance behavior of a machine as its speed gradually increases during power-up, or decreases during coast-down.

To take a coast-down/run-up measurement:

1. Press **2** or **7** **Measure**.
2. Use the arrow keys on the left to highlight **Coast-down/Run-up** > Press **✓**
3. Use the arrow keys on the left to select a parameter set > Press **4** to create a new set.
4. Set the parameters as required.
5. Press **✓** > Select the machine location to save measurements to.
6. Press **✓** again to start measuring.
7. After the first spectrum has been recorded, switch off the machine, or begin ramping its speed up or down.
8. Once the machine has stopped rotating, or its speed has been fully adjusted, press **X** to stop measuring and return to the *Coast-down/Run-up* menu.

NOTE: The measurement location will contain several measurements. You can transfer these to Ascent and display them as a waterfall chart. If you used the tachometer as well, you can also display your measurements as a bode plot.

Recommendations

We recommend using a tachometer to obtain the RPM reading for each measurement as this aids interpretation.

You can set the Recording Interval as either a time interval between recordings, or as a change in machine RPM. We suggest using the latter, with the RPM Difference set to machine speed / 20. This will result in approximately 20 recordings being taken during a complete coast-down or run-up.

A large number of recordings are taken during a coast-down or run-up. If you intend to repeat the process several times on a machine we recommend you save each set of recordings to a separate location so that they can be easily distinguished.

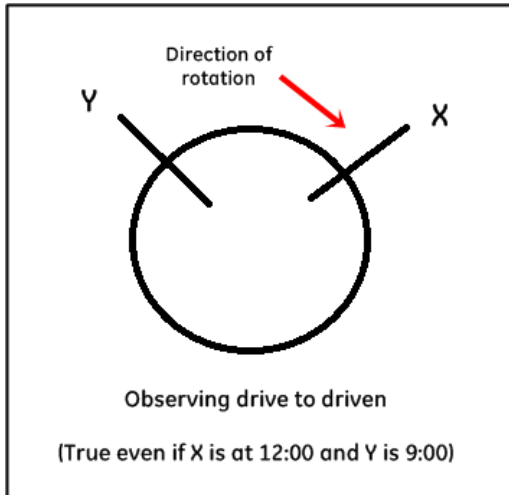
Orbit Plot

An orbit plot shows the motion of the center of mass of a shaft. You can plot a shaft's vibration in two directions simultaneously (e.g. vertical and horizontal) to get a trace of the motion of that shaft.

A perfectly balanced shaft with no movement in any direction produces a dot in the middle of the plot. Unbalanced or misaligned machinery may exhibit as circular orbits, figure eights, leaning orbits, or flat orbits. Rub or looseness may display as indents around the circumference of the orbit plot, or small loops around the larger plot orbit. You can use orbit plots to detect abnormal movements of the shaft in the bearing (e.g. unbalance, misalignment, or rubbing against a drive casing. The shaft movement will give you an indication of its cause. For example, if there is a lot of up/down movement, the machine feet might not be bolted down tightly enough.

Two probes are used when taking and analyzing enhanced orbit plot recordings. These are nominally referred to as X and Y. By convention, when viewing the machine from the driver to the driven end, the Y probe is positioned 90 degrees counter-clockwise from the X probe.

The direction of shaft rotation is not important for the X and Y position. You just need to ensure you view the machine from the driver to the driven end. For example, the Y probe will be positioned 90 degrees counter-clockwise from the X probe regardless of the actual angles and positions used.



The sensors used to take the measurements should be displacement probes. This is because we are measuring the physical movement of the shaft, not its speed. (You can take the readings with an accelerometer if no displacement probes are available but there will be a small loss of accuracy in the displayed plot when the signals are integrated.) The number of samples and measurement duration you choose determines the resolution and length of the orbit recording. We suggest 1024 samples and a duration that covers 4-6 revolutions of the machine being tested. For example, an 890 RPM system (14.8 Hz) has 1 revolution every 67 milliseconds ($6 \times 67\text{ms} = 402\text{ms}$). If you choose 400 ms for the duration, you will just capture 6 revolutions of the machine.

NOTE: Severe rub or looseness can produce random orbit plots.

Once the recordings have been received in Ascent, you can select a recording from either location > Select **Chart > Orbit+Waveform**. The recording at the other location is automatically selected for plotting when you choose the orbit plot option.

NOTE: If you have modified the legacy Orbit chart, this might also display on the Chart menu.

The availability of orbit plot functionality depends on your licensing agreement. If you have the enhanced orbit plot functionality you will also be able to:

- Position your probes at custom angles (e.g. 45 degrees from vertical) and include the direction of the shaft rotation for display and analysis.
- Record tach pulses for any tach-triggered waveform recording, using one average.
- Easily take orbit plot recordings on a route you have set up in Ascent.

NOTE: When using your instrument to collect data on route, if the route includes corresponding recordings for two different axes on the same bearing, these will be collected as an orbit recording.

MORE: Contact your sales representative.

Use Orbit Plot Measure Mode

To take an orbit plot measurement:

1. Press **2** or **7** **Measure**.
2. Use the arrow keys on the left to highlight Orbit Plot > Press **✓**.
3. Use the arrow keys on the left to select an existing parameter set or press **4** to create a new one.
4. Set the parameters as required.
5. Configure your sensors by pressing **ALT** > **5** Sensor Setup.
6. Enable two sensors > press **✓**.

NOTE: Ideally the sensors used to take the measurements should be displacement probes. This is because you are measuring the physical movement of the shaft. If required, you can also take the measurements with accelerometers (if no displacement probes are available). These measure the movement of the bearing housing, not the shaft.

7. Press **7** **Number of Samples** > Select an appropriate number of samples.

TIP: We recommend 1024 samples.

8. Press **9** **Wfm Duration Total Time** > Select a measurement duration.

*TIP: We recommend 4-6 revolutions. You could select **4** Revs followed by the number of revolutions or an equivalent duration in seconds/milliseconds.*

9. Press **0** **Tach Trigger** repeatedly to select the required tach mode.

NOTE: If OFF is selected, you will be prompted to enter the machine's RPM manually before you start measuring.

10. Press **✓** to begin sampling — The sensors will settle and the orbit plot will display.

11. Press **✓** again once the plot has stabilized — A single waveform orbit measurement displays.

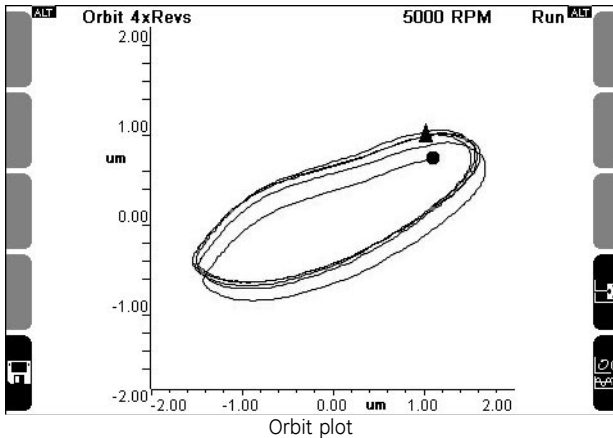
NOTE: Filtering is NOT supported on your instrument. You can use Ascent for advanced analysis.

12. Press **5** **Save** to save the two waveform measurements used to generate the orbit plot.

NOTE: You must specify the vertical and horizontal channels in order to correctly view the orbit plot in Ascent.

NOTE: The circle icon indicates the start position of the waveform. The triangle indicates the end.

13. Press **0** **Change View** to toggle between orbit plot and waveform views.



Take Orbit Plot Measurement on Route

Before you take an orbit plot measurement on route you will need to enable two sensors. To do this:

1. Press **0** **Options**.
2. Press **5** **Sensor Setup**.
3. Enable two sensors > press **✓**.

NOTE: Ideally the sensors used to take the measurements should be displacement probes. This is because you are measuring the physical movement of the shaft. If required, you can also take the measurements with accelerometers (if no displacement probes are available). These measure the movement of the bearing housing, not the shaft.

To take an orbit plot measurement on route:

1. Press **1** or **6** **Route**.
2. Select the route you have set up and imported from Ascent.
3. Press **5** to toggle to the Axis/Point Mode to Multi-Axis (X & Y for Orbit).
4. Press the buttons on the left of the *Multi-Channel On Route* screen to specify you X and Y axes.
5. Press the buttons on the right of the *Multi-Channel On Route* screen to specify all the other the axes you wish to record > Press **✓**.
6. Select the axis point you wish to take a recording for > Press **✓** to begin sampling.

- Press **✓** again once the plot has stabilized — A single waveform orbit measurement displays.

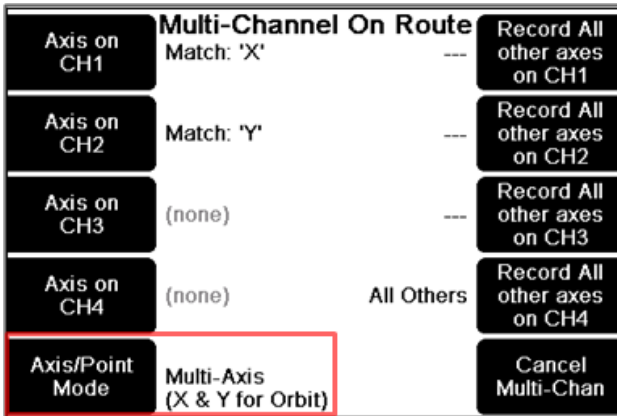
NOTE: Filtering is NOT supported on your instrument. You can use Ascent for advanced analysis.

- Press **5 Save** to save the two waveform measurements used to generate the orbit plot.

NOTE: You must specify the vertical and horizontal channels in order to correctly view the orbit plot in Ascent.

NOTE: The circle icon indicates the start position of the waveform. The triangle indicates the end.

- Press **0 Change View** to toggle between orbit plot and waveform views.



Preparing to take an orbit plot recording on route

Take Multi-channel Simultaneous Measurements

Taking a multi-channel measurement uses the same process as taking a single channel measurement. The only difference is that you must enable more than one channel, and save each measurement separately. You do not have to save each channel's measurements as you can selectively choose which ones to keep, e.g. you can save a measurement taken on channel 2 but discard the measurement taken on channel 1.

Set up Sensors and Channels




1. Select your measurement type and parameters as normal and press **ALT** > **5** **Sensor Setup**.
2. You will need to assign and enable a sensor to each channel you are measuring. Press **Change Sensor** opposite your chosen measuring channel. (If this is new sensor that has not yet been defined in the instrument you will need to create a sensor definition before you can assign it to a channel. See Defining and Editing Sensors.)
3. Use the arrow keys to highlight a sensor > Press **✓** to assign it to your channel.
4. To enable the channel for measuring, press the left key beside your chosen channel. The text will change from '---' to 'Enabled' to indicate that this channel can now be used to take measurements.
5. Repeat this process to enable additional channels > Press **✓** twice to begin measuring. To save the measurements refer to the next topic.

Sensor Setup			
CH1	Enabled	Accel 100mV/g	Change Sensor
CH2	Enabled	Accel 100mV/g	Change Sensor
CH3	Enabled	Accel 100mV/g	Change Sensor
CH4	Enabled	Accel 100mV/g	Change Sensor


Save Multi-channel Measurements

If you wish to transfer your measurements to Ascent, be aware that the program identifies recordings by their location and date/time stamps. If two or more recordings are taken at the *same* time and saved to the *same* location, they will have identical date/time stamp and location details. This will cause Ascent to delete one of your measurements. To prevent this, we recommend you store your recordings in measurement locations that reflect the direction the sensors were placed when the measurement was taken.


To save multi-channel measurements:

1. Press  when you are ready to stop measuring.
2. Press  **Save** — This opens the Select Location to Save menu.
3. Press **Save to** on the right beside the channel you wish to save.
4. Use the arrow keys to select an existing location to save the measurement to, or press  to create a new location.





NOTE: You can save each channel's measurements or select only those you wish to keep.

5. Press  to return to the *Select Locations* menu.
6. Repeat steps 3 to 5 to store your other measurement(s).

TIP: To undo saving of a measurement, press the channel's Save key again — The text will change to Don't Save.

7. Press  when you have selected all the measurements you want to save — Your instrument will display *Data Saved* before returning to the measurement screen.

Select Locations

 CH1: SpectWfm 1000Hz Spect,Wfm	Machine Point Horizontal	Save to..
 CH2: SpectWfm 1000Hz Spect,Wfm	Machine Point Vertical	Save to..
		
		
		

Saving multi-channel measurements

Section 5 – Set Measurement Options





This section describes the different parameters used to take measurements and how to apply them. You will learn:

- What the various parameters are for spectra, waveforms and other measurement types
- How to create parameter sets for taking measurements
- What measurement units and overall scaling options are available
- How to assign sensors to channels

Set Measurement Units, Spectrum Scaling

You can choose the standard US or SI units, or choose your own preferences. The tables below outline the available options.

To select your preferred measurement options:

1. Open the main menu.
2. Press  **Options** > Press  **Measuring Units**.
3. Press  repeatedly to toggle the unit set displayed.
4. Select **Custom** to set your own preferences > Press the keys beside the first option you wish to change.
5. Press the keys repeatedly to cycle through the various options.
6. Press  when you have finished to save your settings and return to the *Measurement Units* menu.

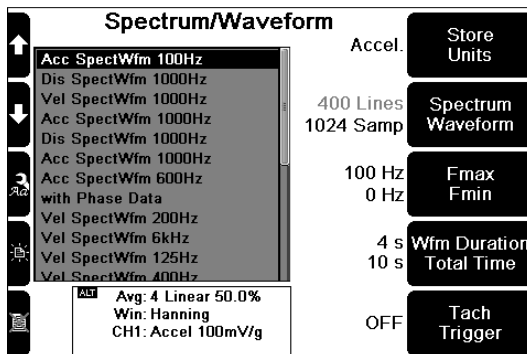
	Units	Spectrum Scaling	Time Waveform Scaling
Accel	g, m/s ²	RMS, 0-pk, pk-pk	RMS, 0-pk, pk-pk
Veloc	mm/s, in/s	As above	As above
Disp	mm, μm, mil	As above	As above

Unit Set	SI	US	Custom
Frequency	Hz	CPM	Hz, CPM
vdB Units	vdB SI (1e-6 mm/s)	vdB US (1e-5 mm/s)	vdB US, vdB SI
adB Units	adB SI (1 $\mu\text{m/s}^2$)	adB US (1 μg)	adB US, adB SI
Linear Speed Distance	mm	in	mm, in
Weight	g, kg	lb, oz	lb, oz, tons, kg, g

Balancing Units			
Quantity	Acceleration	Velocity	Displacement
Units	g	in/s, mm/s	mm, μm , mil
Scaling	RMS, 0-pk, pk-pk		

Set Measurement Parameters

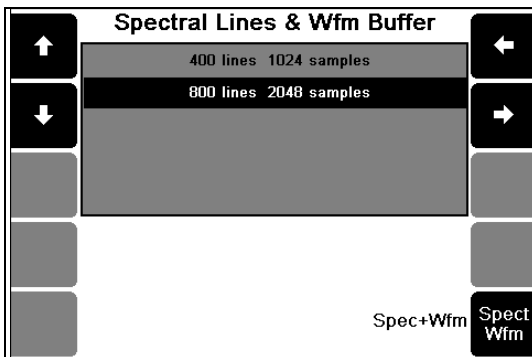
When you select a measurement type (e.g. *Spectrum Waveform* from the *Measure* menu), the default parameters display.



Spectrum measurement setup showing default parameters

To set measurement parameters:

1. Open the main menu.
2. Press **2** **Measure** > Press **6** **Spectrum Waveform**.
3. Press **?** to display the hint labels.
4. Press **4** **Create New Paramset** — The default parameters for a spectrum measurement display.
5. Press a key beside a parameter value to change it — This will cause the parameter to cycle through the available options. Alternatively, a submenu will display, enabling you to enter a value using the keypad or select a value from the list. Press **✓** to save your changes if you have opened a submenu.
6. Press **ALT** to display Averaging parameters and Window type.



Spectral lines submenu

Create your own Parameter Sets

You can create a new parameter set which you can store and reuse. To do this:

1. Access the measurement type you wish to create:
 - a. Open the main menu.
 - b. Press **2** or **7** **Measure**.
 - c. Press the arrow keys to select the required measurement type.
 - d. Press **✓** to select it.
2. Press **?** to display the hint labels.
3. Press **4** **Create New Paramset** to create a copy of the default parameter set.
4. Press **?** to redisplay the hint labels.
5. Press **3** **Edit Name** > Enter a description for your parameter set > Press **✓**
6. Press the keys beside the relevant options to set the measurement parameters.

EG: You could create a custom parameter set for a spectrum waveform and change the store units to acceleration, set the Fmax to 1500 CPM; the ORD to 10 x the machine running speed; the number of spectral lines to 3200; and the average overlap to 62.5%.

*MORE: If you have already defined a sensor and enabled a channel, you can now press **✓** to take a measurement. See *Assigning Sensors to Channels*.*

Assign Sensors to Channels



You will need to specify which sensor is assigned to each channel. When you take a measurement, the instrument will detect which sensor is being used, offer you the appropriate measurement unit, and the overall scaling options to display on your screen.

If you unplug a sensor in order to take a different type of measurement (e.g. if you swap an accelerometer for a current sensor), you will need to assign this new sensor to the channel.

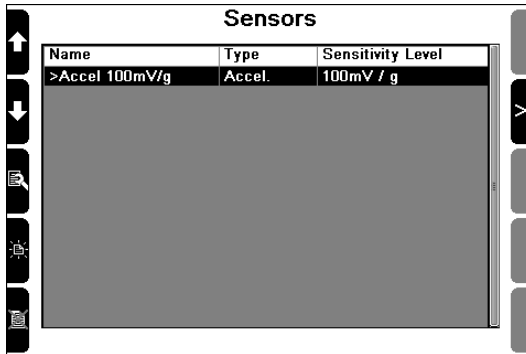
To assign a sensor to a channel:

1. Open the main menu.
2. Press **0** **Options**.
3. Press **5** **Sensor Setup** > Press **Change Sensor** beside your chosen measuring channel.

NOTE: If this is a new sensor that has NOT yet been defined in the instrument, you will need to create a sensor definition before you can assign it to a channel. See [Defining and Editing Sensors](#).

4. Use the arrow keys to select a sensor > Press  to assign it to the measuring channel you selected.
5. Press a key on the left beside your required channel to enable it for measuring — The channel will be labeled *Enabled* to indicate you can now use it to take measurements.
6. Press  twice to return to the main menu.

NOTE: You can enable as many channels as required.



Name	Type	Sensitivity Level
>Accel 100mV/g	Accel.	100mV / g

Multi-channel Measurements

To take simultaneous measurements, follow the procedure described previously and enable as many channels as required.

Spectrum Parameters

This section explains spectrum parameters. You will learn about:

- Fmax
- Spectral lines
- Fmin
- Tach Trigger
- Averaging

Fmax

Fmax is the maximum frequency displayed on the spectrum (i.e. the frequency range, over which vibration amplitudes are displayed, starting from zero).



In general, the higher the operating speed of the machine, the higher the Fmax needs to be to capture all crucial information. For vibration involving fingered elements such as gear teeth, fan blades, pump vanes, and bearing elements, an Fmax equal to three times the number of fingers multiplied by the operating speed is usually sufficient. For vibration not involving fingered elements, an Fmax equal to 40 times the operating speed is usually sufficient.

Some instruments support 60 KHz and 80 kHz Fmax options. This is in addition to the normal options of up to 40 kHz. The special 60 kHz and 80 kHz high frequency ranges can be recorded in Acceleration and single channel only. Instruments that support these Fmax ranges will provide consistent, trendable readings, even though their normal noise, distortion, and anti-aliasing specification (-70 dB) is not met in the 60 kHz and 80 kHz high frequency ranges.

NOTE: If you want to add support for up to 80 kHz Fmax on an instrument manufactured before 1 March 2013, you will need to return the instrument to New Zealand for calibration.

MORE: Contact your local sales representative for details.

You can specify the Fmax of a measurement as an exact value or a multiple (order) of a machine's running speed. To do this:

1. Select your measurement type.
2. Press  **Fmax Fmin.**
3. Press the ORD orders keys.
4. Enter an Fmax orders value.
5. Press  twice to return to the measurement setup.

NOTE: When you take a measurement, the resulting display will use an Fmax with the specified number of orders. The value will be rounded up to the closest Fmax if an exact match is NOT available.

Spectral Lines

The resolution of the spectrum increases with the number of spectral lines used (i.e. the more spectral lines, the more information the spectrum contains). However, the more spectral lines used, the longer the measurement takes. We recommend you only use several spectral lines when required.

EG: You may need to use several spectral lines when you need to distinguish between two closely-spaced vibration frequencies, or when the F_{max} is very large.

For coast-down or run-up measurements, we recommend a resolution of 400 lines.

Fmin


You can use the Fmin setting to eliminate the *ski-slope* effect from the low frequency end of the spectra. All spectral lines **below** the Fmin value will be set to zero and will NOT be included in the overall RMS calculation.

Tach Trigger

When you select **Tach Trigger**, measuring will only start when a tachometer pulse is detected. If *Tach Trigger* is set to *OFF*, the instrument will start measuring as soon as the settling time has elapsed.

Averaging

When measuring vibration, several spectra are usually measured and averaged to produce an average vibration chart. The averaging process minimizes the effect of random variations or noise spikes that are inherent in vibration signals. Averaging is applied to amplitude values, NOT to the frequency range.

You can press  from your preferred measurement setup menu to display the available averaging options.

Average Overlap

Overlapping is a means of quickly collecting and displaying data. As vibration measurements are collected, a percentage of the new data is combined (overlapped) with each subsequent measurement. The higher the overlap percentage, the less newly acquired data is needed to generate a spectrum and the faster the spectrum can be displayed. An overlap percentage of 50% is ideal in most cases.

Waveform Parameters

This section provides more information on the available waveform parameters:

- Equivalent Fmax
- Number of Samples
- Duration

Equivalent Fmax

You can use equivalent Fmax to control the waveform sampling rate by expressing it in terms of the maximum frequency of interest. For example, if you want a waveform with frequency content (Equivalent Fmax) up to 1 kHz, the instrument will automatically sample at 2.56 kHz.

Changing the Equivalent Fmax directly affects the sampling rate, which has an inverse effect on the duration of the waveform.

Number of Samples

The resolution of the waveform increases with the number of samples used i.e. the more samples, the more information the waveform contains. However, the more samples in a waveform, the more memory is used up to store the waveform.

TIP: An easy way to select the number of samples and duration is to let the instrument set them for you. Set the Equivalent Fmax so that it covers your required frequency range; the instrument will select the maximum number of samples and duration that can be used with this Fmax. You can then adjust these values as required.

Duration

The duration of a waveform is its recording time. The duration value depends on the number of samples selected. Increasing the number of samples increases the duration.

Section 6 – Take Recordings

This section describes how to take recordings with your instrument. You will learn to:

- Take recordings
- Review and delete recordings
- Attach notes to recordings

Walkthrough – Take Recordings

Once you have created your machine structures and assigned parameter sets to the measurement locations, you can take recordings. To do this:

1. Connect your sensors to the appropriate measurement locations.
2. Set up the tachometer (if you are taking tachometer readings).
3. Ensure the folder containing the machines you want to monitor is selected — The name of the currently selected folder will display on the main menu beside the *Folders* feature.

*NOTE: To select a different folder, press **4** **Folders & USB Export** > Use the arrow keys to select the required folder > Press **✓** This loads the folder and all its machines into current memory and returns you to the main menu.*

4. Press **3** **Record Review** to display the machines in the selected folder.
5. Press **0** **Save** (if required).

MORE: See [Recording Save Options](#).

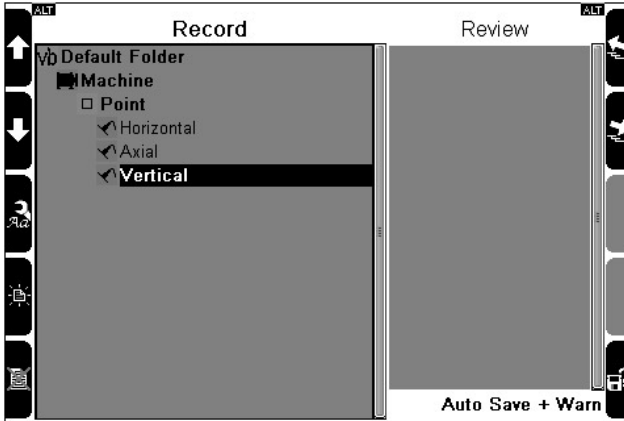
6. Use the arrow keys on the left to scroll up and down > Press **7** **Expand Navigator** repeatedly to expand a machine so its points and locations display.
7. Highlight the parameter set you wish to record.

TIP: If you want to record all parameter sets at a location, highlight the location — The recordings will be taken in the order in which they appear on your instrument.

8. Press  to start the first recording,

NOTE: Your instrument and sensor will take a short time to settle before recording starts.

9. To take additional recordings, select another parameter set (or select a location to record all parameter sets under that location).




Taking recordings


Take Individual and Multiple Recordings

You can record all parameter sets at a location or select parameter sets individually. This enables you to selectively record data. You can also speed up data collection by reducing the number of key presses needed to take multiple recordings at a single location.

Individual recording




To record an individual parameter set, select the set > Press  to start recording.







Multiple recording

To record every parameter set in a location, select the location > Press  to start recording.

Save Recordings

There are several options for saving your recordings when you open the *Record Review* menu. The table outlines these.

Auto Save,  BL, Bands	Your instrument momentarily displays the recorded information on the screen before returning you to the <i>Record Review</i> menu.
Auto + Delay,  BL, Bands	Your instrument displays the recorded information on the screen for several seconds before returning you to the <i>Record Review</i> menu.
 BL	Your instrument displays a data quality message if the difference between the last measurement taken and the preconfigured baseline value is outside the typical or expected range of variance. This applies if a baseline has been configured and if the measurement differs from the baseline by more than 50%.
Bands	Your instrument displays band alarms if these have previously been configured in Ascent.

Record/Review,  BL, Bands	<p>Your instrument pauses after each recording so you can review the details on your screen.</p> <p>Press  to take the next recording. This will either:</p> <ul style="list-style-type: none">• Return you to the <i>Record Review</i> menu.• Start taking the next recording — If you have selected a location with multiple parameter sets beneath it.
Manual Save,  BL, Bands	<p>Your instrument will continuously record the signal and update the information displayed on the screen.</p> <p>Press  to stop measuring.</p> <p>Press  to save the recording.</p> <p>Press  to record the next parameter set without saving your current recording. This will either:</p> <ul style="list-style-type: none">• Return you to the <i>Record Review</i> menu.• Start taking the next recording — If you have selected a location with multiple parameter sets beneath it.

Review Recording

You can review a recording as soon as you have taken it, or once you have stored it.

Review Current Recording

To review a recording as soon as you have taken it, set the instrument's save option to *Record/Review*. To do this:

1. Press **3** or **8** **Record Review** on the main menu.
2. Press **0** repeatedly until *Rec/Review* displays in the bottom right of the screen.

Review Stored Recording

To review recordings you have taken and stored:

1. Press **3** or **8** **Record Review** on the main menu.
2. Use the arrow keys on the left to scroll up and down > Select the recording you wish to review.
3. Press **?** to display the button labels.
4. Press **7** **Expand Navigator** repeatedly to expand a machine so its locations and parameter sets display.
5. Press **8** **Review Selected Recording** to display the newest recording.

NOTE: When you highlight a parameter set, its associated recordings display in the Review column. The newest recording is highlighted at the top of the column.

6. Display older recordings:

- a. Press **7** to select the *Review* column – A black border displays around the column to indicate you can now move up/down through the recordings.
- b. Use the arrow keys on the left to select a recording > Press **✓** to display your selection.

NOTE: An asterisk beside a recording indicates that more than one recording type is contained within the record (spectrum and waveform, or 6Pack combination measurements, for example).

7. Use the cursors, harmonics, and zooming to analyze the data better.

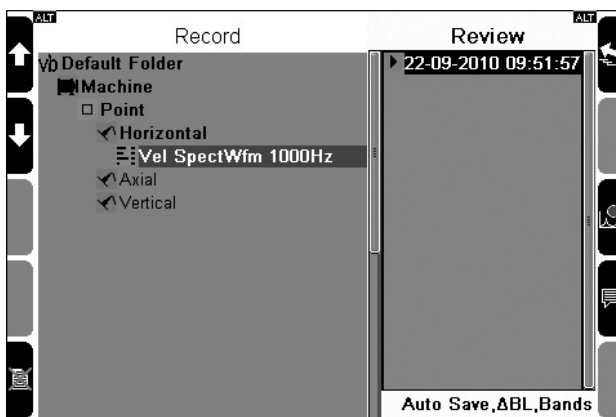
MORE: See [Analyze Measurement](#) for more information on using cursors and zooming.

8. Press **3** **View Schedule** (if required).

9. Press **X** to return to the *Review* column when you have finished reviewing the recording.

10. Select another recording for review or press and hold **X** to return to the main menu.

11. Press **6** to select recordings from a different parameter set, location, or machine navigate – This will take you back to the machine list in the *Record* column. A black border will display around the *Record* column to indicate you can now select items.



The black border indicates all recordings can be reviewed

Delete Recording

To delete a recording:

1. Press **3** or **8** **Record Review** on the main menu.
2. Use the arrow keys on the left to scroll up and down > Select the recording you wish to review.
3. Press **5** to delete the recording.
4. Press **✓** to confirm the deletion.

Attach Note

You can add a text note or comment to a recording. To do this:

1. Highlight the recording in the *Review* column.
2. Press **9** to open the *Note* menu.

Section 7 – Analyze Measurements **Onsite**

This section describes how to take measurements and perform onsite analysis. You will learn to:

- Take a measurement
- Change how a measurement is displayed
- Perform analysis using cursors and zooming
- Set a measurement's RPM
- Store a measurement

Tips for Taking Measurements

Here are some tips to consider when taking measurements:




- Use the operating mode typical of the machine in question (e.g. typical load and running speed). This will ensure the loads on the components (e.g. bearings) are the same as those that define their wear. For multi-operating mode machines, it is best to take measurements when the loads on the bearings are at a maximum. Ensure you take all future measurements in the same mode.
- Ensure you do NOT lean on the machine or place a heavy object on it (e.g. a heavy tool box). Doing so will change the vibratory behavior of the machine.
- Stop any machines that are operating near the machine you are measuring (if possible). Machines operating nearby can affect the vibration of the machine you are measuring.
- In addition to taking measurements:
 - Stop and listen to the sound of the machine.
 - Look for loose bolts and oil leaks.
 - Check whether any machine parts that are vibrating visibly.
 - Touch the machine to check for hot bearings.
 - Touch the area that is vibrating (e.g. with a screwdriver) to look for symptoms that might later aid vibration analysis (if it is safe to do so).
- If you have a stroboscope, you can use this to freeze rotating shafts, belts, and couplings. This will enable you to observe the operating shapes and relative speeds of these parts, which will help with later vibration analysis.

MORE: See [Strobe Output](#) for more information on using your instrument to automatically control strobe frequencies.

Walkthrough — Take Measurement

You can measure a machine onsite and analyze the machine's vibration on your instrument's screen as it occurs. This is a quick way to check a machine. If required, you can also record your vibration measurements, save these against a new or existing machine, and transfer the data to your computer later for analysis.

To measure a machine's vibration using your instrument:


1. Attach the sensor.
2. Attach the tachometer if you wish to take rotor speed and phase angle measurements.
3. Start the machine you wish to measure.
4. Wait until the machine is operating at its normal load and running speed.
5. Open the main menu on your instrument.
6. Press  or  **Measure**.
7. Use the arrow keys to select the required measurement type > Press .
8. Change the default settings for the measurement option (if required).

MORE: See [Change Default Measurement Settings](#) below.


9. Press  to start the measurement.

NOTE: The instrument and sensor will take a short time to settle before measuring begins.


NOTE: Measurements are taken in free run mode. This means the signal on your screen continually updates until you stop the measurement.

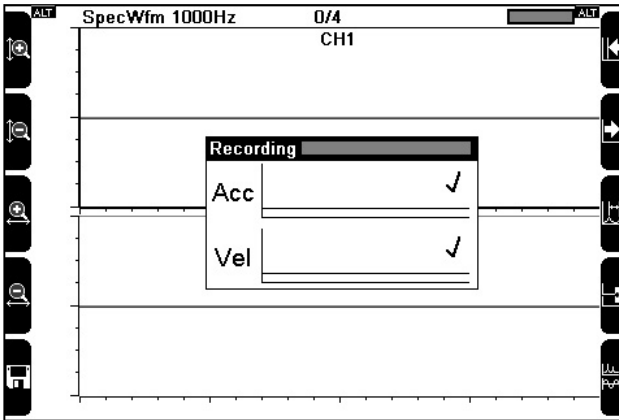
10. Press  to stop the measurement.
11. Analyze the measurement on your screen — E.g. You can display the amplitude of spectral peaks and identify harmonics.

MORE: See [Analyze Measurements](#).

12. Press  to save the measurement (if required) > Select an existing machine location (or create a new one).

MORE: See [Save Measurement](#).

13. Press  to stop viewing the measurement and exit without saving.

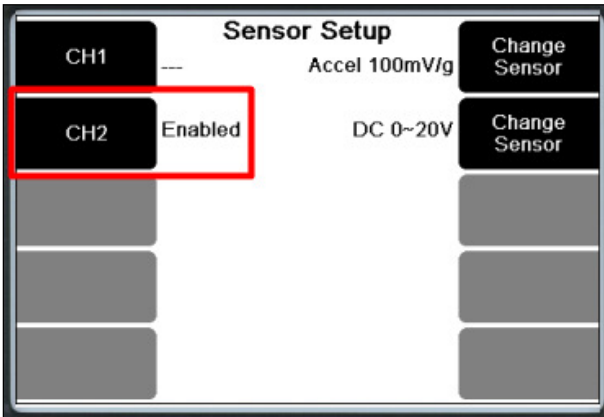


Taking measurements

Change Default Settings

To change the default settings for a measurement option:

1. Press a key on the right beside a setting you wish to change.
2. Press **ALT** > Press a key beside a setting you wish to change > Enter a value or select the required value from the list.
3. Press **✓** to apply your changes and return to the previous menu.
4. Press **ALT** > Press **5** to access the *Sensor Setup* option and select a different sensor.
5. Press the required button on the right to select the required measuring channel.
6. Use the arrow keys on the left to highlight the required sensor > Press **✓** to proceed with your selection.
7. Press the required button on the right to enable your preferred measuring channel.
8. Press **✓** twice to start measuring.

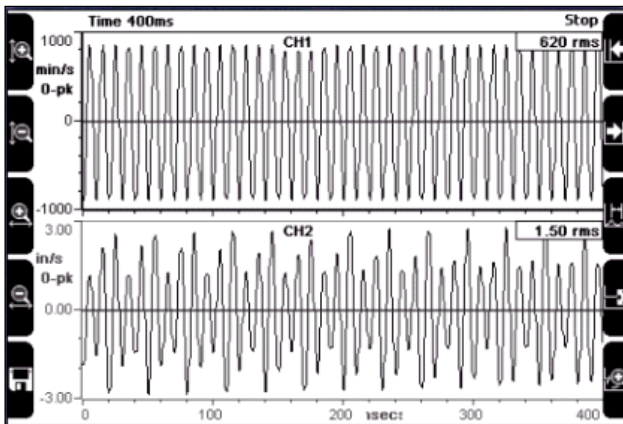


Changing the default measurement settings

Charts


You can display a separate chart on your screen for each measurement channel. Doing this enables you to:


- Watch several live measurements simultaneously
- Freeze and compare all measurements on your screen
- Toggle between charts to view each one individually

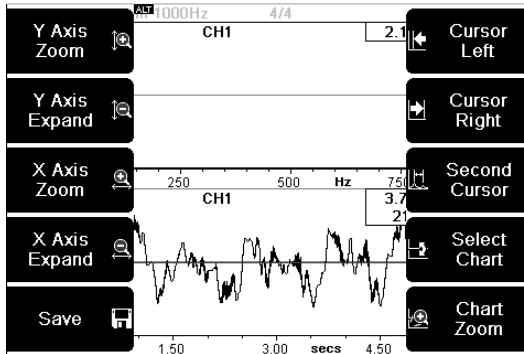


Viewing two waveforms simultaneously

Analyze Measurements

You can press  to stop and analyze a measurement. When you do this, the overall vibration value will display at the top of the screen.

TIP: You can press  to display hint labels for analysis options such as zooming and cursors.



Pressing  displays analysis options

Cursors

Cursors are a valuable tool for analyzing your data. You can use them to show the amplitude and frequency of a peak, identify harmonics, and show the frequency difference between two peaks.

The table provides more detail on working with cursors.

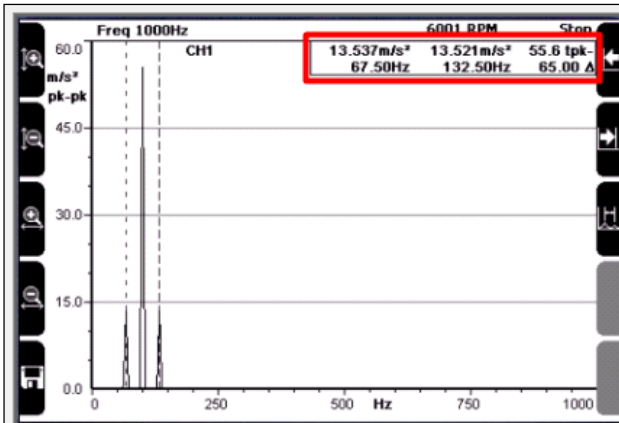
<p>Place one cursor on the chart</p>	<p>Press 6 or 7 repeatedly to activate a cursor and move it across the screen.</p> <p>Press and hold a key to move the cursor rapidly from peak to peak within a displayed waveform recording.</p>
<p>Place a second cursor on the chart</p>	<p>Press 8 Second Cursor — The second cursor will NOT be visible immediately as it will be placed directly behind the first cursor. The values for the new cursor will display at the top of the screen.</p> <p>Press 6 or 7 repeatedly to move the cursor to either side so that it becomes visible.</p>
<p>Toggle the active cursor</p>	<p>Press 8 Second Cursor to toggle between the two cursors. The selected cursor will be darker with a dashed line. The inactive cursor will be a lighter gray with a finely dotted line.</p>
<p>Clear cursors</p>	<p>Press ALT then 8 Clear Cursors to remove all cursors and harmonics.</p>
<p>Display the amplitude or frequency of a peak</p>	<p>Press 6 or 7 repeatedly to activate a cursor and move it across the screen. The frequency and amplitude values indicated by the cursor will display at the top of the screen. A horizontal crosshair across the active cursor will indicate the interpolated amplitude of the selected peak at the cursor location.</p>

Display the frequency or time difference between peaks

Press **6** or **7** repeatedly to activate a cursor and move it to the first peak.

Press **8** **Second Cursor** to add a new cursor to the display > Press **6** or **7** repeatedly to move it to the second peak.

The values for both cursors will display in the top of the screen. The delta Δ symbol will display on the far right. The value beside the delta displays the frequency or time difference between the two peaks.



The delta indicates the frequency/amplitude difference of two peaks

Show or Hide Harmonics

To hide or show harmonics:

1. Press **ALT** > Press **6** **Harmonics Sidebands**.
2. Repeat the previous step to cycle between harmonic, harmonic & sideband cursors, and normal cursors – The selected cursor type is identified by a brief message on your screen.
3. Press **6** or **7** repeatedly to move the cursor over different peaks – Additional cursors will display as whole-number multiples of the frequency or time value indicated by the main cursor.
4. Press **ALT** > Press **8** **Clear Cursors** to remove all harmonics and sidebands.

Zoom

Zooming enables you to take a closer look at a specific area of interest on a chart. The table explains the zooming options available.

Chart zoom and expansion	<p>Magnifying glass icons display on the left of your screen to indicate when zooming is available.</p> <p>If the magnifying glass icons are NOT visible, press ALT to toggle them on.</p> <p>Press ? to display hint labels for the zooming and expansion options.</p>
Zoom horizontally across chart	<p>You can use the arrow keys on the right to expand the peaks of a spectrum or waveform. To do this:</p> <ol style="list-style-type: none"> 1. Move the cursor to the position of interest. 2. Press 3 X Axis Zoom repeatedly to zoom in to the cursor position. <p><i>NOTE: You will zoom in by a factor of two per key press.</i></p> <p>The more spectral lines or waveform sample points used, the more times you can zoom.</p>
Zoom vertically and horizontally	<p>To see low amplitude peaks more clearly:</p> <ol style="list-style-type: none"> 1. Move the cursor to the position of interest. 2. Press 1 Y Axis Zoom to zoom in by a factor of two per key press. 3. Press 3 X Axis Zoom to expand the frequencies on either side of the cursor.
Zoom out	<p>Press 4 X Axis Expand repeatedly to zoom out horizontally.</p> <p>Press 2 to zoom out vertically.</p>

View Multiple Charts

When you measure more than one channel simultaneously, or display a spectrum and a waveform, both charts will display on your screen.

You can view the measurements on all charts at the same time when you view three or more measurements simultaneously. For example, you might be viewing 6Pack recordings. This applies to waveform or spectra only.

When you use an analysis option (e.g. zooming), this will only be applied to the selected chart.

Select Chart

To select a chart:

1. Display your charts.
2. Press **?** to display the hint labels.
3. Press **9** **Select Chart** — The axes of the chart become thicker and darker to indicate the chart is selected.
4. Press **9** repeatedly to toggle to the chart you wish to work with.

Display Single Chart

To display one chart:

1. Select a chart to make it fill the screen.
2. Press **ALT** > Press **9** **Chart Zoom**.

*NOTE: Once you have zoomed in to a single chart on a multi-chart measurement type (e.g. spectrum + waveform or 6Pack), you can press **0** Change View to toggle between measurement type charts.*

3. Repeat step 2 to redisplay all charts (if required).

Change Chart View

You can toggle between waveform and spectrum recordings, and set the default layout of multi-channel and single-channel onscreen measurements using the Change View and Multi Chart Layout functions.

NOTE: The following functions are only available when viewing multi-channel (two or more) and multi-domain (spectrum+waveform) measurements.

Select Chart Layout

To select a chart layout:

1. Display your charts.
2. Press **?** to display the hint labels.
3. Press **0** **Change View** to change the chart type currently displayed. Press repeatedly to toggle between waveform or spectrum displays for up to four channels, and spectrum + waveform to view both measurement types on your screen simultaneously for individual channels.

Change Multi-chart Layout

To change a multi-chart layout display:

1. Display your charts.
2. Press **?** to display the hint labels.
3. Press **ALT** > Press **0** **Chart Data Change** to open the *Multi Chart Layout* screen.
4. Press **5** to choose the channels you want displayed in your *Multi Chart Layout* screen.
5. Press **1** or **2** to select a layout.

NOTE: For single channel displays you can choose waveform, spectrum, or spectrum + waveform. For multi-domain measurements that use three or more channels which all display simultaneously, you can only display waveform or spectrum simultaneously.

Set Y Axis (Amplitude) Scale

You can toggle the left axis scale between Linear, Log, and dB to increase or decrease the amplitude of the peaks displayed. This enables you to see the bigger picture or access a more detailed view of your data. The Linear scale is suitable for most cases. Log scaling (base 10) is more useful for displaying vibration for very large or very small amplitudes.

To access the required option:

1. Display the spectrum measurement on your screen.
2. Highlight your spectrum measurement.
3. Press **ALT** > Press **1** **Y Axis Log** to set the Y axis (amplitude) scaling options.
4. Press **1** **Linear Log dB** repeatedly to toggle between Linear, Log, and dB scaling.

NOTE: VdB and adB scaling are only available when you measure velocity and acceleration respectively.

5. Press **2** **Y Axis Max** — This is the highest amplitude value that will be displayed on your screen.
6. Use the arrow keys to highlight a value > Press **✓** to select the value.
7. Press **3** **Y Axis Range** repeatedly to toggle the Y Axis range — This selects the lowest amplitude value that will be displayed on your screen, relative to your chosen Max value.
8. Press **✓** when you have finished to return to the measurement screen.

Fixed Y Axis scale Options

Setting a Max dB Value sets the highest value that the amplitude axis can display, so if a peak goes above this value while you are measuring you will not see the top of the peak. When using *Linear* scaling you have two extra display options:

- **Automatic** – This allows the instrument to autoscale the left axis to accommodate the highest and lowest peaks.
- **Current** – This fixes the Y axis to whatever amplitude is currently displaying, regardless of how large or small the peaks become.

Amplitude Display Units

Your chosen store units (acceleration, velocity, etc) determine the amplitude scaling options available:

- VdB scale is only available if you are taking velocity measurements.
- AdB is only available if you are taking acceleration measurements.
- Linear and Log scaling are available for all measurement types.

The tables list the amplitude display units you can choose from.

Store Units	Max dB Value	Max dB Value
	Linear Scale	Log Scale
Acceleration	m/s ² , mm/s ²	m/s ² , mm/s ²
Velocity	mm/s, μm/s	mm/s, μm/s
Displacement	mil, mm, μm	mm, μm

Store Units	Y Axis Fixed	Y Axis Fixed
	Linear Scale	Log Scale
Acceleration	automatic, current, mm/s ²	m/s ² , mm/s ²
Velocity	automatic, current, μm/s	mm/s, μm/s
Displacement	automatic, current, m	mm, μm

vdB

The vibration velocity level vdB is 20 times the logarithmic of the ratio of the RMS velocity level to a reference velocity value (the vdB reference).

The value 1e-6 mm/s is an abbreviation for 1x10⁻⁶ mm/s. It is the SI reference level. The value 1e-5 mm/s is the reference level used by the US Navy and several American industries.

adB

The vibration acceleration level adB (US) is 20 times the logarithm of the ratio of the RMS acceleration level to 1 μg RMS.

The SI version of adB is less commonly used, and has a reference value of 1 μm/s².

Set RPM

Setting the 1X RPM enables you to view the chart in orders (for spectra) or revs (for waveforms).

You can enter the RPM manually (if you know it), or set the RPM from a spectral 1X peak.

Enter RPM Manually

To enter the RPM manually:

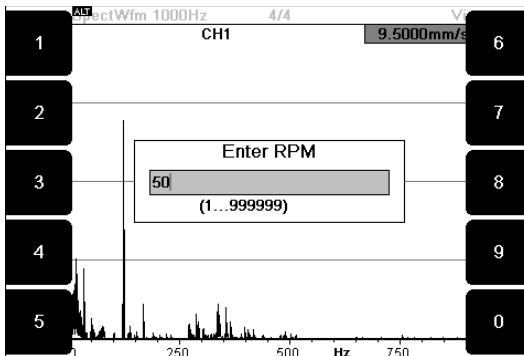
1. Display a measurement.
2. Press **ALT** > Press **F7** **Extended Commands**.
3. Select **Set RPM**.
4. Enter a value using the number keys > Press **✓**

Enter RPM using 1X Peak

To enter the RPM using the 1X peak:

1. Press **F6** or **F7** repeatedly to move the cursor to the 1X peak.
2. Press **ALT** > Press **F7** **Extended Commands**.
3. Select **Set RPM** — The frequency of your selected peak will display.
4. Press **✓** to save this frequency as the RPM value.

NOTE: If a tachometer is connected to your instrument, it will use the RPM from the tachometer rather than an entered value.



View Orders

When orders are displayed, the frequency axis of a spectral chart is labeled in order of running speed, rather than Hz or CPM. This enables you to see how closely spectral peaks correspond to the running speed of the machine.

You can also move a cursor to a peak of interest. The exact number of orders at that frequency will display at the top of your screen.

To view an order:

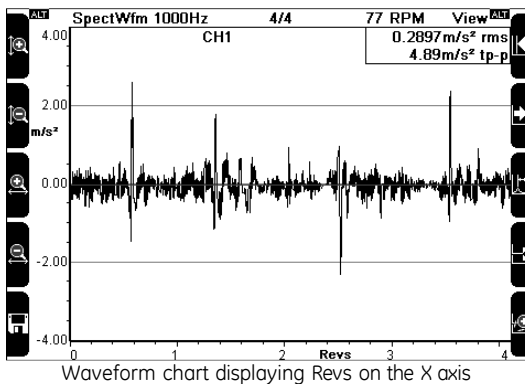
1. Display a spectral chart.
2. Set the RPM.
3. Press **ALT** > Press **3** **X Axis Orders**.
4. Repeat the previous step to deactivate orders.

View Revolutions


When revolutions (revs) are displayed, the time axis of a waveform chart is labeled in revolutions of running speed, instead of your regular measurement units.

To view the revolutions:

1. Display the waveform chart,
2. Set the RPM — The bottom axis will display the revs.



Save Measurement





To save a measurement, press  to stop the measurement > Press **5** **Save**. You now need to select or create a machine, point, and location to save the measurement to.

Save to Existing Machine

To save your measurement to an existing machine:

1. Press a key beside **Save to**.

*NOTE: You can use keys **6** to **9** depending on the number of channels you used for the measurement.*





2. Press  or  to scroll up and down.
3. Press  **Expand Navigator** repeatedly to expand a machine so its points and locations become visible.
4. Press  to save the recording to your chosen location.

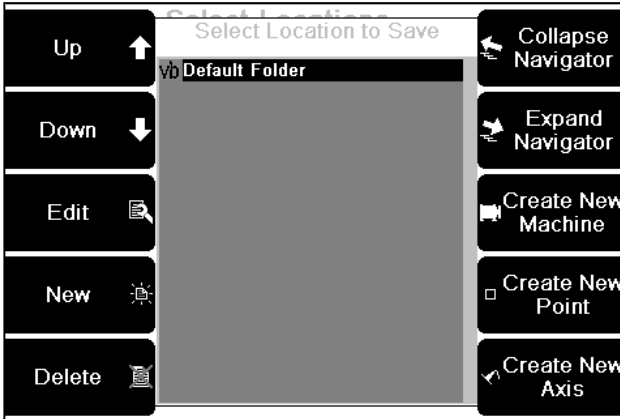
Save to New Machine

To save a measurement to a new machine:

1. Press a key beside **Save to**.

*NOTE: You can use keys **6** to **9** depending on the number of channels you used for the measurement.*

2. Press **8** **Create New Machine**.
3. Enter a name for the machine > Press .
4. Repeat this process to create a point .
5. Press  and use the arrow keys to select a location.
6. Press  until you see the message *Data Saved*.



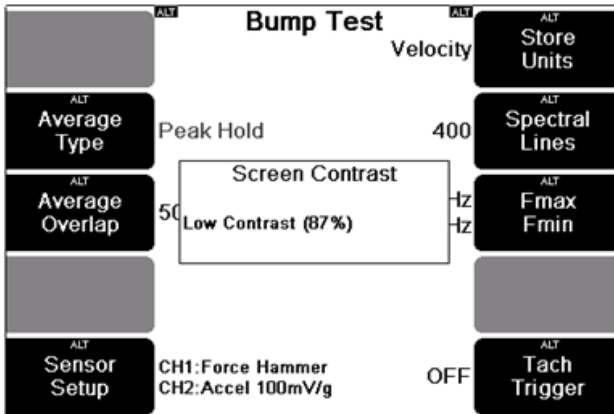
Functions that display when you press **?** after creating a new machine

Change Screen Contrast in *Measure* Mode

You can make a quick adjustment to the screen contrast without exiting Measure or Route mode. This is useful when you are working in an environment that has varying light conditions. To access this option:

1. Press and hold **ALT**
2. Press **1** or **2** to toggle between a high or low screen contrast.

MORE: You can access additional settings by pressing **0**
Options > 6 LCD Contrast/Backlight/Sound.



Adjusting screen contrast while in Measure mode

Section 8 — Balance Rotor

This section describes the procedure for performing balancing operations with your instrument. You will learn to:

- Understand the balancing process
- Select appropriate balancing settings
- Set up a balancing job
- Manually enter balancing values
- Use the instrument's suggested balance weight calculations

Methods for Balancing Rotors

Your instrument can balance rotors that are rigid and do NOT flex significantly at their operating speeds.

An unbalanced rotor has an uneven mass distribution that causes the rotor to vibrate when it rotates. Balancing a rotor requires correcting the uneven mass distribution by adding or removing weight to/from precisely calculated positions on the rotor.

You can balance a rigid rotor in one or two planes. You can correct any uneven mass distribution in the rotor by adding/removing weights to/from one or two selected cross-sectional planes on the rotor.

For single plane balancing, the mid-plane of the rotor is usually used as the balancing plane. The planes at the extreme ends of the rotor are usually used for dual-plane balancing. However, other planes on the rotor can also be used.

The effect of a rotating weight (i.e. centrifugal force) increases with the radial distance of the weight. Consequently it is common to add weight to, or remove weight from, the rim of the rotor (rather than a position close to the center of rotation). Making weight adjustments at the largest possible radial distance minimizes the amount of weight that needs to be added to, or removed from, the rotor.

The centrifugal force of a heavy spot on the rotor that causes the rotor to vibrate increases with the square of the rotational speed. The vibration level of the rotor may be acceptable at one speed but not at another. Therefore, it is important to always allow the rotor to settle to its normal operating speed before taking balancing analysis measurements.

Whether a rotor should be balanced in one plane or two depends on the dimensions and operating speed of the rotor. The table outlines a commonly used guideline.

Rotor Length to Diameter Ratio	Operating Speed	Balancing Technique
0.5 or less	1000 RPM or less	Single plane balancing
	More than 1000 RPM	Dual plane balancing
More than 0.5	150 RPM or less	Single plane balancing
	More than 150 RPM	Dual plane balancing

NOTE: Before attempting to balance a rotor you must confirm that the cause of vibration is uneven mass distribution in the rotor. Good balancing results can be obtained only if vibration is caused by uneven rotor mass distribution. Attempting to balance a rotor with other problems will not, in general, reduce the vibration level.

Balancing Process

You can balance a rigid rotor in one or two planes. This involves:

- **Setting Balancing Parameters** — Select the units and balancing method.
- **Initial Reading** — Measure the initial imbalance.
- **Trial Reading** — Attach a trial weight to the balancing plane and take another measurement. For dual plane balancing, do the same for the second plane.
- **Balancing** — Attach correction weights to the balancing plane(s) as recommended by the instrument.
- **Trim Balance** — Take a measurement in each plane to confirm the rotor is balanced. Any residual imbalance can be removed via additional trim balance cycles.

Balancing Tips

Here are some tips for balancing a rotor:

- Before performing a balance job, clean the rotor by removing any dirt or loose-hanging material (e.g. rust, flaking paint). If the debris later falls off, this may affect the balancing results.
- Ensure any weight(s) you add will NOT come loose at the normal rotor speed or obstruct machine motion. If possible, manually rotate the rotor to ensure the weight does NOT clash with any part of the machine. Keep in mind that the rotor's center line may shift when it operates at its normal speed.
- Ensure the weight of any mechanism used to hold the correction weights in place is included as part of the correction weight. If you are welding on the weight, ensure the weight of the flux is NOT included (scrape the flux off before weighing the electrode).
- Ensure the shape of the correction weight does NOT cause it to become a dirt trap. Dirt accumulated on the weight can cause rotor imbalance.
- It is important to attach the correction weight(s) at the same radial distance as the trial weight.

EG: If the trial weight was attached 2 mm/inches from the center of the rotor, the correction weight must also be attached 2 mm/inches from the center of the rotor.

Tachometer

The tachometer provides your instrument with information regarding the rotational speed of a rotor and the angle at which the rotor is vibrating. The angle is measured from a fixed reference mark on the rotor. It is called the *phase angle*. To balance a rotor, you must consider the amplitude of vibration and the phase angle. The amplitude shows the severity of the imbalance. The phase angle indicates the geometry of the imbalance (i.e. the location of the heavy spot).

MORE: See [Set up Tachometer](#) to learn how to set up the tachometer to measure phase angles.

Suggested Trial Weight Mass and Location

Your instrument can assist with balancing operations by calculating an appropriate trial weight mass and location for you.

MORE: See [Machine Information](#) for help with calculating the trial weight mass.



Manually Enter Balancing Information

You can enter amplitude and phase values manually for the initial, trial, and trim readings. Doing so enables you to:



- Interrupt the balancing process without saving the values, then re-enter these later and continue balancing.
- Experiment with different trial weight masses and placements to see the effect on the imbalance, without having to attach weights to the machine.
- Calculate the effect of further trim balances.
- Change the units used in a final balancing report by selecting different units, then re-entering the collected values.



To enter a value manually:


1. Work through your balancing setup process as usual.

2. Press  to take a reading — The CH1  icon will display.

NOTE: For a dual plane balance, the CH2 icon will also display.

3. To enter your own values for CH1, press  (or press  for CH2 for two channel measurements).

4. Press  to enter an amplitude value > Press  to enter a phase value.

5. Press  twice to exit and return to the Initial, Trial, or Trim Reading menu and continue your balancing job.

Set up Balancing Job

The *Balance Setup* menu gives you a large degree of flexibility in how you set up balancing jobs. Many of the setup items are optional and you can select items in any order you wish.

EG: You can select a machine to save the balancing report to at the beginning or end of the process, or perform balancing without saving the report.

To set up a balancing job:

1. Press **5** **Balance** on the main menu.
2. Press **1** **New Job** — This clears any existing setup data from previous balancing jobs.
3. Press **3** **Setup** > Use the options in the *Balance Setup* menu to apply your preferred balancing settings.

Balance Setup		
Planes & Weight Positions	1 (360°)	WR Weight Orientation
# Sensors	1	
# Averages	1	Standard Tach Type
Machine Information	(optional)	g/kg m Weight Lin Dist
Filter Bandwidth	Wide	mm/s rms Store Units

Setting up a balancing job

The rest of this section describes the *Balance Setup* menu options.

Balancing Walkthrough explains how to use these options when performing a balancing job.

Balance Planes and Weight Positions

Performing balancing operations on a rotor requires you to establish a positioning system for balance weights. To do this, first establish a reference mark somewhere on the rotor circumference. You can then choose the weight positioning system most appropriate for your balance job:

- **Degrees** — Measure the angle in degrees from your reference mark (0° - 359°). The radius of the rotor must stay constant.
- **Circumference arc** — Measure the linear distance around the outside of the rotor from the reference mark to the balance weights.
- **# Fixed positions** — Create a fixed number of attachment positions.

EG: Drilled and tapped holes that are equally spaced on a fixed radius from the center of rotation.

TIP: To assist with physical balancing setup, you can use a different weight position system for each balancing plane.

To perform a balancing operation:

1. Press **5** **Balance** on the main menu.
2. Press **1** **▲** **New Job** to clear your setting.
3. Press **3** **Setup** to use your existing configuration.
4. Press **1** **▲** **Balance Planes** > Use the arrow keys to select the number of balance planes to use.
5. Press **✓** to proceed with your selection — The *Balance Weight Setup* menu displays.
6. Press **1** **▲** **Plane A Weight Position**.
7. Use the arrow keys to select the required option > Press **✓**
8. Enter the required value > Press **✓**

NOTE: If you select circumference arc or # fixed positions, the Circumference or # Fixed Position submenus will open. Here you need to specify the rotor circumference or the number of fixed positions.

*NOTE: You can set the circumference units used (inches or mm) in the Balance Setup screen. To do this, press **9** **Weight Lin Dist** > Press **8** **Linear Distance**.*

9. Press **2** **▼** **Plane B Weight Position** if you selected dual plane balancing > Repeat the previous steps for Plane B.
10. Press **✓** repeatedly if necessary to return to the *Balance Setup* menu and specify your sensor settings.

*NOTE: If you selected dual plane balancing, pressing **✓** will automatically take you to the Balance Sensor Setup menu.*

Sensors

You can use this option to specify the type and number of sensors you are using. This menu also contains an option that enables your instrument to recommend where to place trial weights (optional).

To set up your sensors for balancing:

1. Press **5** **Balance**.
2. Press **3** **Setup**.
3. Press **2** **# Sensors**.
4. Select the number of sensors required > Press **✓**.
5. Press **6** **CH1 Sensor** > Select an existing sensor or press **4** **Create New Sensor** as required.
6. Press **✓** to return to the *Balance Sensor Setup* menu.
7. Press **7** to specify a second sensor for dual plane balancing (if required).

NOTE: Some instruments support simultaneous two-channel dual plane monitoring.

8. Use the CH Position option on the left of your screen if you want your instrument to help you determine where to place trial weights (if required).

Channel Position

Using channel (CH) position is optional. You can use it in conjunction with Reference Mark. The instrument uses this information to calculate where on the rotor you should place your trial weights after taking an initial reading. The aim is to reduce the initial vibration in order to maximize the accuracy of the trial weight readings. Your instrument will recommend a trial weight angle based on the:

- Phase of the initial reading.
- Angle between the tachometer and sensor (CH Position).
- Angle between the tachometer reflective tape and the weight reference mark on the rotor (Reference Mark).

You need to enter **both** the CH Position and the Reference Mark location. This will enable your instrument to calculate the trial weight angle.

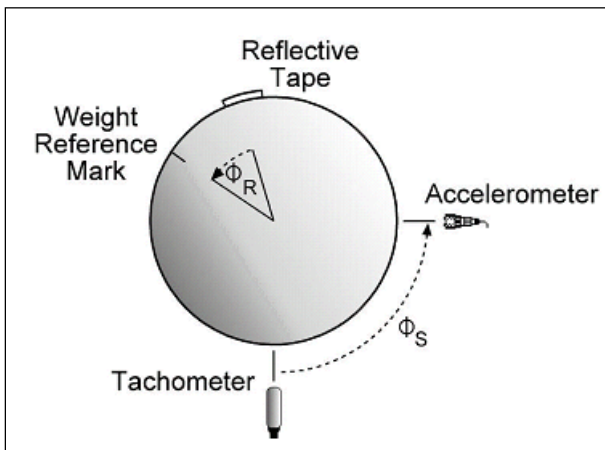
Once you take the initial reading, your instrument will display the suggested trial weight angle in the upper right of the screen.

Angles are measured in the direction you designate as your Weight Orientation (i.e. with rotation or against rotation).

If you are performing a dual plane balance, you should only use this option in cases where each balance plane is physically close to its sensor, and the two planes are separated by a distance greater than the rotor diameter. For overhung rotors, this option should only be used for single plane balancing on the closest bearing and balance plane, to help with reducing the static imbalance. The CH2 sensor and weight reference mark must be in line with that of CH1.

To specify your channel position:

1. Press **5** **Balance**.
2. Press **3** **Setup**.
3. Press **2** **# Sensors**.
4. Select the number of sensors to use > Press **✓**
5. Press **1** **CH1 Position** > Enter the angle from the tachometer to your sensor (Φ_S) > Press **✓**
6. For dual plane balancing, repeat the above step if you want your instrument to recommend trial weight placement angles for both planes.



Using channel position

Averages

Averaging the 'out of balance' values can increase the accuracy of your measurements, allowing the instrument to make more precise recommendations for the size and placement of balance weights. A higher number of averages produces more accurate measurements, but lengthens the recording time accordingly.

Machine Information

Entering machine information is optional. It allows you to specify some of the physical properties of the machine being balanced.

Rotor Weight, Diameter, Speed

Entering the rotor's weight and diameter helps your instrument calculate the appropriate size and placement of trial weights based on your machine's physical properties. The aim is to calculate a trial weight which will cause a significant change from the initial reading.

To enter the rotor's weight and diameter:

1. Press **5** **Balance**.
2. Press **3** **Setup**.
3. Press **4** **Machine Information** on the *Balance Setup* menu.
4. Use the options on your screen to enter the values.

*TIP: If you need to enter a decimal point, press **ALT** > Press **0***

5. Return to the *Balance Setup* menu if you need to change a measurement unit (e.g. for rotor weight or diameter).
6. Press **9** **Weight Lin Dist**.
7. Change the units as required > Press **✓**.

NOTE: Once you take the initial reading, your instrument will display the suggested trial weight mass.




NOTE: A suggested angle and weight will NOT be provided by the instrument if you are using Manual input mode without a tachometer connected.

Reference Mark

Reference Mark is an optional item you can use in conjunction with CH Position. Your instrument uses this information to calculate where on the rotor you should place your trial weights after taking an initial reading.

You need to enter the Reference Mark Location and CH Position. This enables your instrument to calculate the trial weight angle.

To enter your reference mark details:

1. Press  **Machine Information** on the *Balance Setup* menu.
2. Press  **Reference Mark** > Enter the angle from the tachometer reflective tape to your reference mark > Press 
3. Enter zero if these marks are aligned with each other.

NOTE: Once you take the initial reading, your instrument will display the suggested trial weight angle in the top right of the screen.

Filter Bandwidth

Bandwidth filtering is used to filter unwanted vibrations close to the machine running speed.

The following three settings are available:

- **Narrow** — Uses an automatic FMax value of 2 x RPM and a filter bandwidth of the running speed divided by 200. This option removes most nearby frequencies, but will result in slower measurement times.
- **Medium** — Uses an automatic FMax value of 10 x RPM and a filter bandwidth of the running speed divided by 40. This is a good general purpose filter.
- **Wide** — Uses an automatic FMax value of 40 x RPM and a filter bandwidth of the machine running speed divided by 10. This option should be used for low speed machines or when short measurement times are important.

EG: If you were to balance using the Narrow option on a machine running at 3000 RPM, the filter and resolution would be set to 15 RPM (3000 RPM divided by 200), or 300 RPM if using the Wide setting (3000 RPM divided by 10).

Weight Orientation

Weight Orientation enables you to choose where to place balance weights on a rotor, relative to the rotor's direction of rotation. You can place these:

- **With rotation (WR)** — You choose a reference point, then place your weights forward of that point in the direction of rotation (i.e. in the same direction as the rotor turns).
- **Against rotation (AR)** — If the rotor is turning forward, place your weights backwards from the reference point (i.e. in the opposite direction of the rotor's rotation).

IMPORTANT! *Ensure you measure angles in the direction specified with the rotor stationary. Do NOT rotate the rotor in the direction specified.*

Tach Trigger

The Tach Trigger enables you to specify whether you are using a standard tachometer or a Keyphasor®.

Weight Lin Dist

You can use Weight Lin Dist to specify the measurement units for linear speed distance, balance weights, and rotor weight. To change the units displayed:

1. Press **9** **Weight Lin Dist.**
2. Press **8** to cycle through the linear speed options or **9** to open the *Weight Units* menu where you can set balance and rotor weight units.
3. Press **✓** to navigate back to the *Balance Setup* menu when you have set your units.

Store Units





Store units allows you to specify your preferred measurement units and overall scaling for balancing jobs.


Combine and Split Trim Weights

As you continue to fine-tune a balance job, you may end up with several trim weights fixed at various angles on the balancing planes. You can combine all trim weights for an individual plane into one weight/angle solution, or split a larger trim weight into several smaller weight/angle solutions using the Adjust Weights and Split Weights calculators.

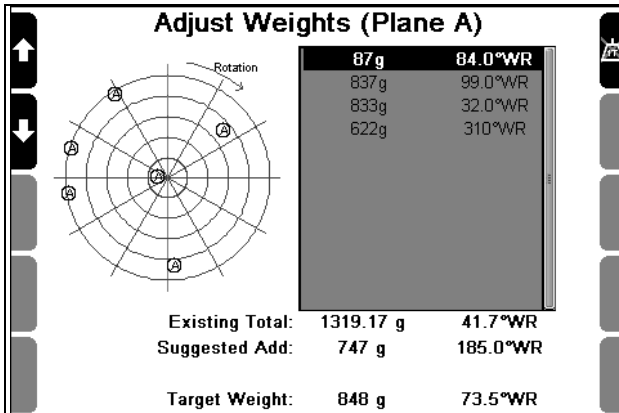
Combine/Adjust Weights

To combine and adjust weights:

1. Take a trim reading.
2. Press  to display the *Balance Weight* menu (or  **Balance Readings** from the *Balancing* menu).
3. Press the arrow key on the left beside Plane A or B.
4. Press  **Adjust Weights** — The *Adjust Weights* menu displays the locations and amounts of your individual trim weights, the weight vector (Existing Total), and the target weight and angle (the trim weight/angle solution you hope to achieve).
5. Use the arrow keys on the left to select one of the trim weights you want to remove.
6. Press  **Remove or Keep** — The calculator will recalculate the suggested weight/angle.

NOTE: You can experiment with different remove/keep combinations by repeating this process. Press  again to add a subtracted weight back to the calculator.











7. Press  when you are satisfied with the suggested weight calculation.



Combine and adjust weights

Split Weight

You can split a larger weight into two smaller trim weights. To do this:

1. Take a trim reading.
2. Press  to display the *Balance Weight* menu (or press  **Balance Readings** from the *Balancing* menu).
3. Press the arrow key on the left beside Plane A or B.
4. Press  **Split Weight** — The *Split Weight* menu displays the location and amounts of your current individual trim weight (Target Weight/Target Angle). It also shows the resultant *effective* weight and angle that your split configuration will achieve (the trim weight/angle solution).
5. Press  **First Weight**.
6. Enter the weight of the first split weight > Press .
7. Press  **First Angle**
8. Enter the proposed angle of the first weight > Press  — The instrument will suggest the second trim weight placement angle and size beside **Second Weight** and **Second Angle**. The *effective* (single-weight equivalent) of the new split weights solution will be displayed beside **Resultant Weight** and **Resultant Angle**. If required, you can also manually experiment with the size and position of the second weight. To do this, you adjust the second weight using  **Second Weight** and  **Second Angle**. Remember that the combination of the two weight/angle solutions should approximate the original single weight solution as displayed beside **Target Weight** and **Target Angle**.
9. Press  when you are satisfied with the suggested weight calculation.

Split Weight			
Target Weight	0.01g	180.0°AR	Target Angle
First Weight	<Enter>	<Enter>	First Angle
Second Weight	<Enter>	<Enter>	Second Angle
Resultant Weight	0g	0°AR	Resultant Angle






Splitting a weight

Adjust Weights for New Radius Location



Trim weight positions may be unsuitable in some situations. For example, an obstruction might prevent you from placing a weight on a fan blade near the blade tip. In this case you would need to move the weight closer to the fan hub.

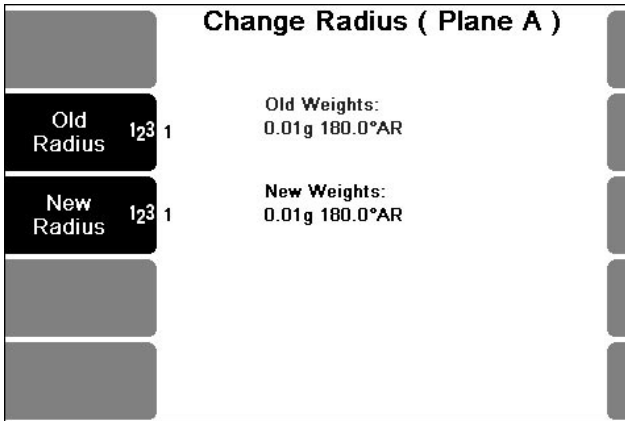
Because trim weight positions are not always suitable, your instrument includes a calculation tool. This tool recalculates the required weight for various locations along the balancing radius.

To reposition trim weight along the balance radius:

1. Take a trim reading.
2. Press  to display the *Balance Weight* menu (or press  **Balance Readings** from the *Balancing* menu).
3. Press  **Change Radius Plane A** (or Plane B) — The *Change Radius* screen opens.
4. Press  **Old Radius**.
5. Enter the current radius position > Press .

NOTE: The value can be in any distance (unit: feet, inches, meters, etc). Only the ratio between the old and new radius is being calculated.

6. Press  **New Radius**.
7. Enter a new radius position.
8. Press  — The new adjusted weight suitable for this new radius will be displayed beside **New Radius** at the center of the LCD screen in the default weight values previously configured for the instrument.




Adjusting weights for a new radius location

Review Previous Balancing Job

You can review previous balancing jobs. To do this:

1. Press **5** **Balance** on the main menu.
2. Press **2** **Select Machine**.
3. Use the arrow keys on the left to select a machine — All balancing jobs associated with that machine will display in the *Recordings* column on the right.
4. Press **7** to select the *Recordings* column — A black border will display around it, indicating you can now browse through the recordings. The newest balance job is highlighted at the top of the column.
5. Press **✓** to display the selected recording or use the up/down arrows on the left to select another.
6. Press **8** **View and Save** on the *Balancing* menu to access the *Balancing* report.

Section 9 – Balancing Walkthrough

This walkthrough guides you through the process of balancing a rotor using single and dual plane balancing. Dual plane balancing requires additional steps; these extra steps are indicated with this symbol 

You will learn to:

- Take initial imbalance measurements
- Set up and apply trial weights
- Balance the rotor using correction weights
- Perform trim balancing to further reduce the vibration
- Save and review your balancing job
- Produce balancing reports

Step 1 – Set up New Balance Job

To set up a new balance job:

1. Press **5** **Balance** on the menu > Press **1** **New Job** to clear any previous settings.
2. Press **3** **Setup**.
3. Use the options in the *Balance Setup* menu to choose the required settings for your balancing job.

Balance Setup			Weight Orientation
Planes & Weight Positions	1 (360°)	WR	
# Sensors	1		
# Averages	1	Standard	Tach Type
Machine Information	(optional)	g/kg m	Weight Lin Dist
Filter Bandwidth	Wide	mm/s rms	Store Units

Set up new balance job

Step 2 – Take Initial Reading

To take an initial reading:

1. **Stop the machine.**
2. Attach the sensor to the bearing housing closest to the rotor.


TIP: For best results, attach the sensor in the radial direction in which the machine is most flexible (and vibrates the most).



For dual plane balancing, attach a sensor to each of the bearings supporting the rotor. It is NOT important how the sensors are paired or which sensor is attached to which end.


3. Set up the tachometer (see Setting up the Tachometer.
4. **Start the machine** > Let the rotor settle to its normal operating speed.

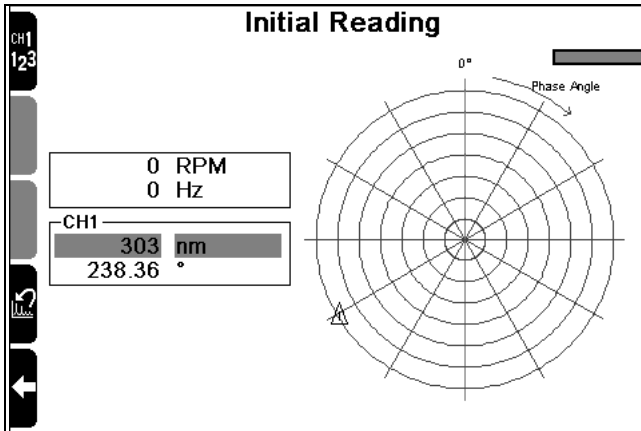
NOTE: Because the vibration level depends on the speed of the rotor, it is important to take all readings while the rotor is operating at its normal speed.

5. Press  from the *Balance Setup* menu to take the initial reading —The initial reading measures the *out of balance* level of the rotor.
6. After a few seconds, the instrument displays the speed of the rotor in RPM and Hz, the vibration level due to the imbalance (i.e. amplitude at 1X the rotor speed), and the phase angle of the vibration.



For dual plane balancing, two sets of values display.

7. Wait for the readings to stabilize > Press 



Taking an initial reading

Step 3 – Take Trial Reading

To take a trial reading:


1. STOP THE MACHINE.
2. Establish a reference mark on the balancing plane — This will be used to measure the angular position of the trial weight and the final balance weights. The reference mark can be at **any** position around the balancing plane. It does NOT need to be referenced to the tachometer reflective tape position.






For dual plane balancing, ensure you also establish a reference mark on Plane B. It does NOT need to correspond with the Plane A reference mark.

3. Attach a trial weight to the balancing plane.

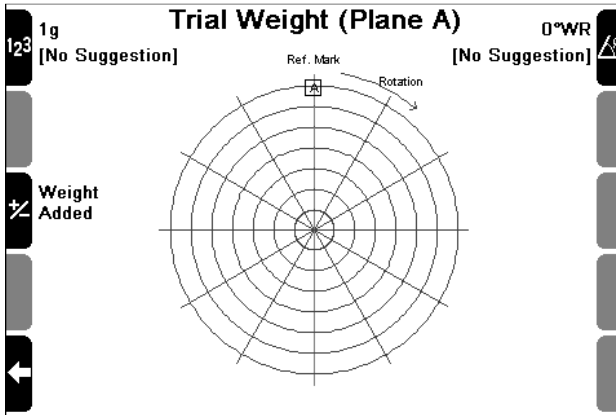
IMPORTANT! Ensure the trial weight is NOT too large as this may damage machine bearings. You will also need to ensure it is NOT too small, as its effect will be imperceptible. Your trial weight must be of sufficient mass to change the imbalance by approximately 30% in amplitude or 30% in phase (these figures are the industry norm). The change must be seen by at least one sensor for each Trial reading. This will enable the instrument to calculate accurately.

4. Ensure the trial weight position is close to the rim of the rotor.
NOTE: It can be at any angular position.
5. Starting at the reference mark, measure the angular position in the direction you specified for the Weight Orientation — This will either be With Rotation (WR) or against rotation (AR).
6. Press  from the *Trial Weight* menu.
7. Enter the value for your trial weight.

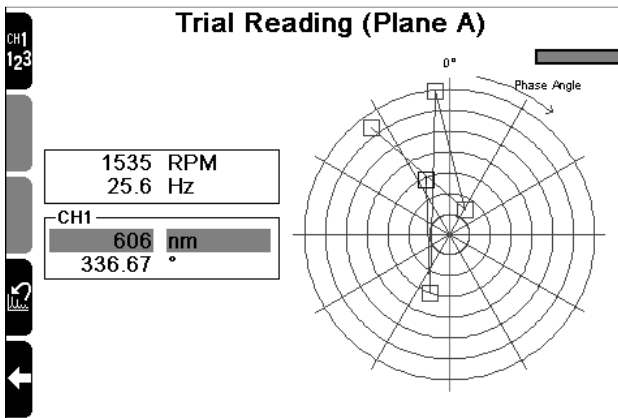
TIP: If you need to enter a decimal point, press  > Press 


8. Press  to return to the *Trial Weight* menu.
9. Press  > Enter the position of your trial weight in relation to the reference mark.
10. Press  to return to the *Trial Weight* menu.

11. Press **3** to specify whether you are adding or removing (drilling out) a weight.

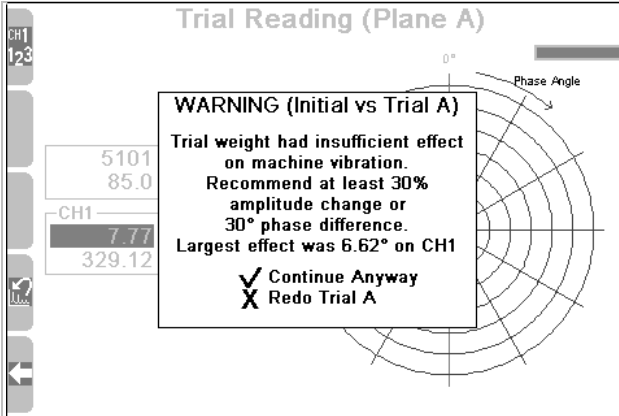


12. Replace the safety covers.
13. Start the machine again.
14. Let the rotor settle to its normal operating speed.
15. Press **✓** to take a reading of the imbalance with the trial weight added — After a few seconds, the instrument displays the speed of the rotor in RPM and Hz, the vibration level with the trial weight added.



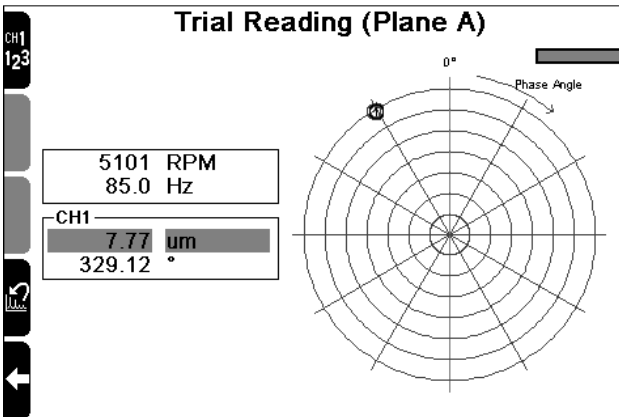
16. Wait for the readings to stabilize > Press 

NOTE: If the trial weight was NOT of sufficient mass to affect the imbalance, the instrument will display a warning prompt. You can redo the trial reading several times if required, or continue with balancing.



17. Press the appropriate key when the instrument displays the prompt *Will the Trial Weight be removed now?*

NOTE: You can redo the trial reading several times if required or continue with balancing.





For dual plane balancing, perform the same procedure for Plane B — Attach a trial weight, enter its position, and specify whether weight is being added or drilled out. If you are removing trial weights, you must remove the Plane A trial weight before you do the Plane B trial reading.

Step 4 — Balance Rotor

The *Balance Weight* menu displays when you complete the Initial and Trial Readings. Your instrument displays the weight required to correct the initial imbalance and the angular position at which it must be attached.

To balance the rotor:

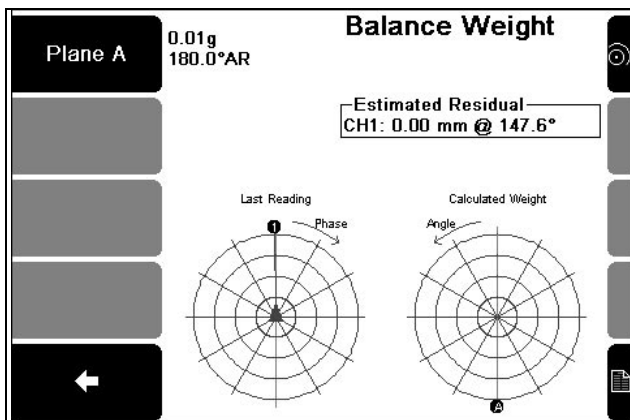
1. **Stop the machine.**

IMPORTANT! If you are removing trial weights as you go, ensure you do this before attaching your correction weight.

2. Attach or remove the recommended correction weight as indicated by your instrument.
3. Proceed to *Trim Balance*.





For dual plane balancing, two sets of values will display.

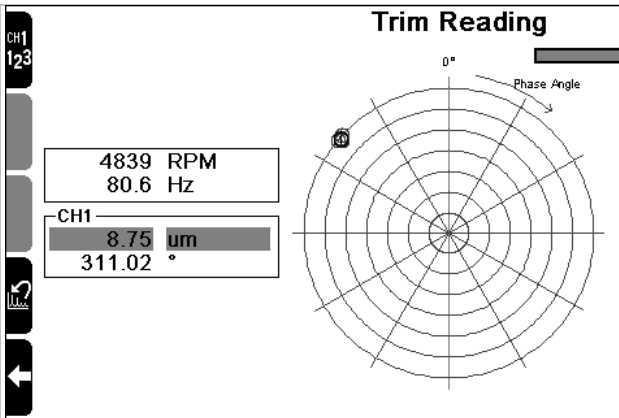


Balancing the rotor

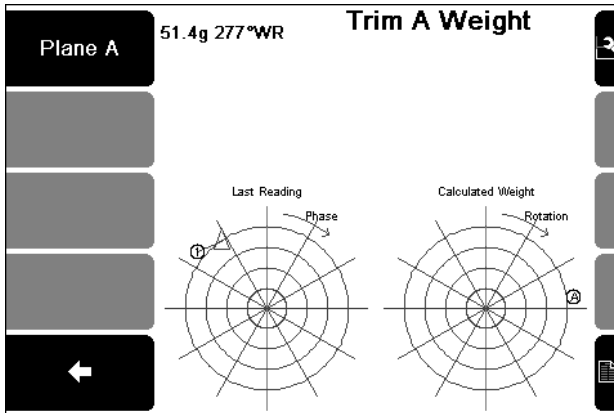
Step 5 – Perform Trim Balancing

To perform trim balancing:

1. Replace safety covers,
2. Start the machine again.
3. Let the rotor settle to its normal operating speed.
4. Press  to take a trim reading — After a few seconds, the instrument displays the vibration level with the imbalance corrected.
5. Press  to accept this measurement — The instrument displays the details of the additional weight adjustments required to trim balance the rotor (i.e. to further reduce the level of vibration/imbalance). You can end balancing at this point or continue with another reposition of trim balance weights (as indicated) to improve on the balance level. Repeat trim balancing until you are satisfied with the results.



Taking a trim reading



Taking a trim reading

Step 6 – View and Save Balancing Jobs

If required you can view and save your balancing job (optional).



Press **0** to view the *Balancing Report* menu – This displays the results of your initial and trial readings, the balance reading, and trim balances.

Balancing Report		
	Plane A (g °WR)	CH1 (um rms)
Initial	---	7.97 327°
Trial-A	1 @ 8°	8.00 328°
Bal.	45.96 @ 259°	8.91 309°
Resid.	51.41 @ 277°	---

Accessing a *Balancing* report

Save Balance Job

To save the balance job:

1. Press  **Save Balance Job** from the *Balancing Report* menu.
2. Select or create a machine to save the balancing job to.
3. Press  — The balance job will be saved to the same machine in your Ascent database the next time you transfer the containing folder to your computer.

NOTE: You can save multiple balance jobs to a single machine to create a history of balancing.

Section 10 – Create, Edit, Delete Items

This section describes the procedures for creating folders, machines and other items within the instrument. You will learn to:

- Create and manage machine structures, sensors and notes
- Copy and delete items
- Restore items
- Rename and edit items
- Attach and remove notes

Storage Capacity and Recording Volume

Your instrument's storage capacity is determined by the amount of available memory space. There is no limit to the number of routes, folders, and machines you can store on your instrument. However, the memory space on your instrument will decrease as you store recordings. The number of recordings you can store depends on the type and setup of those recordings.

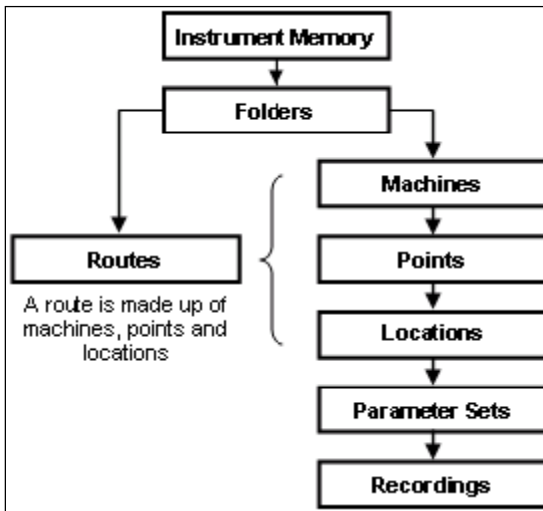
EG: You can store more 400 line spectra than 10-minute long time waveforms because spectra take up less memory space.

Organize and Store Recordings

In addition to analyzing recordings onsite, you can store recordings on your instrument, transfer these to your computer and analyze these in your own time.

TIP: Analysis is best carried out away from machines in a safe, quiet environment.

The image outlines the hierarchical data storage structure which your instrument uses.



Data storage structure on your instrument

The table provides more detail on the components of the data storage structure on your instrument.

Folder	<p>This is used to group and identify machines.</p> <p><i>EG: If you collect vibration data from several factories, you should use a different folder to hold each factory's machines.</i></p>
Route	<p>This is a sequential list of machine measurement locations you follow when taking recordings.</p>
Point	<p>A point represents the position on a machine where a measurement will be taken.</p> <p><i>EG: Drive end or driven end.</i></p>
Location	<p>Also known as axis, this refers to the direction a sensor is facing when you place it on a machine.</p> <p><i>EG: Horizontal, vertical, tangential.</i></p> <p>Because you can vary the direction (location) of the sensor with each new recording, each machine point can have several locations.</p>
Parameter set	<p>This defines a list of measurement parameter values used to take a recording. Because parameter sets are stored in the instrument, they can be retrieved and reused. This saves time when you are taking large numbers of identical recordings.</p> <p>You can identify parameter sets by their parameter value summaries (e.g. accel 400 ms or veloc 1000 Hz).</p>
Recording	<p>This is the data you collect at a particular location on a machine.</p> <p>You can identify recordings by their date/time stamps.</p>




NOTE: Routes, folders, machines, points, and locations are identified by the names you give them.

Folders

This section explains how to work with folders.

Create Folder

To create a folder:

1. Press  twice on the main menu.
2. Enter a name for the folder.
3. Press  – The newly created folder is selected.
4. Press  again to select your new folder and return to the main menu.



Rename Folder

To rename a folder:

1. Press  **Folders & USB Export** on the main menu.
2. Use the arrow keys to select the required folder.
3. Press  **Edit Name**.
4. Edit the name as required.
5. Press .

Delete Folder



To delete a folder:

1. Press  **Folders & USB Export** on the main menu.
2. Use the arrow keys to select the required folder.
3. Press  **Delete Folder**.

Restore Deleted or Overwritten Folder

A folder backup is automatically generated every time you delete a folder. This makes it possible to recover recordings or routes you previously stored in a folder you have deleted. Note that only the **five most recently deleted folders** are retained in your instrument's *Recycle* folder. You can also recover folders that were overwritten when you clicked *Send* in Ascent. The folder's restore point will be the date and time of its original deletion.

To restore a folder that has been deleted and over-written:

1. Press  **Folders & USB Export** on the main menu.
2. Press  — The *Restore* folder from the *Recycle Bin* screen will display.
3. Use the arrows keys on the left to select a folder to restore.
TIP: The date beside the folder indicates when it was deleted.
4. Press  to restore the selected folder.

NOTE: If you have created a new folder with the same name as the backup folder, the existing folder will be overwritten during the restoration process. You can rename the current folder to prevent this from happening.

WARNING! All folder backups will be erased during an instrument Proflash.

NOTE: The parameter set and sensor tables are global across all folders. Consequently, the restore process will be most successful if none of the parameter set and sensor tables have been deleted since the folder was overwritten or deleted.

Machines

If you intend to take large numbers of recordings on a regular basis, you should create permanent machine structures. This will enable you to save your recordings to named locations. You can group your machines within different folders so they can be segregated by type, geographic location, frequency of data collection, and more.



The quickest, easiest way to create your machines is in Ascent. You can create your folders, machines, and schedule entries, then send these to your instrument.





MORE: See the [Ascent Reference Guide](#).

When you create machines and measurement parameter sets on your instrument, these are automatically added to your Ascent database when you transfer data from the instrument to your PC.

Create Machine Structure

To create your machine structure:

1. Select the folder you wish to store your machines in.
2. Press **4** **Folders & USB Export** on the main menu.
3. Use the arrow keys on the left to select a folder > Press 
4. Press **3** or **8** **Record Review** on the main menu.
5. Press **ALT** to display the machine creation icons.
6. Press **3** **Add New Machine** to create a new machine.
7. Enter a name for the machine > Press 
8. Press the keys beside the relevant icons on the screen to create points, locations, and parameter sets.

Key	Icon	Description
3		Machine
4		Point
5		Location
8		Parameter set (Schedule)

Create Parameter Set

A parameter set describes the settings used to take a measurement. A parameter set includes information such as the type of measurement, Fmax, units of measurement, number of averages, and more. To create a parameter set:

1. Press **3** or **8** **Record Review** on the main menu.
2. Use the arrow keys on the left to select a machine.

*TIP: If there are no machines displayed, press **7** to make these visible.*

3. Press **7** repeatedly to expand the machine until the required axis location is selected.
4. Press **ALT** to display the machine creation icons > Press **8** **Add New Schedule**.
5. Select a measurement type — The screen will display the default parameters for your measurement.
6. Press **✓** to assign the *default* parameter set to this location (if required).
7. Press **4** to create a new parameter set — It will display at the top of the list, ready for editing.
8. Press **3** **Edit Name** to rename the parameter set > Enter a name for the parameter set > Press **✓**
9. Edit the other parameters as required.
10. Press **ALT** to assign a different sensor (see below) or press **✓** to return to the *Record Review* menu.

Change Sensor

If required you can change the sensor assigned to the parameter set. To do this:

1. Press **5** **Sensor Setup**.
2. Press **Change Sensor** beside your measuring channel > Select a different sensor.
3. Press **4** **Create New Sensor** to define a new sensor.
MORE: See Define and Edit Sensor.
4. Press **7** **Select as Default** to select the sensor you wish to use for schedule entries sent from Ascent.
5. Press the key on the left beside your chosen channel to enable it (if required).
6. Press **✓** twice to return to the *Record Review* menu.

Add Structure to Existing Machine

You can add structures to an existing machine structure. To do this:

1. Press **3** or **8** **Record Review** on the main menu.
2. Press **7** on the main menu to display your machines.
3. Use the arrow keys on the left to select a machine.
4. Press **7** repeatedly to expand the machine so its points and other lower level items display.
5. Select the machine, point, or location where you wish to add the new structure.
6. Press **ALT** to display the machine creation icons.
7. Press the appropriate key beside each icon to create that item.

Copy Machine Structure

You can copy an entire machine or part of its structure (e.g. a point or parameter set). You can then add the copied items to other machines.

NOTE: Only the machine structure is copied when a new machine is created in this way. The recordings are NOT copied.







1. Press **3** **Review Record** on the main menu.
2. Press **7** to display your machines.
3. Use the arrow keys on the left to select a machine.
4. Press **7** repeatedly to make the points and other lower level items visible.
5. Highlight the item you wish to copy.
6. Press **ALT** > Press **9** **Copy**.
7. Use the arrows on your screen to select the location for your copied item > Press **0** **Paste**.

Rename Machine Structure

If required, you can rename a machine structure.

CAUTION! *Ascent identifies machines structures and sensors by their names. If you rename an item on your instrument, Ascent will treat this as a new item when you transfer the data.*

NOTE: *The default locations (horizontal, vertical etc) cannot be renamed. If you want to rename a location from horizontal to vertical, (for example), simply create a new vertical location on a point and copy any required parameter sets from the horizontal location, then delete the horizontal location.*

1. Press  or  **Record Review** on the main menu.
2. Press  repeatedly to display the machines.
3. Use the arrow keys on the left to select a machine.
4. Press  repeatedly to display the points and other lower level items.
5. Select the item you wish to rename > Press  **Edit Name.**
6. Edit the name as required > Press 

NOTE: *The screen will also display point and machine speed details (e.g. speed type, default speed, RPM multiplier). This information is read-only and cannot be edited.*

Delete Machine Structure

If required you can delete a machine structure.

NOTE: When you delete a machine structure, any parameter sets that are used by a deleted machine will NOT be removed. They will remain stored in your instrument so you can apply them to future recordings.

To delete a machine structure:

1. Press **3** or **8** **Record Review** on the main menu.
2. Press **7** repeatedly to display your machines (if required).
3. Use the arrow keys to select the required machine.
4. Press **7** repeatedly to display the points and other lower level items.
5. Select the item you wish to delete > Press **5** **Delete**.
6. Press **✓** when prompted to confirm your action.

Sensors

This section explains how to work with sensors. You can:

- Define and edit sensors
- Check the Bias Voltage
- Set the default sensor
- Delete sensors

Define and Edit Sensor

Ascent identifies sensors by their names. If you rename a sensor on your instrument, then send the folder to your computer, Ascent will identify this as a new sensor.

Once a sensor has been defined as a particular sensor type (e.g. accelerometer), you will NOT be able to change the sensor type if the instrument contains any recordings that have been taken with that sensor. Your instrument will associate these recordings with their sensor. If you need to redefine the sensor type, first delete all the associated recordings on your instrument.

When you set the parameters for a measurement, you cannot choose settings that conflict with the type of measurement you are trying to create (e.g. if you are measuring acceleration, you cannot select a current sensor). When you try to take the measurement, the instrument will display a message to say the sensor is incompatible and that it cannot take that type of recording and sensor.

To define or edit a sensor:

1. Press **0** **Options** on the main menu.
2. Press **5** **Sensor Setup** > Press **Change Sensor** opposite your chosen measuring channel.
3. Follow EITHER of these steps according to your requirements:
 - Press **4** **Create New Sensor** to create a new sensor.
 - Use the arrow keys on the left to select an existing sensor > Press **3** to change its settings.
4. Press the corresponding keys to define the settings:

1 ↗	Edit the Name.
2 ↗	Toggle the Sensor Type between acceleration, velocity, displacement, and current.
3	Toggle the Voltage Ring and Coupling settings.
4	Toggle Auto Settling ON/OFF. When Auto Settling is ON, your instrument will ignore the user-specified settling time (see above) and automatically select the most efficient settling time for your sensor type.
6	Edit the Sensitivity. The range of sensitivities will vary depending on the selected sensor's Store Unit. To enter a decimal point, press ALT then 0 .
7	Toggle the Store Unit (e.g. between mV/g and mV/m/s ² for accelerometers).
9	Toggle the sensor's Drive Current ON/OFF. Drive Current is the 2.2 mA power supply for ICP®-type accelerometers.
0	Toggle Bias Voltage Check on and off (none). Edit, create, or delete this value.

5. Press **✓** when you have finished editing the sensors.

Sensor		
Name	Accel 100mV/g	100 Sensitivity
Type	Accel.	mV/g Unit
Voltage Rng and Coupling	AC +/- 8V	
Settling	3 s	ON Drive Current
Auto Settling	ON	(none) Bias Voltage Check

Editing a sensor

Bias Voltage Check

The Bias Voltage Check enables your instrument to warn you of errors or fault conditions (e.g. short-circuits, faulty sensors, or open-circuits). Your instrument achieves this by comparing the actual sensor bias voltage with the expected voltage range (as configured on your instrument).

Most accelerometers have an output voltage centered on 12 V DC. Consequently your instrument has a default bias voltage range of 8-16V.

Some sensors use a lower or higher bias voltage. If you are using a sensor like that, review the manufacturer's documentation and create a new Bias Voltage range according to your requirements.

To change the Bias Voltage range settings for a sensor:

1. Press **0** **Options** on the main menu.
2. Press **5** **Sensor Setup**.
3. Press **Change Sensor** beside the channel you wish to use.
4. Press **3** **Edit Sensor** to edit the configuration of an existing sensor, or **4** **Create New Sensor** to create a new sensor.
5. Configure the sensor's normal parameters (name, type, settling, units, etc).
6. Press **0** **Bias Voltage Check** to open the *Bias Voltage* screen.

*NOTE: Pressing **0** toggles the Bias check on/off.*

7. Press **4** **Create New Bias Voltage**.

8. Press **2**.

9. Enter a name > Press **✓**.

TIP: You can use the name of the sensor.

10. Press **3** **Min Bias** > Enter the minimum bias Voltage level > Press **✓**.

11. Press **4** **Max Bias** > Enter the maximum bias voltage level > Press **✓**.

12. Press **✓** twice to select the new bias check configuration — The sensor will now use the new or edited bias values.

Delete Sensor

If required you can remove a sensor from your machine. To do this:

1. Press **0** **Options** on the main menu.
2. Press **5** **Sensor Setup** > Press **Change Sensor** beside your chosen measuring channel.
3. Use the arrow keys on the left to select the required sensor.
4. Press **5** **Delete Sensor**.

Notes

You can create, view, attach, edit, and remove notes.

Create Note

You can create and store notes that are up to 50 characters long on your instrument. You can attach these to any part of a machine structure or route item (but not schedule entry). Any notes you have attached will be sent to your Ascent database when you transfer your collected data.

To create a note:

1. Press **3** or **8** **Record Review** on the main menu.
2. Press **9** to display the *Note* menu.
3. Press **4** **New Note**.
4. Press **4** in the *Note Entry* menu > Enter your text.

*TIP: Press **0** to enter punctuation. Press **9** to enter a space.*

*Press **ALT** > **8** to delete characters.*

5. Press  to save the note.

Edit Note

To edit a note:

1. Press **3** or **8** **Record Review** on the main menu.
2. Press **9** to display the *Note* menu.
3. Press **4** **Create New Note**.
4. Press **3** **Edit Note** on the *Note Entry* menu > Enter your new text.


NOTE: You will be prompted to create a new note if the note is attached to any items.

*TIP: Press **0** to enter punctuation. Press **9** to enter a space.*



5. Press  to save the note.

Attach Note

You can attach notes to the machines, points, and axes within the machine structure. To attach a note:

1. Use the arrow keys to select the item you wish to attach the note to.
2. Press **9** to display the *Note* menu.
3. Press **4** **Create New Note**.
4. Select the required note.
5. Press  to attach it to your chosen item or **4** to create a new note.

*TIP: Press **4** again to attach additional notes (if required).*

6. Press  to return to the previous menu — The note  icon will display beside your chosen item to indicate a note is attached.

View Note

To view a note:

1. Use the arrow keys to select the item with the attached note.
2. Press **9** **Notes**.

Remove Note

Removing a note only detaches it from a selected item. The note will remain in the *Note Entry* menu where it can be selected and attached to other items. To permanently delete a note see the next topic.

1. Use the arrow keys to highlight the item with the note attached.
2. Press **9** to display the *Note* menu and highlight the note you want to remove.
3. Press **5** **Delete Note** > Press **✓** to return to the previous menu.

Delete Note Permanently

To delete a note permanently:

1. Press **3** or **8** **Record Review** on the main menu.
2. Press **9** to display the *Note* menu.
3. Press **4**
4. Use the arrow keys to select the note you wish to delete.
5. Press **5** **Delete Note** — If the note is attached to any items, you will be prompted to confirm your action.
6. Press **✓** to confirm.

Delete all Recordings in Folder

You can Delete an Individual Recording or delete all recordings in a folder. To delete all the recordings within a folder:

1. Press **4** **Folders & USB Export** on the main menu.
2. Use the arrow keys to select the required folder.
3. Press **0** **Delete Recording**.
4. Press **✓** to confirm you wish to proceed.




Delete all Stored Information

All folders, machines, parameter sets, recordings, and notes are stored in a single database. You can empty the database on your instrument to clear out all your machine structures, customized settings, and recordings. Doing this will restore your instrument to its default factory settings.

You should **only** empty the database on your instrument if it becomes corrupt, or if you are certain you no longer require any of the information stored on your instrument (e.g. if you plan to resell the instrument). Before emptying the database, transfer any information you wish to save into Ascent.

WARNING! *Emptying the database on your instrument removes all information you have stored there. You will lose all machines, routes, parameter sets, and notes you have stored on your machine. Only the factory default settings will remain (e.g. axis names, parameter sets, and notes).*

To delete the information stored on your instrument:

1. Press  **Folders & USB Export** on the main menu.
2. Press  **Empty Database**.
3. Press  twice to confirm.





Section 11 — General Setup Options

This section describes how to:

- Set the date and time on your instrument
- Synchronize the date and time on your instrument with Ascent
- Set instrument to automatically adjust to Daylight Saving
- Adjust the LCD display
- Change the LCD interface language
- Manage the battery pack
- Release your instrument's memory
- View the instrument's system information
- View the instrument's unlocked features
- Activate your instrument's *mirror* backup database
- Format (erase) your instrument's flash memory
- Upgrade your instrument's firmware

Set Date and Time

You can set the time in 12- or 24-hour format. Recordings are date- and time-stamped according to this clock. Your instrument adjusts the date and time automatically to accommodate leap years and daylight saving. You can also select your local time zone automatically. To set the date and time:

1. Press  **Options** on the main menu.
2. Press  **Date/Time**.
3. Press  to set the date or  to set the time.
4. Press the number keys to enter your values — The cursor will automatically advance to the next position.

TIP: If you enter an incorrect number, press the key repeatedly until the cursor returns to the beginning of the line, then start again.

5. Press  to save your changes.

Adjust Date Format

To adjust the date and time format:

1. Press **0** **Options** on the main menu.
2. Press **0** **Date/Time**.
3. Press **8** repeatedly to cycle between date display formats (e.g. from DD/MM/YYYY to MM/DD/YYYY).
4. Press **9** to toggle between 12- and 24-hour time formats.

Select Local Time Zone

To select your local time zone:

1. Press **0** **Options** on the main menu.
2. Press **0** **Date/Time**.
3. Press **2** **Edit Time zone**.
4. Use the arrow keys to select your local time zone > Press **✓**.

*TIP: Use **6** and **7** to jump to the top or bottom of the list.*

Daylight Saving Automatic Adjustment

You can set your instrument to automatically adjust to Daylight Saving. This is important for ensuring data is imported correctly when you are working with remote instruments in different time zones.

If required, you can also deactivate the automatic adjustment to Daylight Saving.

To access these options:

1. Press **0** **Options**.
2. Press **0** **Date/Time**.
3. Press **0** **Daylight Saving** repeatedly to toggle between the available options:
 - **Auto Adjust**
 - **Do Not Adjust**






NOTE: If your country is not listed in the available time zones, you will need to select a country with the same GMT offset. Once you have done this, ensure you set the 'Daylight Saving' option to 'Do Not Adjust'.

Date/Time		
Edit Time zone	(GMT+12:00) Auckland, Wellington	
Edit Date	05/10/2012 DD/MM/YYYY	Date Format
Edit Time	16:55:40 24 H	Time Format
Ascent Time Sync	Auto	Auto Adjust Daylight Saving

Setting your instrument to automatically adjust to daylight savings




Adjust Sound Volume

You can adjust the sound volume. To do this:

1. Press  **Options** on the main menu.
2. Press  **LCD Contrast / Backlight / Sound**.
3. Use the arrow keys on the left to adjust the volume up  or down .
4. Press  to save your setting.






Set Instrument Language

The language displayed on your instrument varies from region to region based on the original purchase location. Some regions (e.g. North and South America) support more than one language. To change the language displayed on your instrument:

1. Press  **Options** on the main menu.
2. Press  **Language**.
3. Use the arrow keys on the left to select a language — The two windows at the bottom of the screen demonstrate how the language selected will appear.
4. Press  to save your language selection.

Adjust Screen Contrast






You can adjust the contrast on your screen. To do this:

1. Press  **Options** on the main menu.
2. Press  **LCD Contrast / Backlight / Sound** — The screen displays a chart and text so you can preview the effect your adjustments will make on the display.
3. Use the  and  keys to increase or decrease the screen contrast > Press .

Switch Backlight On/Off

The backlight consumes a relatively high level of power and will automatically switch off after a timeout period.

To switch the backlight on or off:

1. Press  **Options** on the main menu.
2. Press  **LCD Contrast / Backlight / Sound.**
3. Press  and  to adjust the backlight brightness or switch it off > Press .

If the backlight level is set to *High*, the LCD backlight level will be reduced automatically to the *Low* setting ten seconds before it times out (as configured in Setting Backlight Timeout). This advance notice enables you to press any key (e.g. **ALT**) to return the backlight to its previous level.

Recharge Instrument

Plug the power transformer into a standard power outlet and attach the connector to the instrument's charger socket. You can continue to use the instrument while the battery is charging.

Estimate Remaining Operating Time

Your instrument can estimate its operating time based on the amount of current remaining in the battery and the average current usage. The true operating time before the battery runs flat will depend on how you use the instrument. To check the estimated operating time remaining:

1. Press **0** **Options** on the main menu.
2. Press **9** **Battery Pwr Mngmnt.**

NOTE: The battery State percentage value and Time Left figure on the Battery and Power Management screen will NOT attain maximum accuracy until the battery has completed at least one learn cycle. This consists of using your instrument until the battery discharges to a near empty state (below 7 V, when a battery warning icon displays in the middle of the LCD screen, then performing a complete charge cycle (a full three hour charge without interruption). Until this sequence is complete, the 0% and 100% indications may be inaccurate by +/-10%.

Conserve Battery Power





The length of time you can operate your instrument for depends on how you use it and the settings you apply. You can adjust the following settings to reduce power consumption and increase your instrument's operating time:

- Sound volume
- Screen brightness/contrast
- Backlight brightness and timeout period
- Sleep Mode timeout
- Shutdown timeout

Set Backlight Timeout

The backlight will switch off automatically once the timeout period has elapsed (60 seconds by default). If a measuring period exceeds the backlight timeout, the backlight will remain on during measuring and switch off when measuring is complete.

To change the default timeout period for the backlight:

1. Press  **Options** on the main menu.
2. Press  **Battery Pwr Mngmnt.**
3. Press  **Turn Off Backlight.**
4. Enter a value in seconds (1-9999).
5. Press .





Set Sleep Mode Timeout

Sleep mode switches your instrument off if no keys are pressed for a set period of time (15 minutes by default). This method of automatically powering off the instrument conserves battery charge. It also enables fast powering up (approximately 3-7 seconds). However, it is less battery efficient than using the *Complete Powerdown* option because the internal module remains switched on. Your instrument will power down completely once the complete powerdown timeout period has elapsed.


When recording a route, powering up the instrument from *Sleep* mode will return you to the last displayed menu. In all other cases, your instrument will display the main menu.

Change Default Sleep Mode Timeout


To change the default time period for Sleep mode timeout:

1. Press  **Options** on the main menu.
2. Press  **Battery Pwr Mngmnt.**
3. Press  **Enter Sleep Mode** > Enter a value in minutes (minimum 1, maximum 9999).
4. Press 

Switch Instrument On





Press  **Power** to power up the instrument from *Sleep* mode.

NOTE: Sleep mode is disabled if the battery level drops to 25% or less. The instrument will immediately enter Complete Powerdown

Mode when  Power is pressed, or at the completion of the Sleep Mode Timeout period.

Set Complete Powerdown Timeout

After a set period of time in Sleep Mode (1 hour by default), complete powerdown will switch your instrument off. The change the default time period for the Complete Powerdown Timeout:

1. Press  **Options** on the main menu.
2. Press  **Battery Pwr Mngmnt.**
3. Press  **Complete Powerdown.**
4. Enter a value in hours (1-9999).
5. Press 

Manage Instrument Memory

Your instrument's internal memory requires occasional maintenance to ensure it operates efficiently. The following topics explain:





- How to check the available memory on your instrument
- The types of memory warnings you may encounter over time
- The procedures for freeing instrument memory and formatting the instrument's internal memory card.

Check Available Memory

The *Memory* menu displays information about:

- Your instrument's memory capacity
- The amount of memory in use
- The number of folders, schedule entries, and recordings stored in the instrument.

To check how much memory is available on your instrument:

1. Press  **Options** on the main menu — The percentage of instrument memory currently being used will display beside  **Memory & System**.
2. Press  **Memory & System** to display the instrument's actual memory usage.
3. Press  to return to the *Options* menu.

Instrument Memory Warnings

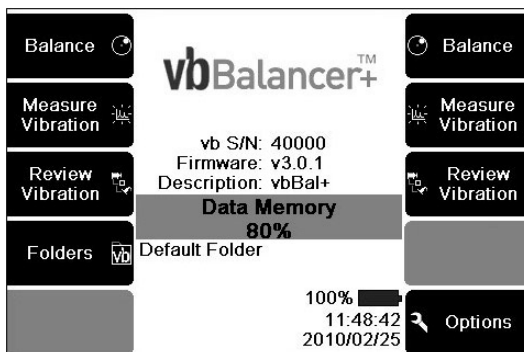
Approximately one third of your instrument's 1 GB of internal memory is taken up by system data. All remaining data capacity is available for recordings, notes, and routes. This free memory is capable of accommodating significant amounts of measurement data.

It is possible for your instrument's memory to become full if large numbers of high resolution recordings are taken over a long period of time, or if older recordings are allowed to accumulate unnecessarily. Large amounts of data will slow the instrument and increase recording times. You should delete unnecessary data or transfer it to Ascent whenever possible.

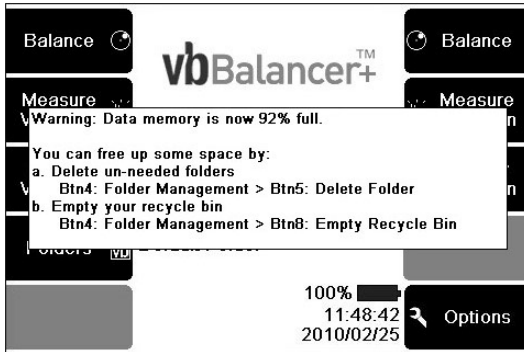
If 80% or more of your instrument memory capacity has been used, a series of alert messages will display.

80% Memory Capacity Warning

If memory use is allowed to exceed **80%** of your instrument's total memory capacity, a flashing warning will display on the main menu. This message will remain until the memory use has been reduced to below 80%. You can accomplish this by deleting recordings or folders from your instrument, or emptying the recycle bin on your instrument.



A message will also display to warn you of high memory use. This message will appear shortly after the 80% threshold is crossed, regardless of the screen currently being viewed, and will require acknowledgement.



95% Memory Capacity Warning

If memory use is allowed to exceed **95%** of your instrument's capacity, a second message will display to warn you of high memory use.

100% Memory Capacity Warning

If your instrument's memory use is allowed to reach **100%** of its maximum capacity, a message will display to advise you that no more recordings can be saved.

Free up Instrument Memory

You should remove unnecessary data from your instrument whenever possible. Ideally you should transfer recordings to Ascent, then delete these measurements from your instrument memory. The easiest way to do this is to receive all data from your instrument into Ascent. You can then immediately resend the folder from Ascent to your instrument. Measurements within the folder will be deleted from your instrument.

Formatting your instrument's memory will also increase available memory by deleting all machines, routes, and recordings.

MORE: See [Reformat Memory Card](#).

Emptying your instrument's recycle bin will also achieve this.

MORE: See [Empty Recycle Bin](#).

To manually delete individual folders from your instrument:

1. Press **4** **Folders & USB Export** from the main menu.
2. Select the required folder.
3. Press **5** **Delete Folder**.

TIP: Avoid deleting folders that contain measurements which have NOT been received into Ascent, unless you are certain they are NOT required.

Reformat Memory Card







Like conventional hard drives, data stored on flash memory devices can become fragmented over time and gradually slow data to read/write speed. Reformatting this memory will return it to its factory state, and detect and quarantine any bad data sectors that may have developed since the memory device was manufactured. Data corruption that cannot be removed by deleting individual files will also be corrected by the formatting process.

Your instrument will suggest you format its memory once 365 days or more have passed since the last flash memory format occurred, or every 50 000 recordings. Once formatted, these counters will be reset.

Formatting your instrument memory will delete all routes, machines, parameter sets, notes, and recordings. This returns the device's memory to its original blank factory configuration. The formatting process will take about ten minutes.

NOTE: If you wish to retain data stored on your instrument, you can use Ascent to retrieve this information from your instrument before formatting. The formatting process will delete all data on your instrument.

To reformat your memory card:

1. Press  **Options** on the main menu.
2. Press  **Memory & System** to open the *Memory* screen — Your instrument's current memory usage will display.
3. Press  **Reformat Memory Card**.
4. Press  to confirm you wish to format your instrument's memory — The format process will start. During this time, your instrument will display a series of progress messages. Do NOT interrupt the formatting process. Doing so might damage the instrument.
5. Press and hold  when the formatting is complete.
6. Press  to restart your instrument.

To reformat a memory card:

1. From the main menu press **0** **Options**.
2. Press **4** **Memory & System** to open the *Memory* screen. The instrument's memory usage will be displayed.
3. Press **3** **Reformat Memory Card** > **✓** to confirm that you wish to format the instrument memory. The format process will begin, during which the instrument will display a series of progress messages. Do **not** interrupt the formatting process; doing so may damage the instrument. Upon completion, press and hold **5** > Press **⏻** to restart the instrument.

Empty Recycle Bin

A folder backup is automatically generated every time a folder is deleted and stored in your instrument's recycle bin. To free additional memory capacity on your instrument you can empty the recycle bin, removing these backup files. If you do this, all folders in the recycle bin will also be erased during an instrument Proflash.

To empty your instrument's recycle bin:

1. Press **4** **Folders & USB Export** on the main menu.
2. Press **8** — You will be asked to confirm you wish to empty the recycle bin.
3. Press **✓** to proceed or **X** to cancel.

Overwrite Primary Database with Mirror Backup

Your instrument includes two operational databases:

- A primary database used to store system information, measurements, and setup data.
- A secondary mirror backup database. The mirror database is an exact duplicate of the current system database, and is continually updated in real time.

If database corruption is detected (e.g. from a memory failure), your instrument will automatically prompt you to overwrite the bad primary database with the good mirror database when you switch it on.

To overwrite your current system database with the mirror backup database:

1. Press **0** **Options** on the main menu.
2. Press **4** **Memory & System** to open the *Memory* screen.
3. Press **2** **Swap to Mirror DB**.
4. Press **✓** to overwrite the primary database with the mirror backup, or **X** to cancel.

NOTE: Once the mirror database has been overwritten, you should immediately import all data from your instrument to Ascent. You should then format your memory card before taking any further measurements.

Display System Information

If you encounter a problem with your instrument and require assistance from Customer Support, you may be asked to provide specific information about your instrument system. To access these details:

1. Press **0** **Options** on the main menu.
2. Press **4** **Memory & System** to access the *Memory* screen — Your instrument's system details display below the **System** heading:
 - **Firmware Version** — Your instrument's current firmware version. New firmware versions are released regularly and can be downloaded from the Commtest website at <http://www.commtest.com>.
MORE: See [Upgrade Instrument Firmware](#) for instructions on installing new firmware versions.
 - **Firmware Backup** — The firmware version that will be used if you restore the backup firmware version by pressing **4** **Restore Backup Firmware**. Restoring your instrument firmware will reset the instrument to its factory state. This action should only be taken if a conflict arises with a new firmware version, or if the installed instrument firmware becomes corrupt.
 - **PCB Revision** — This is your instrument PCB board version. Possible revisions are C, D, and E. Revision E versions include USB host ports and C1D2 CSA certification. Revision C and D boards are found in earlier instrument versions.
 - **OS version** — The instrument's operating system.
 - **Instrument Region** — The region your instrument has been configured to and the available languages supported. These include *English* (English), *Americas* (English, French, and Spanish), *Europe* (French, Spanish, Hungarian), *Russia* (Russian) and *China* (Chinese).
 - **Processor Type** — The (CPU) processor type used on your instrument.

The screen also displays your instrument's unique 20-digit serial number. This serial number may be requested by the technical support team in order to create customized upgrade packages tailored to your instrument.

vbXManager

vbXManager software is used to retrieve balance reports from vbBalancer and vbBalancer+ instruments. Once imported, these reports can then be printed directly from the software or exported to an external spreadsheet application.

The vbXManager software allows users to specify the units displayed in each report (S.I., U.S./Imperial or Custom Units) and to customize their appearance with the optional inclusion of a company logo. Basic administrative functions such as the updating of instrument firmware and backing up of instrument databases are also included in the vbXManager utility.

vbXManager System Requirements

Minimum system requirements for the vbXManager software are:

- Microsoft® Windows® XP® SP2, Server 2003®, Server 2008®, Vista® or 7® (32 or 64-bit) operating system
- 1 GHz 32-bit (x86) or 64-bit (x64) processor or faster
- 1 GB of system RAM
- 1 GB of available hard disk space
- A CD-ROM compatible optical drive
- Windows-compatible mouse, touchpad or other pointing device
- An unused USB or Ethernet port for instrument communications
- Microsoft .NET Framework® Version 3.5 SP1 or higher

Note that you must have Administrator rights to install vbXManager software. If you are within a corporate or managed network you may need to contact your network administrator to request a group user policy that allows Windows registry changes.

NOTE: The vbXManager and Ascent software applications should not be operated simultaneously. Close Ascent, if running, before starting the vbXManager software.

Install vbXManager

1. Close all open programs on your PC.
2. Insert the Ascent and vbXManager installation CD-ROM into your computer's CD-ROM drive.
 - Wait for the installation home screen to open in your web browser and follow the onscreen instructions.

OR

- Run the **vbXManagerSetup_[VERSION].exe** installer program located in the root directory of the CD-ROM.
3. Select the installation language from the dropdown list > Click **OK**.
 4. Click **Next**.
 5. Accept the license agreement by scrolling to the bottom of the text, selecting the two checkboxes > Click **Next**.
 6. Accept the default installation location and press **Install**. The software will install.
 7. Click **Close**.

Uninstall vbXManager

- Navigate to **Start > All Programs > Commtest > vbXManager > Uninstall vbXManager** and follow the onscreen instructions.


OR

- Navigate to **Start > Control Panel > Add or Remove Programs**. Select **Commtest vbXManager** > Click **Remove**.

Change Interface Language

The vbXManager software interface is provided in several languages. The steps required to change the displayed interface language are described below.

Change Ascent Interface Language

1. In the vbXManager software, select **Balance > View reports**. The *vbX Balance Reports* screen will open.
2. Click the **Select Language**  button. The *Select Language* panel will open.
3. Select the language you require from the list of available languages > Click **OK**. The software interface will update and a notification will be displayed stating that the language has changed.

NOTE: To view the vbXManager software in a non-Roman character set language, such as Russian or Chinese, you may also need to change your Windows locale setting.

Change Windows Locale Setting

See your Windows operating system documentation for further details or use the quick guide instructions below.

Windows XP

1. Select **Start > Control Panel**.
2. Double-click the **Regional and Language Options** icon.
3. Select your location from the **Locations** dropdown list at the bottom of the **Regional Options** tab.
4. Click the **Advanced** tab and select your required language from the **Language for non-Unicode programs** dropdown list.
5. Click **OK**. You will be asked to restart the computer.

Windows Vista

1. Select **Start > Control Panel**.
2. Double-click the **Regional and Language Options** icon.
3. Click the **Location** tab and select your location from the dropdown list.
4. Click the **Keyboards and Languages** tab and select your required language from the **Choose a Display Language** dropdown list.
5. Click the **Administrative** tab, then the **Change System Locale** button. Select your geographic location. Apply the change then click the **Restart now** button.

Windows 7

1. Select Start > **Control Panel**.
2. Click the **Clock, Language and Region** link.
3. Click the **Change Display Language** link. The *Region and Language* window will open.
4. Click the **Administrative** tab, then the **Change System Locale...** button. Select your required language from the 'Current system locale:' dropdown list and click **OK**. You may be asked to restart your computer: do so by clicking the **Restart now** button.

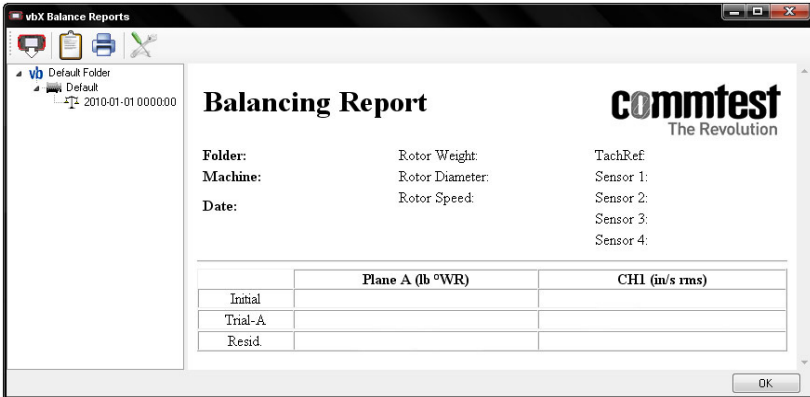
Retrieve Balance Reports using vbXManager

Retrieve Balance Report from Instrument



1. Connect the vbBalancer instrument to the PC using the supplied USB cable, or connect using an Ethernet cable (a crossover cable for direct connection or via a router/switch for standard Ethernet).
2. Turn on the vbBalancer the instrument.
3. Start the vbXManager application.
4. Select your instrument (identifiable by its serial number) from the vbXManager selection list.
5. Press the **Receive Balance Report** button.
6. Select the checkbox(es) beside the balance report(s) you wish to import; or to import all balance reports on the instrument click **Select All**.



7. Press the **Receive** button. The balance report(s) will be downloaded and a popup notification message displayed.
8. Click **OK**. The *vbX Balance Reports* panel will open. Select individual balance reports from the left menu to display in the right panel.




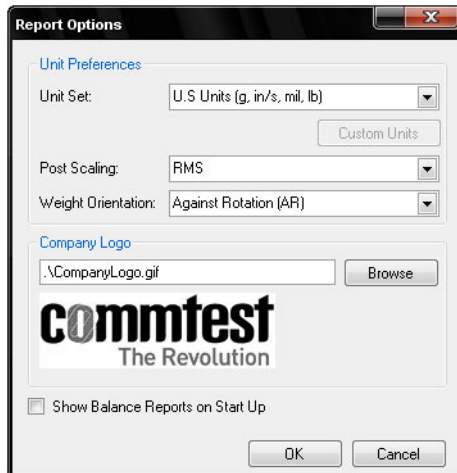
NOTE: All previously downloaded balance reports will be displayed in the vbX Balance Reports navigator. Downloaded reports are stored in the 'Reports' folder on your computer (typically in C:\Program Files\Commtest\vbXManager\Report in Windows XP) in XML format. These files will remain even after the instrument memory has been cleared or a firmware upgrade has been performed. Over time the Reports folder may gradually increase in size, slowing the performance of the vbXManager software. To restore the software's performance, either delete or back up older files elsewhere on your computer, or archive the files to CD/DVD-ROM or another folder.

9. Click the **Print**  button to print the balance report to a connected printer using the vbXManager software. To export the selected balance report press the Clipboard  button. The balance report will be saved to your PC's clipboard memory ready to be pasted into other software applications.

Specify Balance Report Units


Balance report unit preferences (U.S./Imperial, S.I. or Custom) are configured via the *Report Options* panel in the *vbXManager* software.

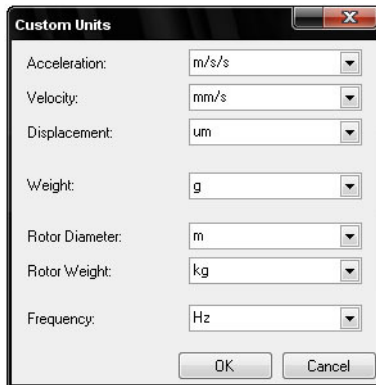
1. Click the **Report Options**  button from the *vbX Balance Reports* screen. The *Report Options* panel will open.
2. Select your unit preferences from the upper 'Unit Preferences' area to suit your preferred report formatting. Available options for each is as follows:
 - **Unit Set:** U.S. Units (g, in/s, mil, lb, CPM); S.I. Units (m/s/s, ms, m, kg, RPM) or Custom Units (see below).
 - **Post Scaling:** RMS, 0-pk, pk-pk
 - **Weight Orientation:** With Rotation (WR), Against Rotation (AR)
3. Click **OK**.



Specify Custom Units

To select a custom unit for one or more of your balance report's parameters:

1. Select **Custom Units** from the Unit Set:' dropdown list. The **Custom Units**  button will activate.
2. Click the **Custom Units** button. The *Custom Units* panel will open.
3. Select the units you require for each parameter from the dropdown lists.
4. Click **OK**, then **OK** again. Balance reports retrieved by the vbXManager software will now use the units specified when displayed, printed or exported.



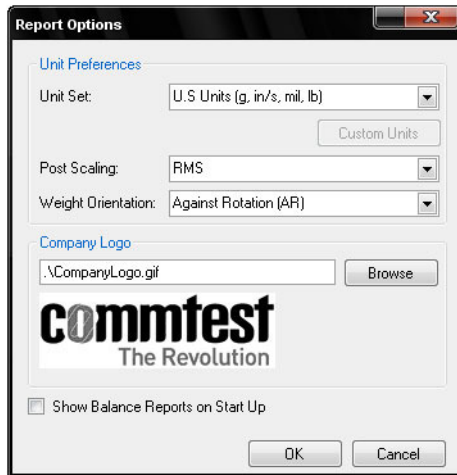
Add Company Logo to Balance Report

The company logo displayed in the top right corner of printed balance reports can be changed using the *Report Options* panel in the vbXManager software.

1. Click the **Report Options**  button from the *vbX Balance Reports* screen. The *Report Options* panel will open.
2. Click the **Browse** button and navigate to the logo image you wish to display in the top right corner of printed balance reports.

NOTE: The image file must be in JPEG, BMP, GIF or PNG format. You may need to adjust the size of the image in an external image editing application if it is too large for the printed report.

3. Click **Save**.
4. Click **OK**. The image will now be used when printing balance reports.



View Existing Balance Reports in vbXManager

Existing balance reports can be viewed by selecting **Balance > View Reports** from the vbXManager's default opening interface.

Existing reports can also be configured to display on startup by selecting the *Show Balance Reports on Start Up* checkbox from the *Report Options* panel, as described in the previous topics.

Upgrade Instrument Firmware — Proflash

We will periodically release new versions of instrument firmware. These upgrades enable you to take advantage of product enhancements and new features that were created after your instrument was purchased. To reprogram an instrument with newer firmware you must **PROFLASH** the instrument with a new firmware file.

WARNING! *Proflashing will restore the instrument to the factory default state and delete all stored information. This includes folders, routes, machines, parameter sets, recordings and balance jobs. If you wish to save any of this information, please transfer all folders to the software before Proflashing your instrument.*

To check if a newer firmware version is available, visit <http://commtest.com/downloads/>. Firmware files are included with Ascent, and not typically provided individually. Update your version of Ascent to access newer instrument firmware.


Proflash Procedure

To upgrade your instrument firmware:

1. Ensure your instrument is already configured in Ascent.
MORE: See the [Ascent Reference Guide](#).
2. Connect your instrument to your PC using the supplied USB cable or any Ethernet cable.
3. Transfer any information on your instrument you wish to keep.
4. Open Ascent.
5. Select **Edit > Manage > vb Instruments**.
6. Double-click your instrument in the new window.



TIP: You can identify your instrument by its serial number.

NOTE: If the vbX Properties window does NOT open immediately, select your instrument from the Manage Instrument panel.

7. Press **Configure**.
8. Click the **Proflash** button under the **Setup** tab — You will see a list the available firmware version(s) stored on your PC.
9. Select the newest recommended firmware version.
10. Click the **Proflash** button.
11. Press  on your instrument (when prompted).

NOTE: Proflashing may take several minutes. During this time your instrument will display a series of progress messages.

WARNING! Do NOT interrupt the Proflash process. Doing so can damage your instrument.

12. Once Proflashing has completed, restart the instrument by holding  then pressing .

Back up Instrument Database

If you wish to transfer existing balance jobs or recordings to a PC for backup purposes, you can make a local copy of the instrument database using the vbXManager application. This instrument database can then be stored and returned to the instrument at a later time for review.

Copy Database from Instrument

To copy a database from your instrument:

1. Connect the instrument to the PC using the supplied USB cable or an Ethernet cable.
2. Start the vbXManager application.
3. Double-click your instrument (identifiable by its serial number) in the new window. The instrument properties window will open.
4. Click the **Tasks** tab then the **Copy** button in the Copy Database area. Browse to the location you wish to copy the database to. Enter a name for the file in the **File name:** field and click the **Save** button. A copy of the instrument database will be saved to the chosen location with a '.pbd' file extension.

Copy Database to Instrument

The existing instrument database will be overwritten during this upload procedure. If you have balance jobs, machines or recordings you wish to save, copy the existing database to your PC first.

To copy a database to your instrument:

1. Connect the instrument to the PC using the supplied USB cable, or any Ethernet cable.
2. Start the vbXManager application.
3. Double-click your instrument (identifiable by its serial number) in the new window. The instrument properties window will open.
4. Click the **Tasks** tab then the **Overwrite** button in the Overwrite Database area. Browse to the database file you wish to upload to the instrument and click the **Open** button.

Export/Import Data using External USB Flash Drive

This feature is intended primarily for owners of vbSeries vibration analyzers and Ascent. If you have purchased a vbBalancer instrument and do not have a copy of Ascent, the information presented below should be ignored.

vbBalancer Instruments with serial numbers below 40800 are not equipped with USB host ports.

The USB host port is used to transfer data—recordings, balance jobs, sensor configurations etc—from the instrument to an attached USB memory device such as a flash drive or an externally powered USB hard drive, and vice versa. Importable XML data is generated using a compatible software application, such as Ascent.

Export data to USB Flash Drive

Before proceeding, securely connect a USB flash drive to the instrument's USB host port. Ensure that the USB drive being used has sufficient available storage capacity (i.e. it is not full) and that any 'write protect' tabs, if present, are set to the unlocked position.

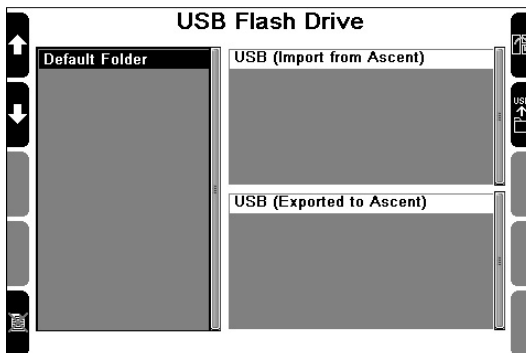
To export data to a USB flash drive:

1. From the main menu press **4** **Folders & USB Export**.

*NOTE: If you have not yet attached a USB flash drive, press **6** **USB Flash Drive** to open the USB Flash Drive screen once you have done so.*

2. Press **6** **Select Window** to toggle between the *Instrument Folders* screen, the USB drive's *Exported to Ascent* folder (*vbX to Ascent* folder on the USB drive) and the USB drive's *Import from Ascent* folder (*Ascent to vbX* folder on the USB drive). Select the left *Instrument Folders* list.
3. Use the left **1** and **2** arrow keys to select a folder to be exported.
4. Press **7** **Export Folder** to export the selected folder. Press **✓** to confirm the transfer. A progress bar will be displayed and the data exported in XML format to the *vbX to Ascent* folder at the root of the USB flash drive. If the drive is blank, the folder will be generated automatically. The XML format file can now be imported into Ascent.

MORE: See in the Ascent Reference Guide 'Import/Export as XML' section for more information.



Import Data from USB Flash Drive

To import data from a USB flash drive:

1. From the main menu press **4** **Folders & USB Export**.
2. From the Folder Management screen press **6** **USB Flash Drive**. The USB Flash Drive screen will open.
3. Press **6** **Select Window** to toggle between the *Instrument Folders* screen, the USB drive's 'Exported to Ascent' folder and the USB drive's 'Import from Ascent' folder. Select the upper right 'USB (Import from Ascent)' list.
4. Use the left **1** and **2** arrow keys to select an XML file to import. The instrument will list the contents of the *Ascent to vbX* folder on the USB drive, and the root of the USB drive. Only XML format files will be listed.
5. Press **7** **Import Folder** to import the selected file. Once imported, return to the main menu. The instrument automatically opens the imported folder, which will be listed beside the *Folders* menu option.

Section 12 – Troubleshooting

If you are having problems with your instrument, you can:

- Contact Technical Support
- Reset your instrument
- Change the USB Communications mode
- Troubleshoot the network communications

Contact Technical Support


If you have any problems please contact Commtest Support directly for assistance. Our email address is help@commtest.com.

We also provide a searchable knowledge base of frequently asked questions (FAQ) on our website at www.commtest.com.

Reset Unresponsive Instrument

An unresponsive instrument (one that does not respond when you press the keys) will continue drawing power until it is reset or switched off. To conserve power, reset your instrument as soon as possible.

NOTE: Resetting your instrument will NOT delete previously stored data or settings.

To reset your instrument, hold  and press  — Your instrument will power off and restart immediately.

Change USB Communications Mode

vbBalancer instruments support two USB communication modes: 'Ethernet over USB' and 'Plug and Play' (PnP). The instrument's default and recommended USB connection mode is Plug and Play as it allows vbBalancer instruments to be used as peripheral rather than networked devices, improving stability and compatibility between the vbXManager software and the instrument.

However, legacy Microsoft Windows operating system users cannot use the Plug and Play communications mode. The software driver used for this mode is not supported by the operating system. Owners of computers running Windows versions prior to Windows XP wishing to use USB communications rather than cabled Ethernet (RJ45) must change the instrument to Ethernet over USB mode. To change the instrument's USB communications mode:

1. From the instrument's main menu press **0** **Options** > **3** **Comms**.
2. Press **2** **USB**. You will now be prompted to select from the two available USB communications methods:
 - To use 'Ethernet over USB' communications (suitable for legacy Windows 2000 users) press **ALT** > **✓** to continue. Use the number keys to enter your new USB IP address, netmask and gateway. We suggest accepting the default values as the vbXManager software is configured to use these automatically. Press **✓** after you enter each item.
 - To use 'Plug and Play' communications, press **✓**
3. Press **5** + **⏻** when prompted. This will reset the instrument hardware and apply your changes.

Troubleshoot Network Communications

Before you change your network configuration, ensure a firewall is NOT responsible for your communication difficulties. Temporarily disable any active firewalls (e.g. Windows Firewall) or check the application `masvb32.exe` has permission to access your network through your firewall (i.e. it has an exception rule applied to it).

When you use *cabled Ethernet* (RJ45), your instrument and Ascent use a default network address to communicate. Usually you will NOT need to change this. However, it is possible that this address may interact negatively with other devices on a network. This conflict may result in other network connections being lost while your instrument is connected to your computer.

To resolve this conflict, change the Ethernet network settings in your instrument and Ascent.

NOTE: Your changes will only take effect once your instrument hardware has been reset.

If you change the network address, you must change it in your instrument and software so the two can communicate.

NOTE: This does NOT apply if you are only changing the last digit of the IP address.

Set USB Network Address

To set the USB network address:




1. Press **0** **Options** > on the main menu.
2. Press **3** **Comms**.
3. Press **2** **USB** > **ALT** to select the Ethernet over USB option. Press **✓** to confirm. Use the number keys to enter your new USB IP address, netmask and gateway. We suggest accepting the default values as the vbXManager software is configured to use these automatically. Press **✓** after you enter each item.
4. Press **5** + **⏻** when prompted. This will reset the instrument hardware and apply your changes.
5. Connect the Commtest supplied data transfer cable to the USB ports of the instrument and computer. Start the computer if it is not running already and open vbXManager.
6. Double-click the instrument from the list of those available.

NOTE: If you accepted the instrument's default network values then the final step below is not be necessary.

7. Enter the new IP address into the **IP address:** field in the **USB** area. Click **Apply** to save the change.

Set Ethernet Network Address


To set the Ethernet network address:

1. Press **0** **Options** on the main menu.
2. Press **3** **Comms.**
3. Press **3** **Ethernet** — A message will ask whether you wish to use a DHCP server to assign an IP address to the instrument.
4. Use EITHER of these methods according to your requirements:
 - Press  to use DHCP > Press  + **5** to reset and apply your changes.
 - Press **X** > Enter your new network IP values manually > Press  + **5** to reset the instrument hardware and apply your changes.

NOTE: Dynamic Host Configuration Protocol (DHCP) is a network protocol that automatically configures TCP/IP networked devices.

Reset Network Values to Factory Default

To reset the network values to the factory default:

1. Press **0** **Options** on the main menu.
2. Press **3** **Comms.**
3. Press **8** **Factory Default** > Hold **5** and press  to reset your instrument.

NOTE: The factory default values are Ethernet IP: DHCP (Auto).

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