Exilis - (GA2008)

Single Axis Vibration Meter

Operating Manual

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Exilis

Single Axis Vibration Meter Operating Manual

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Thank you for buying a Castle product, I am sure you will find both the goods and the service to be of the highest quality but if not, then please feel free to write to me personally and I will ensure that your needs are dealt with immediately.

This manual is designed to show you the operation of the goods you have purchased and a very brief insight into vibration itself. If you would like to become a competent person in the eyes of the law, then you may like to know more about our Competent Persons training course for Human Vibration. You can visit **www.castletrainingacademy.com** to find out more.

Castle Group has become the leading supplier of solutions for health and safety, environmental compliance and plant maintenance and monitoring, with an ever expanding offer comprising equipment for sale or rent, residential or in-house training courses, consultancy services and equipment calibration. If you would like to know more about any of our other products and services then please visit **www.castlegroup.co.uk** or telephone us on **+44(0)1723 584250**.

Simon Bull
Managing Director

Note: for '**Getting Started**' section please turn to Chapter 4

Precautions

- Only operate the instrument as described in this manual.
- These are precision instruments, protect from shocks and physical extremes.
- Ambient conditions for the operation of the unit are as follows:-

  Temperature: -10°C to +50°C

  Relative Humidity: 25 to 90%
- Protect the unit from extremes of temperature and humidity, direct sunlight and air with a high salt or sulphur content.
- Always turn the unit off after use.
- Do not use any solvents or cleaning agents on the instrument. Use only a soft dry cloth or a soft cloth lightly moistened with water when necessary.
- Do not allow any conductive objects, such as wire or metal particles to enter the unit.
- Do not try to disassemble the instrument or attempt any repairs as this will invalidate your warranty. Take a note of the condition of the instrument and contact your authorised Castle service station.
- To ensure continued precision performance of your instrument have it checked and serviced at regular intervals.

Contacting Castle Group

This manual contains complete operating instructions for the Castle Exilis Vibration Meter, read it carefully and you will quickly become familiar with your instrument and its operation.

If you do encounter problems with the operation of your instrument please feel free to contact customer support with your enquiry on: -

Telephone:	+44 (0)1723 584250
Fax:	+44 (0)1723 583728
Website:	www.castlegroup.co.uk
Email:	techsupport@castlegroup.co.uk sales@castlegroup.co.uk

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- Stack-Emissions Monitoring
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- Vibration Meters
- Temperature Monitoring System
- Thermometers
- Thermal Imaging
- Diagnostic Vibration Analysis
- Tachometers
- Inspection Endoscopes

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- Health Surveillance Courses
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  - Noise, Vibration, Air Quality
- Diagnostic Engineering Courses
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- If it Measures, and can be done - we'll Calibrate it
- UKAS Certificates Available
- Multiple levels of Calibration

Equipment Types Covered

- Air quality meters
- Air sampling pumps
- Air sampling calibrators
- Anemometers
- Audiometers
- Balances/Scales
- Barometers
- Dosemeters
- Electrical test equipment
- Force meters
- Gas Detectors
- Hygrometers
- Light meters
- Manometers
- Moisture meters
- Noise meters
- Pressure meters
- Sound level meters
- Sound analysers
- Strain gauges
- Tachometers
- Thermometers
- Thermo-hygrometers
- Thickness meters
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- Vibration meters
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Chapter 1

Introduction

Exilis (GA2008) – Single Axis Vibration Meter

Thank you for purchasing your product from Castle Group Ltd.

The Exilis single axis vibration meter brings simplicity, looks and value for money and to the world of vibration monitoring.

Regular maintenance monitoring of machinery with a vibration meter can help stop excessive downtime and major repair costs later on. The Exilis is ideal for this purpose.

Notes Before Use

Due to the compact screen it has not been possible to fit the full notation for velocity units and the value, so the units displayed as ms^{-1} are actually millimeters per second or mms^{-1}.

There is a slight delay between switching the unit off and it turning off, this is while your data is backed up. If the power switch is pressed during this delay your settings may be lost.

Holding your finger on a key will mean the key is pressed succesivley as far as the instrument is concerned. To avoid confusion when using the keypad, press the keys firmly and release them quickly.

Chapter 2

Accelerometer Type, Removal and Fitting

The accelerometer for use with the Exilis produces a Voltage Output proportional to the signal being measured.

The table below shows the output voltage and specifications for the accelerometer where g is the acceleration due to gravity on the Earth's surface and is defined as 9.80665 ms^2.

Acceleration is measured in metres per second per second (m/s/s) which can be written as either of the following: -

- ms^{-2}
- m/s^2

Accelerometer Type

Exilis – Single Axis Accelerometer (KD1011)

Accelerometer Type	Output Voltage	Operating Range	Frequency Response
Single Axis	100mV/g	±20g	2 to 10000Hz ±10%

KD1011 Single Axis Accelerometer


Attaching & Removing the Accelerometer

Locate the jack socket on the instrument and gently push the 3 pole jack plug of the accelerometer cable into the jack socket.

To remove the accelerometer cable from the instrument, gently pull the jack plug from the instruments jack socket.

Removal of the accelerometer can be achieved with the instrument powered on or off.

Chapter 3

Measuring Vibration

Machinery Vibration Introduction

It is advisable to validate your instrument prior to, and after taking measurements using a known vibration source such as the Castle GA606 Vibration Calibrator, available separately.

It is inevitable that most machinery will vibrate and therefore will have been designed to withstand long periods of normal smooth operating vibration without cause for concern, however if the operating vibration of the machine increases becoming excessive or rough then this could lead to expensive breakdowns and cause production to cease.

To combat this condition monitoring can be used as part of a predictive maintenance program.

Condition Monitoring

Predictive maintenance is a process to help establish the condition of any equipment or machinery and in doing so help predict when any maintenance of this equipment should be performed and prevent expensive breakdowns.

Monitoring of the equipment or machinery condition is commonly known as Condition Monitoring and is widely used in industry as it can be very effective.

It is a process of repeat measurements that monitor the condition of a machine over time. The measurements of which will be taken from the same location and with the same load on the machine.

The course of monitoring for a specific machine starts from a known normal (smooth) operational state and the repeated measurements taken over a period of time will show any gradual deteriation of working order.

To a certain extent human perception can be used for condition monitoring but with modern machinery, which may be operated unattended or even sound proofed, it becomes more and more difficult for operators to detect through experience alone. To this end it is becoming industry standard to use measuring equipment for this purpose.

Vibration measuring equipment is ideal for this as any change in the vibration level monitored indicates that the machine is operating under different condiditions to normal smooth operation.

Vibration, Measurement and Mounting

Every machine that has some form of movement in its operation will transmit vibration through it. The directions of such vibrations are dependant on the machine type and determined by whether the machine has rotating parts or not.

Vibration is a repeated oscillation of a surface about a rest position. How often this occurs in one second is named the vibration frequency measured in cycles per second (Hz).

In most circumstances the machine vibration will consist of various frequencies mixed together and the measuring instrument must be capable of measuring within these frequency boundaries.

The amount of vibration (how rough or smooth the vibration is) is expressed by its vibration amplitude and can be measured in three different ways which are: -

- **Acceleration**
  Acceleration is a vector quantity and is the rate at which an object changes its velocity with respect to time.

  In order to have acceleration the object must be either speeding up or slowing down.

  As the object or machinery vibrates it will move from one location to another and this movement increases and decreases in speed (velocity) continuously at a rate determined by the machines operating frequency.

- **Velocity**
  Velocity is the speed at which the machine or object travels.

  The Velocity signal is created by integrating the Acceleration signal.

- **Displacement**
  Displacement is the distance the machine or object travels from its stationary position.

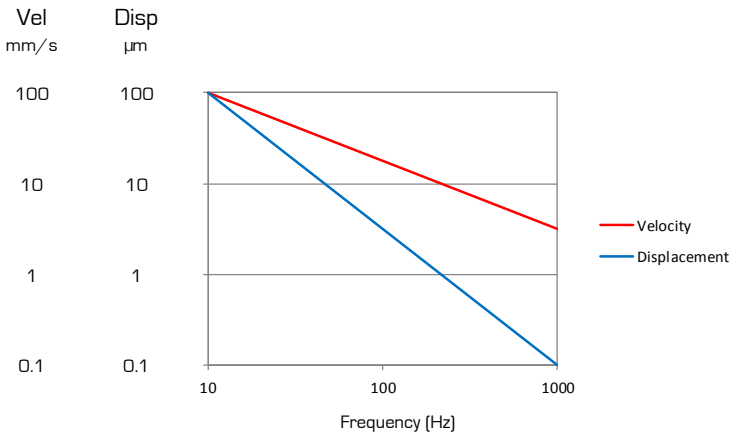
  Peak displacement is the distance of one direction of movement whereas peak to peak displacement includes the distance of the opposite directional movement. The Vexo S always measures peak to peak displacement.

  The Displacement signal is created by integrating the Acceleration signal twice.

Please be aware that the integral (Velocity) and double integral (Displacement) of the Acceleration signal are frequency dependant meaning that as the input vibration frequency increases the output signal decreases.

See the graph below to determine the output signal level relative to input frequency: -

Dynamic Range



The instrument is supplied as standard with a hand held spike probe which attaches to the accelerometer. The probe can then be used for quick measurements without the need for preparing fixed measuring points. The handheld probe will however give the least repeatable measurements and least accuracy due to the variabilites in the contact between probe and machine. It is essential that the user responsible for measuring the data becomes proficient in its use to ensure the most repeatable and accurate results possible using this method.

Consideration of the mass of the machine should also be taken into account and should be at least 9 times greater than that of the accelerometer, including spike probe if used.

For best results and repeatable measurements the accelerometer should be fixed securely to the measuring point using either a high strength magnetic mount or for permanent measuring point fixtures using glue and stud packs, both of which are available separately. See Accessories for details.

If using studs, mounting of the single axis accelerometer to the vibration source is achieved by tapping a stud into the vibration source and then attaching the accelerometer to the stud. Alternatively the stud may be adhered to the device with an adhesive that dries rigid.

In all cases the correct mounting of the accelerometer is cruicial for accurate, meanginful and repeatable measurements. Always mark the location and measure in the exact same point.

The measurement points should not be chosen randomly. Machinery vibration generally radiates through machine bearings and hence measuring points should be situated on or as close as possible to the bearing housing.

It is recommended to have more than one measuring point each located at various positions around the machine to aid in identifying mechanical issues.

Do not use weak flexible areas such as machine cover panels for measuring points.

Vibration direction should also be considered and can be a combination of either radial or axial vibration.

Consider the shaft bearing housing shown below from both the front and top elevations: -

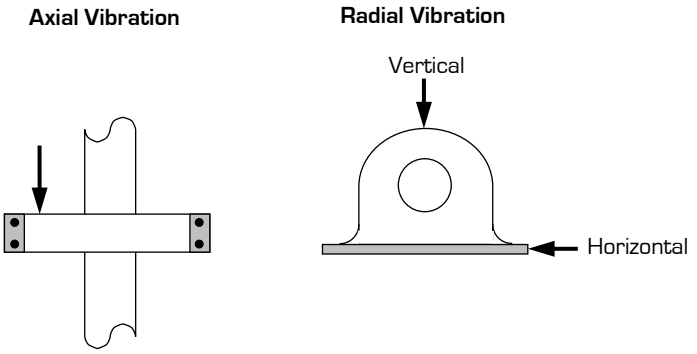


Figure 1 – Vibration Direction

Radial vibration would be evident from machinery with imbalanced rotating parts such as a motor. As the motor rotates the imbalance pulls the motor outward causing a higher vibration than normal operating conditions. The vibration force would also be transmitted through to the rotating shaft and therefore seen in the bearing housings supporting the shaft. Radial vibration travels outwards from the shaft and therefore should be measured horizontally and vertically.

Abnormal radial measurements taken horizontally are generally vibrations caused through imbalance whereas if taken vertically are often issues with the machine mounting or the structure of the machine itself.

Axial vibration travels in either direction along the shaft. Bent shafts or misalignment of bearings or the shaft coupling device can cause higher machine vibration measurements. Ensure flanges are not overloaded to reduce the chance of misalignment issues.

To measure the correct direction, mount the accelerometer so that the resulting vibration travels up through the accelerometer.

The severity of the vibration level measured will be proportional to any amount of misalignment, imbalance or bending of the shaft.

Remember '**Condition Monitoring**' ... you need to devise a regular monitoring schedule for your machinery that enables you to ascertain and repair many costly machine faults before they occur.

Your Exilis instrument is a tool to aid in this condition monitoring, it is not a tool that gives detailed fault analysis by using techniques such as fast fourier transforms. Used correctly with trained personnel it will give a good early indication as to where faults may be occurring and allow you to plan scheduled corrective maintanence.

It is then down to the experience of the engineers to determine and repair the fault or if required analyse the vibration fault even further using specialsed monitoring equipment to determine the exact location of the problem.

Predictive Maintenance Program

In general your vibration predictive maintenance program will consist of the following steps: -

1. Detection
2. Analysis
3. Correction

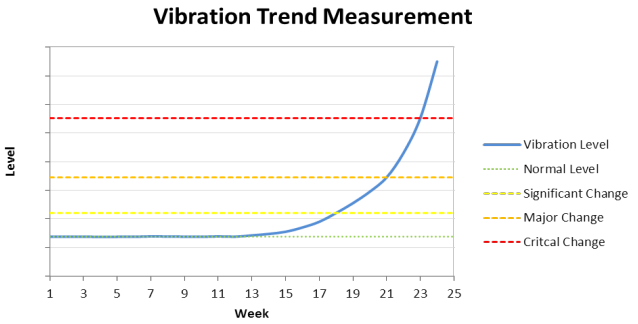
Detection

This first step of your predicitive maintenance program involves measuring the vibration levels for each machine at the marked locations using your Exilis meter.

Measurement frequency depends on the machinery and its operation but in general monthly readings will suffice, however it may be necessary to take more frequent readings for more critical machinery.

The measurement is then noted so the results can be manually trended to determine any change in vibration levels for that specific machine.

The example graph below shows trending analysis for a particular machine using weekly measurement frequency.



In practice whislt the machine is operating under normal vibration levels then only routine maintenance should be required.

When the first significant change in vibration level is discovered then minor repairs to the machine maybe required.

If a major change in vibration level is discovered then again repairs maybe required and a major service should be planned.

Reaching the critical change in vibration level will likely require an immediate shutdown of the machine to undertake major repairs and to complete a service.

Analysis

The next step of your predicitive maintenance program after detecting any machinery complications will be to identify the problem with the machine.

It may be necessary to use more specialized monitoring equipment to determine the vibration signature of the fault and exactly pinpoint the location, however if as discussed vibration readings are recording in all three directions: -

1. Axial
2. Radial – Horizontal
3. Radial – Vertical

Then this maybe be sufficient data to determine the more common machinery problems and there location.

Correction

The last stage of the predicitive maintenance program after detection and analysis will be to correct (repair) the found problem.

With early detection and analysis the correction can be planned in advance for a convienent time to ensure minimum disruption and minimum cost.

Overload Condition

An overload condition occurs when either the peak signal starts to exceed the signal handling capability of the specialised amplifier circuitry or if the vibration level exceeds the top of the selected range by approximately 20%. If the vibration source saturates the input circuitry or is approximately 20% greater than top of the selected range an Overload condition occurs and an OL (Overload) indicator is displayed on your instrument.

If an overload condition occurs it is highly recommended to change to a higher range with a lower sensitivity as your meter will be out of specification.

The overload indicator will remain on for a minimum of 2 seconds or while the overload condition remains.

Please be aware that the selected frequency weighting may attenuate the displayed signal level below the overload triggering point but an overload can still occur. This is because the overload operates from the unweighted input signal.

See **Technical Specification** for a complete list of Overload triggering points.

Chapter 4

Getting Started

Keypad Layout

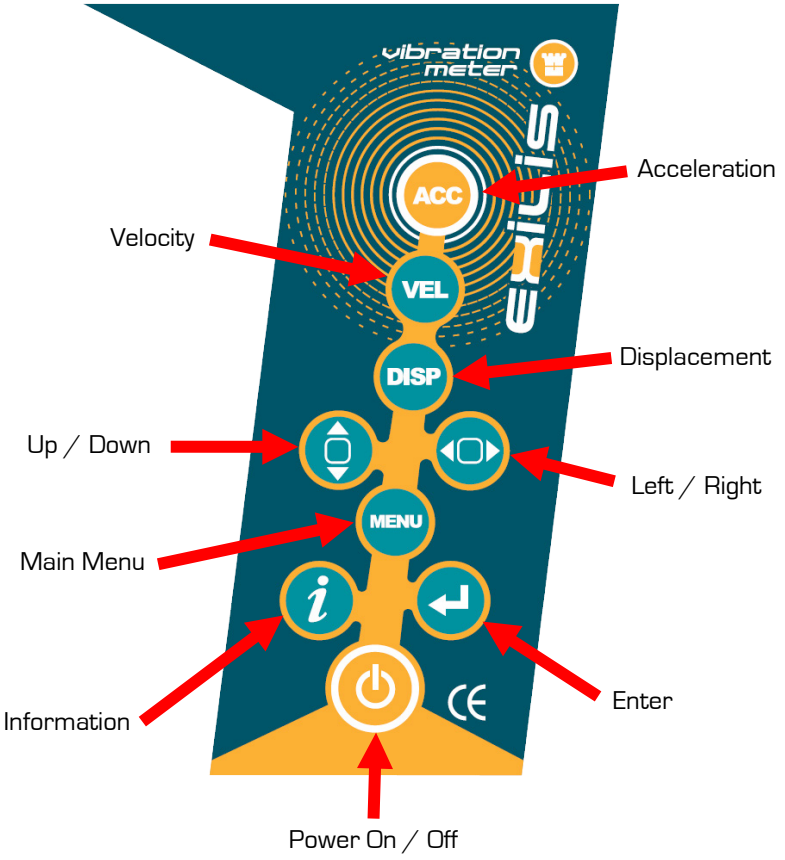


Figure 2 – Keypad Layout

Powering Your Exilis Meter

Your Exilis meter is powered from a standard 9V PP3 battery.

The battery compartment is located at the bottom left hand side whilst viewing the instrument from the front.

Open the battery door by sliding the cover downwards towards the bottom of the instrument. The cover will now swing open exposing the battery compartment. Insert the battery observing the correct polarity as marked on the inside casing.

Close the battery compartment door by reversing the procedure above. The instrument is now ready for use.

When your Exilis instrument is on the battery level can be checked at any time by pressing the **Information** key twice. The battery condition is indicated by a series of vertical bars with 4 bars showing a fully charged battery whilst 1 bar indicates the battery is nearly depleted.

It is recommended the battery is replaced if only 1 bar is displayed.

Switching Your Exilis Meter On/Off

To turn on your instrument press and release the **On/Off**  key.

Your meter will turn and initialise its start up sequence which will take approximately 10 seconds.

Please do not press any keys on the instrument during the start up sequence as data loss may occur.

When the instrument has been turned on and completed its start up procedure, the meter will display the last parameter it was measuring at the time it was switched off.

To switch the instrument off, press and release the **On/Off** key  once. There is a slight delay between switching the unit off and it turning off, this is while your data is backed up.

Chapter 5

Using Your Exilis Vibration Meter

Integration Selection

Your Exilis vibration meter has the following integration methods: -

- Acceleration
- Velocity
- Displacement

Press the following key once on the instrument to operate using the stated integration method: -

Integration	Button
Acceleration	
Velocity	
Displacement	

Setup Screen

Each integration type has an individual Setup Screen.

To view the individual setup screens repeat press  ,  or  .

Due to the screen size the information is abbreviated to fit on the screen, an example screen is shown below: -

RMSAVLnL

Changing Settings within the Setup Screen

To change any setting press the **Enter** Key  .

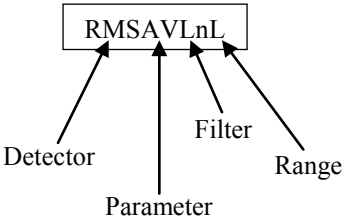
The selected setting flashes indicating that this setting can be changed.

Press the **Up/Down** key  to cycle through the available options for that particular setting.

Press the **Left/Right** key to cycle through the available settings and repeat as required.

To return to the previous screen press the **Enter** key.

Available Settings



Detector	Description
RMS	Display Running Root Mean Square Value
Pk	Display Peak Value

Parameter	Description
AV	Display Vibration Level Average (LAV – Linear Average Value)
Mx	Display Maximum rms Level reached over the measurement

Filter	Description
Ln	Use the Linear Filter
Mc	Use the Mechanical Filter

Range	Description
L	Use the Low Range
H	Use the High Range

For mathematical descriptions see **Function Equations** and more details about Ranges and Filter Responses see **Technical Specification**.

Storing Data

To store the value you are currently viewing press the **Enter** key  .

A message is displayed on the screen informing you which location the data has been stored to. This location is useful to remember when reviewing stored values.

An example is shown below: -

LOADING1

If no empty memory locations exisit then the following is displayed: -

MEM FULL

Reviewing / Clearing Stored Data

To review or clear data stored in memory press the **Menu** key  .

Now use the **Left/Right** key  to select between VIEWER and DELETE.

Viewing Data

To view data from memory select VIEWER and press the **Up/Down** key  to scroll through the available memory slots.

An example is shown below: -

VIEW 1

Press the **Left/Right** key  to view the selected record.

To view the associated settings for the record press the **Left/Right** key again.

Select other records by pressing the **Up/Down** key  .

Clearing Data

To clear data from memory select DELETE and press the **Up/Down** key  .

The screen below is shown: -

DEL 1

To clear the record press the **Enter** key  , press the Enter key once more to confirm your decision or any other key to abort.

Press the **Left/Right** key  to select other records.

Calibration

Calibration should be performed using a GA606 vibration calibrator which produces an output of 100mV/g.

Press the **Menu** key  followed by the **Enter** key  to display the following screen: -

CAL

Press the Enter key again to display the calibrator output sensitivity.

8.8 CAL

Adjust the calibration sensitivity figure displayed using the  and  keys.

The level **MUST** be set between 6.5 and 9.1 otherwise the instrument will be outside of specification, figures outside of this range are used for other models **ONLY**.

The instrument should also be set to the following: -

- Acceleration
- Linear
- Low Range

Whilst displaying the sensitivity value press the **Enter** key  to calibrate the instrument.

Instrument Status

Repeat press the **Information** key  to display the following information on your instrument: -

Operating State (RUNNING or PAUSED)
Battery Level
Instrument Version Number

All functions can be held so that they do not update by pressing the  key whilst the display shows RUNNING. During this period the screen displays PAUSED.

For normal operation of the instrument to continue press the  key once more and the screen will display RUNNING.

Chapter 6

Accessories

GA606	Vibration Calibrator
KA022*	Carry Case for Exilis and Accessories
KD1011*	Single Axis Accelerometer
KD1202	Mounting Studs (Pk 5)
KD1203	High Strength Mag Mount
KD1206*	Removable Spike Probe
KD1215	Glue Studs & Glue (pack of 5)
01USBSTICK*	8GB USB Memory Stick • Trend Analysis Module Included
01VIBWORKPAD1*	Vibration Assesment Work Pad
01ZL1097-01*	Single Axis Accelermeter Cable (1 metre)

* supplied with the Exilis

Chapter 7

Technical Specification

Noise Floor

Range - (Acc , Vel , Disp)	
Low	**High**
<0.01g , <0.1mm/s , <0.2um	<0.1g , <1mm/s , <1um

Accelerometer

Specification	KD1011
Output Voltage	100mV/g ±20%
Operating Range	±20g
Frequency Response	2 to 10000 Hz ±10%
Resonant Frequency	>22kHz
Weight	115 grams (excluding probe)
Operating Temperature Range	-55°C to 85°C -65°F to 185°F
Electrical Noise Floor	0.003g pk
Transverse Sensitivity	5%
Maximum Shock	5000g pk

Normal Operating Mode

Fitted with Single Axis accelerometer KD1011

Minimum and Overload Triggering Points

Points when calibrated with an accelerometer of sensitivity 100.0mV/g

Acceleration : g		
RANGE	**Minimum**	**OL**
LOW	0.03	> 11.9
HIGH	0.3	> 119

Velocity : Metric mm/s		
RANGE	**Minimum**	**OL**
LOW	0.3	> 119
HIGH	3	> 1190

Displacement : Metric µm		
RANGE	**Minimum**	**OL**
LOW	0.3	> 119
HIGH	3	> 1190

Level Ranges

Acceleration : g	
LOW	0.01 – 10g
HIGH	0.1 – 100g

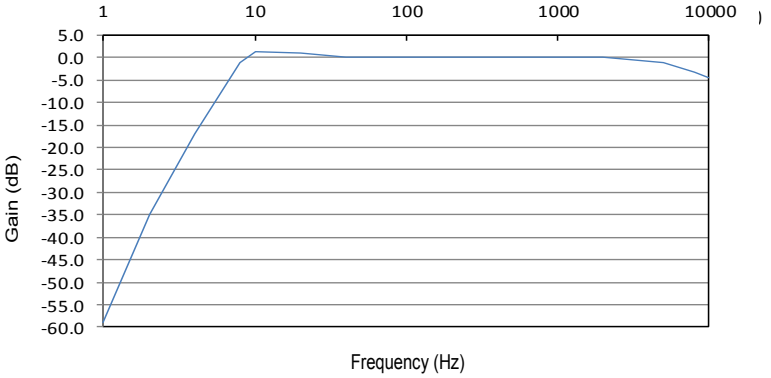
Velocity : Metric	
LOW	0.1 – 100 mm/s
HIGH	1 – 1000 mm/s

Displacement : Metric	
LOW	0.1 – 100 µm
HIGH	1 – 1000 µm

Frequency Weightings

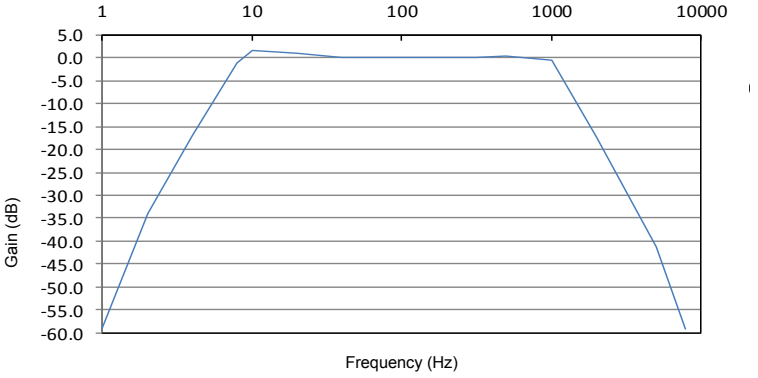
Ln : Linear Filter Response

Filter Frequency Response: -



Mc : Mechanical Filter Response

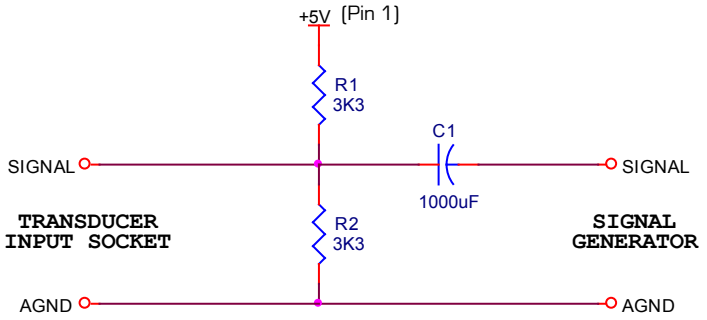
Filter Frequency Response: -



Electrical Signal Input

Electrical signals at frequencies >10Hz can be applied to the Exilis instruments by interfacing a suitable signal generator with an output impedance of 600Ω to the Input Socket.

The axis shall be subject to the following circuitry, (see Signal Wiring).



Maximum Electrical Signal Input For No Damage

5 Volts (Peak to Peak)

Environmental Stabilization Time

30 minutes

Warm up Time

≤ 2 minutes

Settling Time

It is recommended that a calculation settling period of ≥30 seconds is allowed for in any recording.

Temperature Operating Range

-10°C to +50°C

Effect of Air Temperature

Accuracy better than ±5% over the range -10°C to +50°C

Effect of Surface Temperature

Accuracy better than ±4% over the range -10°C to +50°C

Display

1 x 8 Alphanumeric, digit size 7mm x 5mm

Refresh Rate ≤ 500mS

Displayed parameter at each update interval is the value at the time of the update interval.

Memory

Non-volotile E2PROM holding calibration data plus storage of 9 spot results.

Overload

Positive overload warning when the input circuit saturates.

Size and Weight

Dimensions: (H):135mm (without Cable) x (W) :62mm x (D): 30mm

Weight: 250g approximately (including batteries)

Batteries

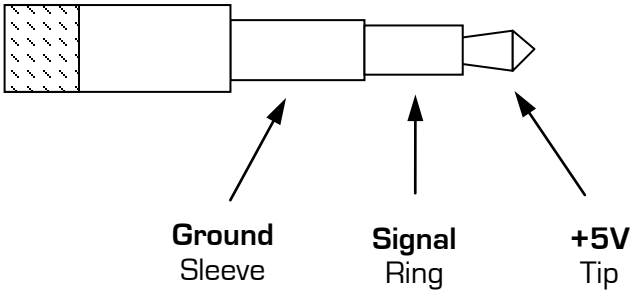
Type: 1 x 9V PP3

Life Expectancy: 10 hours continuous use (approx.)

Wiring Configuration – 3 Pole Jack Socket 3.5mm

Input		
Pin Number Socket (3.5mm)	Description	Mating Plug (3.5mm)
1	+5V	Tip
2	GND	Sleeve
3	Signal	Ring

Mating Plug Diagram: -



EC Declaration of Conformity

CE

The CE marking of the Castle Exilis Vibration Meter indicates compliance with the EMC and Low Voltage Directive.

We, Castle Group Ltd declare that the: -

- *Exilis Vibration Meter*

has in accordance with the following Electromagnetic Compatibility Directives: -

- *SI 2005/281*
- *2004/108/EC*

been designed and manufactured to meet the following tests: -

• *EMC Emissions:*	*EC 61000-6-3:2007+A1:2011* *EN61326-1:2006* *CISPR 22:2008* *EN55022:2006+A1:2007* *FCC Rules, Part 15 2003 Class B*
• *EMC Immunity:*	*IEC 61000-6-2:2005* *EN61326-1:2006* *Levels: ±4kV(Contact) , ±8kV(Air)*
• *RF EM Amplitude Mod:*	*IEC 61000-6-2:2005* *Level 10 V/m*

No performance or function degradation is noticeable whilst subject to electrostatic discharge or a.c power frequency and radio frequency fields under any operating condition with the meter and no differences in radio frequency emissions are apparent during operation where appropriate.

The technical file for the above is maintained at Castle Headquarters.

I hereby declare that the instruments named above have been designed to comply with the relevant sections of the above referenced specifications, and that the above named instruments comply with all essential requirements of the specified Directives.

Simon Bull
Managing Director
Castle Group Ltd, Salter Road, Scarborough, North Yorkshire, YO11 3UZ
February 2014

Chapter 8

Function Equations

The following table describes mathematically how the functions available on the Exilis Vibration Meter are calculated.

All calculations displayed are subject to rounding and/or truncation.

Function	Equation
Running rms Acceleration (g)	$Arms := \frac{1}{9.807} \cdot \sqrt{\frac{1}{\theta} \cdot \int_{t-\theta}^{t} (a_w)^2(ta)\, d(ta)}$ (g) t = instantaneous time (seconds) θ = integration time of the measurement (1second) $a_w(ta)$ = instantaneous acceleration value (ta) = time (seconds)
Running rms Velocity (Metric)	$Vrms := \int \left[\sqrt{\frac{1}{\theta} \cdot \int_{t-\theta}^{t} (a_w)^2(ta)\, d(ta)} \right] d(tv) \cdot 10^3$ (mm/s) t = instantaneous time (seconds) θ = integration time of the measurement (1 second) $a_w(ta)$ = instantaneous acceleration value (ta), (tv) = time (seconds)
Running rms Displacement (Metric)	$Drms := \int \int \left[\sqrt{\frac{1}{\theta} \cdot \int_{t-\theta}^{t} (a_w)^2(ta)\, d(ta)} \right] d(tv)\, d(td) \cdot 10^6$ (μm) t = instantaneous time (seconds) θ = integration time of the measurement (1 second) $a_w(ta)$ = instantaneous acceleration value (ta), (tv), (td) = time (seconds)
Peak	Peak = The maximum peak level of the instantaneous acceleration, velocity or displacement over the measurement period

Chapter 9

Customer Instrument Support

Warranty and After Sales Service

Castle Group Ltd design and manufacture precision instruments, which if treated with reasonable care and attention should provide many years of trouble free service.

In the unlikely event of a fault occurring with your product during the warranty period, the instrument should be returned in its original packaging to Castle Group Ltd or to an authorised agent. Please enclose a clear description of the fault to ensure your instrument is dealt with as quickly as possible.

Any misuse or unauthorised repairs will invalidate your warranty.

Damage to your product caused by faulty or leaking batteries is not covered by the warranty.

Details of the warranty cover are available upon request from Castle Group Ltd or your authorised agent.

All instruments designed and manufactured by Castle Group Ltd adhere to strict British and International standards. To ensure your instrument remains compliant with these standards it is highly recommended that your instrument is returned annually for calibration.

Annual calibration is particularly important for cases in which instrument readings are to be used in litigation or compliance work.

For warranty or service please return your instrument to: -

The Service Department
Castle Group Ltd
Salter Road
Cayton Low Road Industrial Estate
Scarborough
North Yorkshire
England
YO11 3UZ

Question	Answer
The instrument will not power on.	Replace the battery.
The Instrument is not responding to inputted vibration levels.	Turn the instrument Off, wait 10 seconds to allow the instrument to reset and then turn back On.
	Check the cable for possible damage or incorrect attachment to the transducer or instrument.
The instrument is displaying unexpected readings.	Are the sensitivity values entered correctly?
	Ensure cable is securely fastened.
The overload indicator is permanently on.	Change to a higher range.
The overload indicator comes on before the top of the range is reached.	The overload indicator will also be shown if the input amplifier is saturated. This is possible even if the displayed vibration reading on your instrument is below the top of the selected range because of the applied frequency weighting filter.

Disclaimer

Whilst every effort is made to ensure the accuracy and reliability of both the instrument described and the associated documentation, Castle Group Ltd makes no representation or warranties as to the completeness or accuracy of this information.

Castle Group Ltd assumes no responsibility or liability for any injury, loss or damage incurred as a result of misinterpreted or inaccurate information.

Any documentation supplied with your product is subject to change without notice.

Instrument Details

For your records and for future correspondence with Castle Group Ltd regarding your instrument, please complete the following details: -

Instrument

Instrument Serial Number

Transducer Serial Number

Purchase Date