

VE-13 / VE-12 / VE-11-V / VE-11-H Velocity Sensor

Features

- Wide Full Scale Range, ± 1 to ± 100 mm/s**
- Bandwidth 1 Hz to 315 Hz**
- Civil Engineering and general vibration measurement applications**
- Built-in Impulse Test Circuit**
- Single Bolt Mounted Housing provides up to $\pm 10^\circ$ of Levelling Adjustment**
- Downhole Version (VE-1x-DH) is also available**



Outline

The VE Velocity Sensors are engineered for consistent performance over a long lifetime. Advanced computerised testing, manufacturing techniques and quality control are used in the production process to provide both, the uniform parameters and the rugged qualities required in modern velocity sensors.

With the new VE-1x, 1 Hz Velocity Sensor now it is possible to measure vibrations in accordance with DIN 45669-1.

The sensor module has proven itself successfully worldwide for many years in different applications. The symmetrical rotating dual coil construction minimises the force on the spring arms. The use of precious metals ensure optimum electrical contact and a long operating life.

The VE Velocity Sensors operate from a wide range of input voltages and can be used for a variety of civil engineering and general vibration measurement applications. The VE-11-H is uniaxial horizontal, the VE-11-V uniaxial vertical, VE-12 biaxial and the VE-13 is a triaxial velocity sensor.

The VE Velocity Sensors are housed in a very compact 195 x 112 x 96 mm case. The sealed cast aluminium housing contains a MS style connector or a sealed cable inlet. The housing also incorporates a single bolt mount with three levelling screws, which offers extended adjusting capability during mounting.



Specifications VE-13 / VE-12 / VE-11-V / VE-11-H Velocity Sensor

General Characteristics

Application: Civil engineering, general vibration measurement

Configurations:

| | Triaxial | Biaxial | Uniaxial | Axes | Alignment** |
|----------|----------|---------|----------|--------------|-------------|
| VE-13: | ■ | | | X - Y - Z | H - H - V |
| VE-12-H: | | ■ | | X - Y | H - H |
| VE-12-V: | | ■ | | X (or Y) - Z | H - V |
| VE-11-H: | | | ■ | X (or Y) | H |
| VE-11-V: | | | ■ | Z | V |

** H: Horizontal, V: Vertical

Full Scale Range: ± 100 mm/s
optional: ± 1 , ± 10 mm/s

Specification

Instrument Type: Digital grade long travel geo-phones
Dynamic Range: > 96 dB
Linearity: $< 0.3\%$ of full scale
Cross Axis Sensitivity: $< 0.1\%$ of full scale
Frequency Response: 1 to 315 Hz
Damping: standard 0.7
Full Scale Output: 0 ± 10 V differential (20 Vpp)
optional 2.5 ± 2.5 V single-ended (5 Vpp)
 0 to 20 mA current loop
Output Impedance: $< 50 \Omega$
Self Test: Impulse Test
Measuring Range: See plot

Power

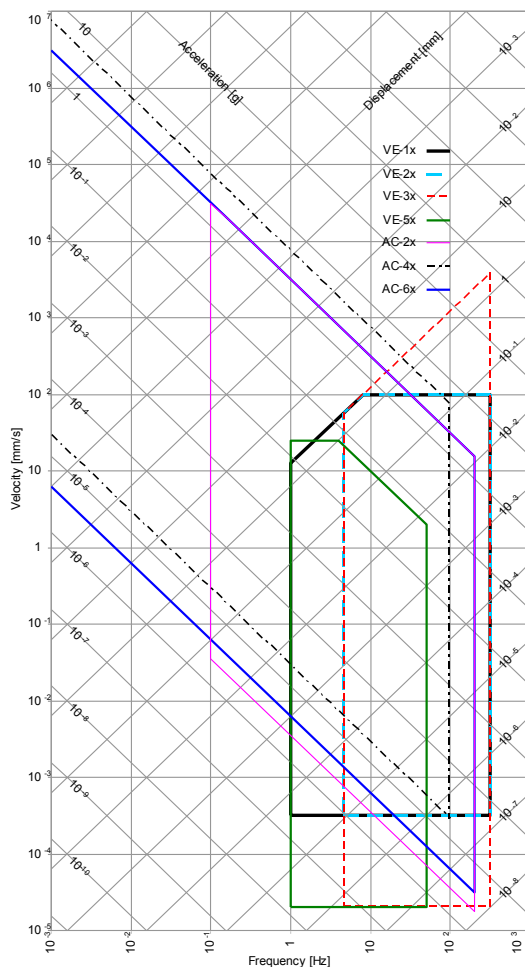
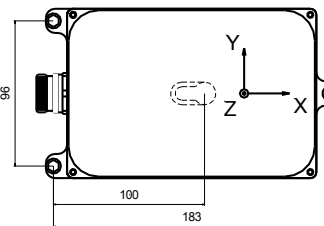
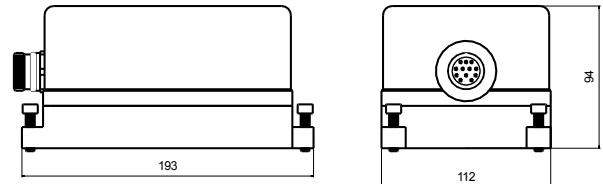
Supply Voltage: 9 to 12 VDC
Supply Current: 12 mA per axis

Connector Pin Configuration

Pin 1-2, 3-4, 5-6: Signal output for axis X, Y, Z
Pin 7-8: Test input, Digital test-pulse (0 – 12 V)
Pin 9-10: +12 VDC Power Supply
Pin 11-12: Sensor Mode
Case: Shielded Ground

Environment / Housing

Housing Type: Cast aluminium
Sealed access cover
Housing Size: $195 \times 112 \times 96$ mm
Weight: 2.0 kg
Index of Protection: IP 65
optional IP 68
Temperature Range: -25 to 85 °C (operating)
 -40 to 100 °C (storage)
Humidity: 0 to 100 % (non-condensing)
Mounting: Single bolt, surface mount, adjustable within $\pm 10^\circ$



Standard VE-1x

Floor mounted, Full scale ± 100 mm/s
2 m cable with sensor mating connector,
concrete anchor and user manual on CD

Options

Cable & connector: Sealed cable inlet, replaces connector
Cable with shielded twisted pairs for any length (including mating sensor connector) with open end Cables for connection to GeoSIG recorder
Connector on user specification mounted at cable end
Housing: Watertight IP68 housing
Downhole housing
Stainless steel protective housing
Temperature Range: -25 to 100 °C (operating)
Temperature Output: Temperature sensing at the sensor side
Ordering Information
Specify: Type of VE-1x, full scale range, and other applicable options

VE-23 / VE-22 / VE-21-V / VE-21-H Velocity Sensor

Features

- Wide Full Scale Range, ± 1 to ± 100 mm/s**
- Bandwidth 4.5 Hz to 315 Hz**
- Civil Engineering and general vibration measurement applications**
- Built-in Impulse Test Circuit**
- Single Bolt Mounted Housing provides up to $\pm 10^\circ$ of Levelling Adjustment**
- Downhole Version (VE-2x-DH) is also available**



Outline

The VE Velocity Sensors are engineered for consistent performance over a long lifetime. Advanced computerised testing, manufacturing techniques and quality control are used in the production process to provide both, the uniform parameters and the rugged qualities necessary in modern velocity sensors.

The sensor module has been proven world-wide for many years in different applications. The symmetrical rotating dual coil construction minimises the force on the spring arms. The use of precious metals ensures optimum electrical contact and a long operating life.

The VE Velocity Sensors operate from a wide range of input voltages and can be used for a variety of civil engineering and general vibration measurement applications. The VE-21-H is uniaxial horizontal, the VE-21-V is uniaxial vertical and the VE-23 is a triaxial velocity sensor.

The VE Velocity Sensors are housed in a very compact 195 x 112 x 96 mm case. The sealed cast aluminium housing contains a MS style connector or a sealed cable inlet. The housing also incorporates a single bolt mount with three levelling screws.



Specifications VE-23 / VE-22 / VE-21-V / VE-21-H Velocity Sensor

General Characteristics

Application: Civil engineering, general vibration measurement

Configurations:

VE-23:

VE-22-H:

VE-22-V:

VE-21-H:

VE-21-V:

| | Triaxial | Biaxial | Uniaxial | Axes | Alignment*** |
|----------|----------|---------|----------|--------------|--------------|
| VE-23: | ■ | | | X - Y - Z | H - H - V |
| VE-22-H: | | ■ | | X - Y | H - H |
| VE-22-V: | | ■ | | X (or Y) - Z | H - V |
| VE-21-H: | | | ■ | X (or Y) | H |
| VE-21-V: | | | ■ | Z | V |

*** H: Horizontal, V: Vertical

Full Scale Range: ± 100 mm/s
optional: $\pm 1, \pm 10$ mm/s

Specification

Instrument Type: Digital grade long travel geo-phones

Dynamic Range: > 96 dB

Linearity: < 0.3 % of full scale

Cross Axis Sensitivity: < 0.1 % of full scale

Frequency Response: 4.5 to 315 Hz

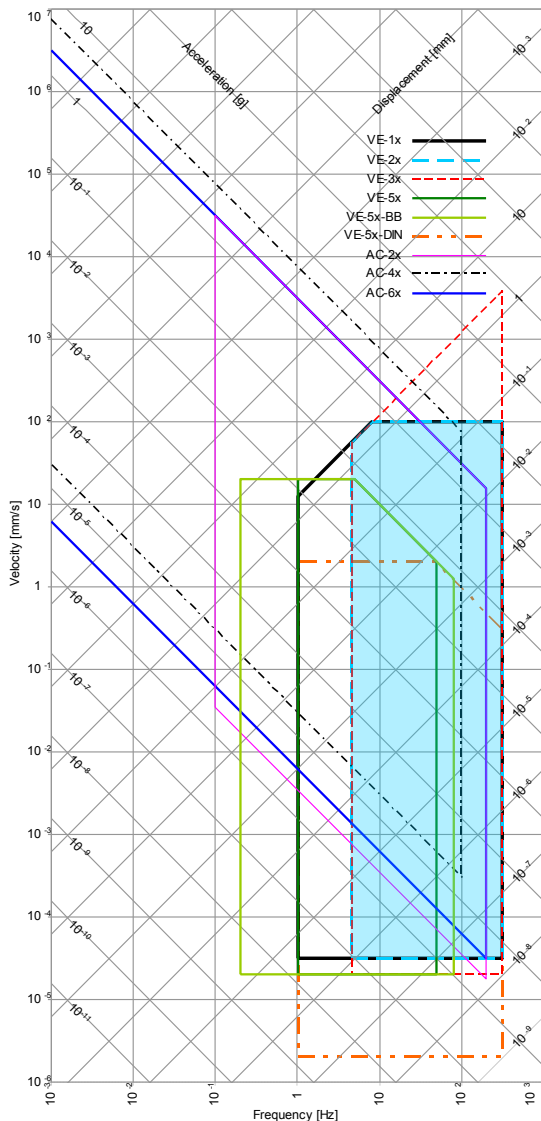
Damping: standard 0.7

Full Scale Output: 0 ± 10 V differential (20 Vpp)
optional 2.5 ± 2.5 V single-ended (5 Vpp)

0 to 20 mA current loop

Output Impedance: < 50 Ω

Measuring Range: See plot



Power

Supply Voltage: 9 to 12 VDC

Supply Current: 1.2 mA per axis

Connector Pin Configuration

Pin 1-2, 3-4, 5-6

Signal output for axis X, Y, Z

Pin 7-8

Test input, Digital test-pulse (0 - 12 V)

Pin 9-10

+12 VDC Power Supply

Pin 11-12

Sensor Mode

Case

Shielded Ground

Environment / Housing

Housing Type:

Cast aluminium
Sealed access cover

Housing Size:

195 x 112 x 96 mm

Weight:

2.0 kg

Index of Protection:

IP 65
optional IP 68

Temperature Range:

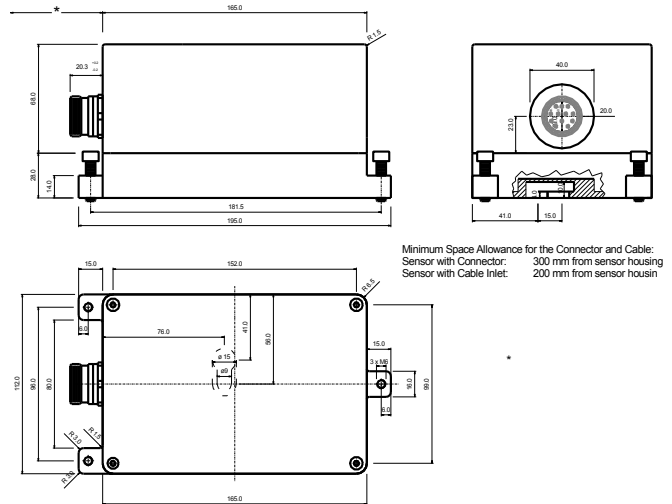
-25 to 85 °C (operating)
-40 to 100 °C (storage)

Humidity:

0 to 100 % (non-condensing)

Mounting:

Single bolt, surface mount, adjustable
within $\pm 10^\circ$



Standard VE-2x

Floor mounted, full scale ± 100 mm/s
2 m cable with sensor mating connector
concrete anchor and user manual on CD

Options

Cable Connection:

Sealed cable inlet, replaces connector
Cable with shielded twisted pairs for any
length (including mating sensor
connector) with open end
Cables for connection to GeoSIG
recorder

Connector on user specification
mounted at cable end

Housing:

Watertight IP68 housing
Downhole housing
Stainless steel protective housing

Temperature Output:

Temperature sensing at the sensor side

1 Hz Extension:

Electrical circuit, which extends
the passband down to 1 Hz.

Low Noise Amplifier:

Amplification of 1000 using very
low noise electronics (model
VE-2XHG).

Ordering Information

Specify:

Type of VE-2x, full scale range, and
other applicable options

VE-33 / VE-32 / VE-31-V / VE-31-H Velocity Sensor

Features

- Sensitivity G 27.3 Vs/m
- Bandwidth 4.5 Hz to 315 Hz
- Civil Engineering and general vibration measurement applications
- Single Bolt Mounted Housing provides up to $\pm 10^\circ$ of levelling adjustment
- Surface and Wall mount
- Temperature compensated



Outline

The VE Velocity Sensors are engineered for consistent performance over a long lifetime. Advanced computerised testing, manufacturing techniques and quality control are used in the production process to provide both, the uniform parameters and the rugged qualities required in modern velocity sensors.

The sensor module has proven itself successfully worldwide for many years in different applications. The symmetrical rotating dual coil construction minimises the force on the spring arms. The use of precious metals ensure optimum electrical contact and a long operating life.

The VE Velocity Sensors has its 3 dB at 4.5 Hz and can be used for a variety of civil engineering and general vibration measurement applications. The VE-31-H is uniaxial horizontal, the VE-31-V uniaxial vertical, VE-32 biaxial and the VE-33 is a triaxial velocity sensor.

The VE Velocity Sensors are housed in a very compact 195 x 112 x 96 mm case. The sealed cast aluminium housing contains a MS style connector or a sealed cable inlet. The housing also incorporates a single bolt mount with three levelling screws, which offers extended adjusting capability during mounting.



Specifications VE-33 / VE-32 / VE-31-V / VE-31-H Velocity Sensor

General Characteristics

Application: Civil engineering, general vibration measurement

Configurations:

| | Triaxial | Biaxial | Uniaxial | Axes | Alignment** |
|----------|----------|---------|----------|--------------|-------------|
| VE-33: | ■ | | | X - Y - Z | H - H - V |
| VE-32-H: | | ■ | | X - Y | H - H |
| VE-32-V: | | ■ | | X (or Y) - Z | H - V |
| VE-31-H: | | | ■ | X (or Y) | H |
| VE-31-V: | | | ■ | Z | V |

** H: Horizontal, V: Vertical

Specification

Instrument Type: Digital grade long travel geo-phones
 Dynamic Range: > 96 dB
 Linearity: < 0.3 % of full scale
 Cross Axis Sensitivity: < 0.1 % of full scale
 Frequency Response: 4.5 to 315 Hz
 Damping: standard 0.7
 Sensitivity G: 27.3 Vs/m
 Output Impedance: 430 Ω

Measuring Range: See plot

Power

Supply Voltage: no power required

Connector Pin Configuration

Pin 1-2, 3-4, 5-6: Signal output for axis X, Y, Z
 Pin 7: Shield

Environment / Housing

Housing Type: Cast aluminium
 Sealed access cover

Housing Size: 195 x 112 x 96 mm

Weight: 1.0 kg

Index of Protection: IP 65

Temperature Range: -25 to 85 °C (operating)
 -40 to 100 °C (storage)

Humidity: 0 to 100 % (non-condensing)

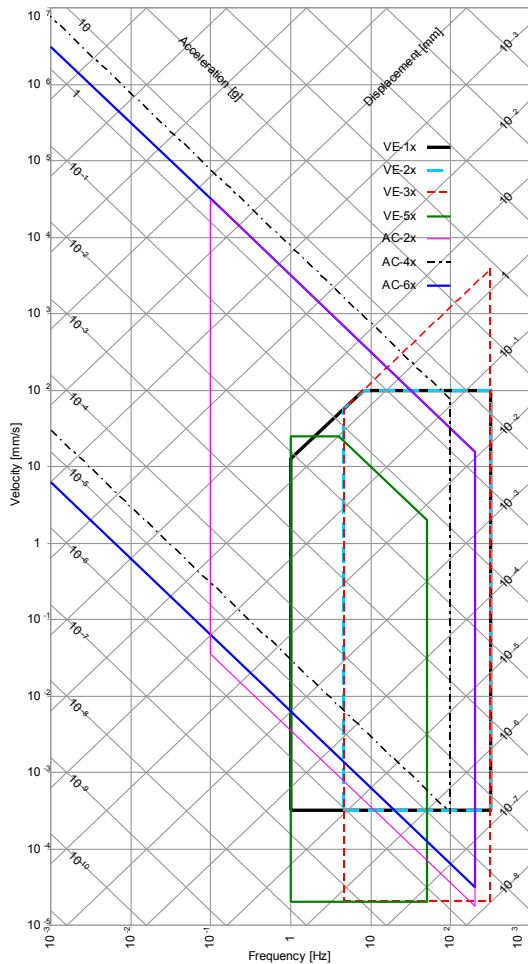
Mounting: Single bolt, surface mount, adjustable within $\pm 10^\circ$

Standard VE-3x

Floor mounted
 2 m cable with sensor mating connector, concrete anchor and user manual on CD

Ordering Information

Specify: Type of VE-3x, and other applicable options



VE-53 / VE 52 / VE 51 Short Period Seismometer

Features

- Sensitivity 1000 V/m/s differential
- Bandwidth 1 to 80 Hz
BB version 0.2 to 160 Hz
- Dynamic range > 120 dB (1 to 30 Hz)
- Excellent temperature stability
- High shock survivability
- High lifetime stability
- Cost effective sensor
- Low power consumption
- Simple test and calibration
- Strong mechanical design
- Downhole version (VE-5x-DH) is also available



Outline

The VE-5x is a triaxial short period seismometer designed for field or survey and monitoring applications.

The VE-5x seismometer is based on a state of the art geophone mass-spring system with electronic feedback. It is ideally suited for installation in vaults with low to moderate noise. This type of sensor yields a very good stability under temperature fluctuations or against aging effects. In addition due to the innovative design of the unit no mass clamping is required.

The VE-5x is housed in a sealed cast aluminium housing. The housing also incorporates a single bolt mount with three levelling screws.

The broadband version, VE-53-BB, is suitable for monitoring applications involving an extended frequency range. Stainless steel packaging options and a downhole version, VE-53-DH, are also available.

The VE-5x seismometer is directly compatible with all GeoSIG systems.



Specifications VE-53 / VE 52 / VE 51 Short Period Seismometer

General Characteristics

Configurations:

VE-53(-BB):

VE-52(-BB)-H:

VE-52(-BB)-V:

VE-51(-BB)-H:

VE-51(-BB)-V:

| | Triaxial | Biaxial | Uniaxial | Axes | Alignment** |
|--------------|----------|---------|----------|--------------|-------------|
| VE-53(-BB) | ■ | | | X - Y - Z | H - H - V |
| VE-52(-BB)-H | | ■ | | X - Y | H - H |
| VE-52(-BB)-V | | ■ | | X (or Y) - Z | H - V |
| VE-51(-BB)-H | | | ■ | X (or Y) | H |
| VE-51(-BB)-V | | | ■ | Z | V |

** H: Horizontal, V: Vertical

Sensitivity: 1000 V/m/s differential

Full Scale Range: 10 mm/s nominal output

Sensor Element

Type:

Over damped geophones

Dynamic Range:

> 120 dB (1 to 30 Hz)

Linearity:

± 0.05 % of full scale maximum

Accuracy:

± 0.2 dB max over the bandwidth

Cross Axis Sensitivity:

± 1 % typical

± 3 % maximum

Bandwidth:

1 to 80 Hz (-3 dB)

optional BB: 0.2 to 160 Hz

Damping:

0.7 critical

Full Scale Output:

0 ± 10 V differential

optional 0 ± 5 V pseudo-differential

Measuring Range:

See plot

Power

Supply Voltage:

9 to 18 VDC

Consumption:

70 mA at 12 VDC

Overvoltage Protection:

All pins are protected

Environment/Housing

Housing Type:

Cast aluminium

Sealed access cover

Housing Size:

195 x 112 x 96 mm

Weight:

2.5 kg

Index of Protection:

IP 65

optional IP 68

Temperature Range:

-20 to 70 °C (operating)

-30 to 80 °C (non-operating)

Humidity:

0 to 100 % (non-condensing)

Orientation:

Floor mount

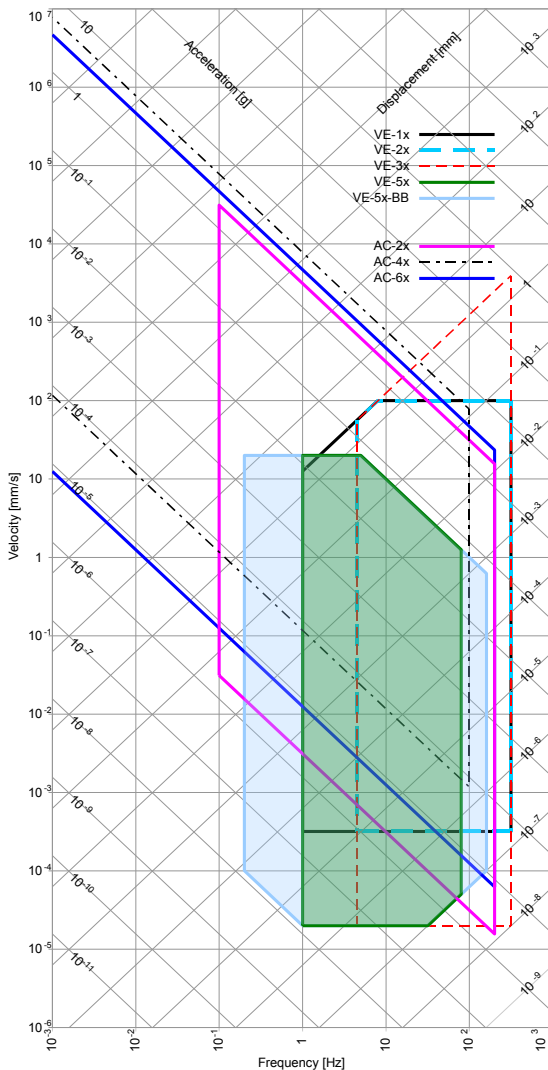
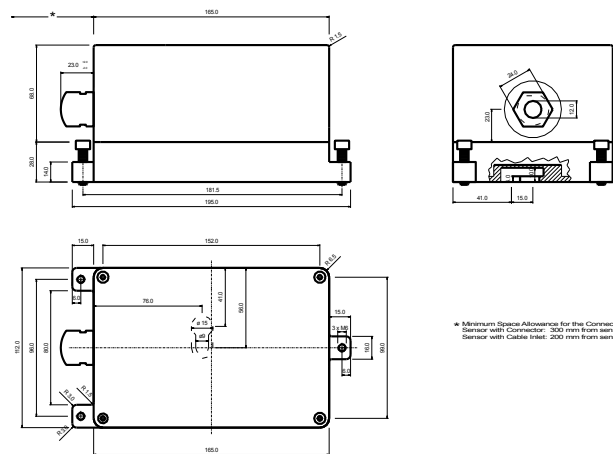
optional Wall mount

See separate document

(GS_Sensor_Orientation)

Mounting:

Single bolt, surface mount, adjustable within ± 10°



Standard VE-5x

Floor mounted, 2 m cable with cable inlet and concrete anchor, includes recorder mating connector if delivered with a GeoSIG recorder.

Downhole Version

See separate datasheet (VE-53-BB)

Options

Cable & connector:

See separate document (GS_Sensor_Connector_Options)

Housing:

Watertight IP68 housing
Stainless steel protective housing

Ordering Information

Specify:

Configuration of VE-5x, and other applicable options

VE-53 / VE-52 / VE-51-DH Downhole Velocity Sensor

Features

- ❑ Sensitivity 1000 V/m/s differential
- ❑ Bandwidth 1 to 80 Hz
BB version 0.2 to 160 Hz
- ❑ Dynamic range > 120 dB (1 to 30 Hz)
- ❑ 20 Vpp full differential signal output
- ❑ Excellent temperature stability
- ❑ High shock survivability
- ❑ High lifetime stability
- ❑ Cost effective sensor
- ❑ Low power consumption
- ❑ Simple test and calibration
- ❑ Strong mechanical design
- ❑ Fits in 3 inch casing



Outline

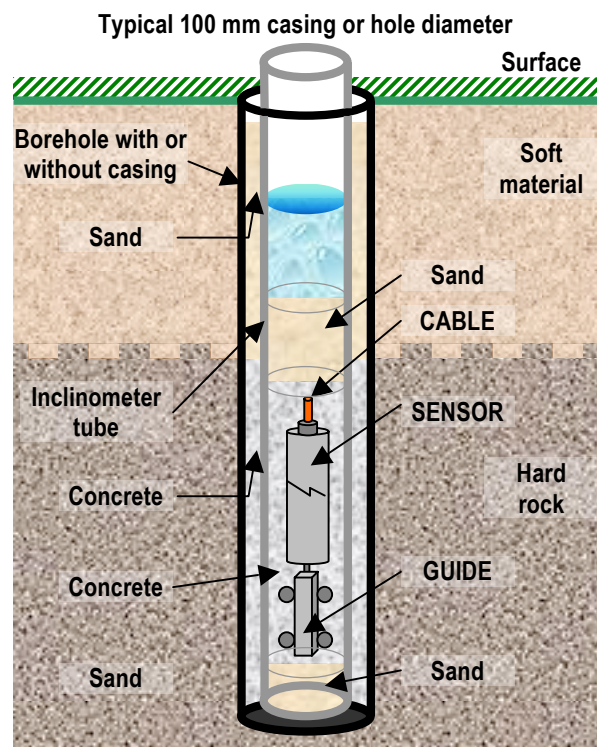
The VE-53-DH sensor package is a triaxial velocity sensor designed for field or industrial survey and monitoring applications concerning vibration or explosion, such as civil engineering.

The VE-5x-DH sensor is based on a standard exploration geophone mass-spring system with electronic feedback. This type of sensor yields a very good stability under temperature changes or aging effects because of the very unsophisticated principle.

With the help of the TEST LINE the VE-53-DH velocity sensor can be completely tested assuring proper operation.

The downhole casing contains the entire sensor system. The sensor is connected through Overvoltage Protection stage to the recorder at the surface with a cable.

By using inclinometer tubes and the provided guiding wheels, the sensor can be oriented before insertion in the tube.



Specifications VE-53 / VE-52 / VE-51-DH Downhole Velocity Sensor

General Characteristics

Configurations:

- VE-53-DH(-BB):
- VE-52-DH(-BB)-H:
- VE-52-DH(-BB)-V:
- VE-51-DH(-BB)-H:
- VE-51-DH(-BB)-V:

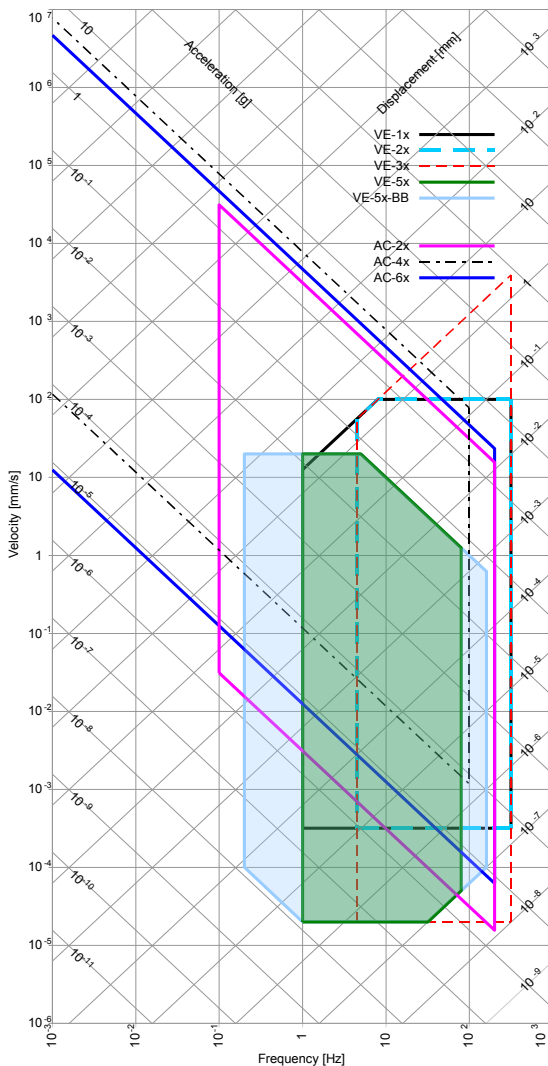
| | Triaxial | Biaxial | Uniaxial | Axes | Alignment** |
|---|----------|---------|----------|--------------|-------------|
| ■ | ■ | | | X - Y - Z | H - H - V |
| | ■ | | | X - Y | H - H |
| | | ■ | | X (or Y) - Z | H - V |
| | | | ■ | X (or Y) | H |
| | | | ■ | Z | V |

** H: Horizontal, V: Vertical

- Sensitivity: 1000 V/m/s differential
- Full Scale Range: 10 mm/s nominal output

Sensor Element

- Type: Over damped geophones
- Dynamic Range: > 120 dB (1 to 30 Hz)
- Linearity: $\pm 0.05\%$ of full scale maximum
- Accuracy: ± 0.2 dB max over the bandwidth
- Cross Axis Sensitivity: $\pm 1\%$ typical
- Bandwidth: $\pm 3\%$ maximum
- Damping: 1 to 80 Hz (-3 dB)
- Full Scale Output: 0 \pm 10 V differential
- Measuring Range: optional BB: 0.2 to 80 Hz
- optional 0 \pm 5 V pseudo-differential
- See plot

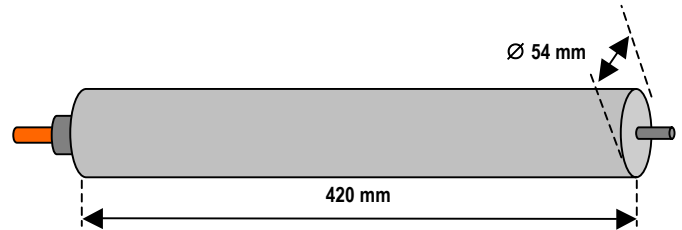


Power

- Supply Voltage: 109 to 1518 VDC
- Consumption: 70 mA at 12 VDC
- Overvoltage Protection: All pins are protected

Environment/Housing

- Housing Type: Aluminium cylinder, fully sealed
- Housing Size: Diameter 54 mm, length 420 mm
- Weight: 3.5 kg
- Index of Protection: IP 68, up to 10 bar water pressure
- Temperature Range: - 40 to 85 °C (operating)
- 40 to 85 °C (non-operating)
- Humidity: 0 to 100 %
- Orientation: Using 3" inclinometer casing (Photo 1) with included guidewheels (Photo 2).



Standard VE-53-DH

User specified cable already mounted, includes recorder mating connector if delivered with a GeoSIG recorder

Options

- Cable & connector: See separate document (GS_Sensor_Connector_Options)

Accessories

- DH-TUBE: 3" inclinometer casing as in Photo 1 in sections of 3 meters with coupling elements.
- Installation kit: All required tools and fixation consumables for up to 100 meters of casing.

Ordering Information

- Specify: Configuration of VE-5x-BB, depth of borehole and total cable length, required accessories, and other applicable options



Photo 1



Photo 2