ENDEVCO
AN AMPHENOL COMPANY

# Model 6634D Signal Conditioner

# IM6634D

## Instruction Manual

78484 Rev NR
ECO 54847
IM6634D
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# 1.0 Table of Contents

## 2.0 Product Description

The ENDEVCO Model 6634D Vibration Amplifier is a signal conditioning instrument designed to condition and display accelerometer signals in vibration testing of rotating machines.

The 6634D Vibration Amplifier is a single channel instrument which operates from one of the following input sources:

- Single-Ended Piezoelectric (PE) Accelerometer
- Differential PE Accelerometer
- External Calibration Source
- Velocity Coil
- Remote Charge Converter (RCC) or Integrated Electronics PiezoElectric (IEPE) Sensor

The 6634D produces the following output signals:

- Broadband acceleration output
- Acceleration output - fixed at 50 mVpk/g pk (or 5.0 mVpk/m/s$^2$ pk)
- Velocity output - fixed at 100 mVpk/ips pk (or 3.8609 mVpk/mm/s pk)
- Displacement output - fixed at 400 mVpk/mil pk (or 15.4436 mVpk/µm pk)
- AC Programmable output can be set to:

    Acceleration – 2 to 200 g pk, Full Scale (20 to 2000 m/s$^2$ pk)

    Velocity - 1.0 to 100 ips pk, Full Scale (50 to 2000 mm/s pk)

    Displacement - 0.5 to 50 mils pk, Full Scale (20 to 1000 µm pk)

- DC Programmable output can also be set to:

    Acceleration – 2 to 200 g pk, Full Scale (20 to 2000 m/s$^2$ pk)

    Velocity - 1.0 to 100 ips pk, Full Scale (50 to 2000 mm/s pk)

    Displacement - 0.5 to 50 mils pk, Full Scale (20 to 1000 µm pk)

The DC output can also be programmed to represent true-RMS, average, or peak. Two TTL compatible latched alarm outputs are triggered if the DC output exceeds pre-programmed levels. The DC and AC Full Scale Outputs can be independently set to 1V, 5V, or 10V.

The 6634D provides the following front panel displays:

- Digital display of DC output level with bar graph
- Red LED fault indicators for Overload, Alert, and Warning

Key features include:

- Programmatically configurable for Imperial or Metric units

- AC and DC programmable outputs
- PE, Differential PE, IEPE and VEL COIL/RCC inputs
- Programmable input filtering: high-pass, low-pass, band-pass
- Wide sensor sensitivity input range
- -3dB Bandwidth up to 90 kHz
- SCPI remote control API
- Embedded web server
- Ethernet and RS-232 connectivity

The 6634D is a line-powered, single-channel instrument which may be used independently, or up to 6 units may be mounted in an optional 19" rack (Endevco P/N 4948A, 5" high). All signal and power connections are made at the rear panel of the unit.

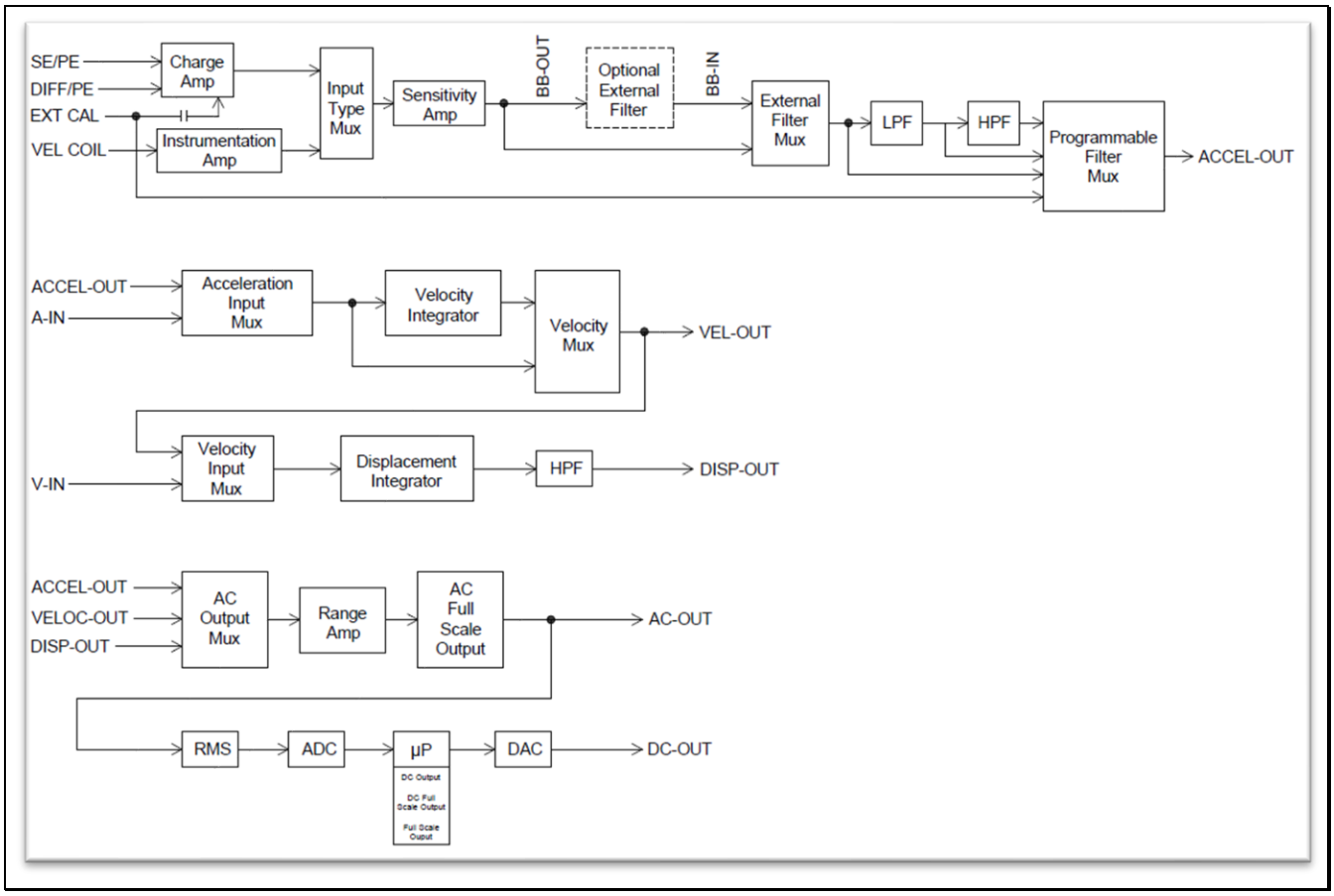



Figure 0: Block diagram of the 6634D

# 3.0 Theory of Operation

The ENDEVCO Model 6634D Vibration Amplifier is a single-channel signal conditioner and display instrument. It provides a wide range of modes and settings, selected by the operator from the front panel, or from a controller/computer via a RS-232 bus or Ethernet connection. Settings are set, verified, and monitored by an internal microprocessor. The ENDEVCO Model 6634D is a programmable signal conditioner providing a number of types of output, as well as a front panel digital display. The internal microprocessor sets up all the operating parameters in response to commands input at the front panel keyboard, or to ASCII string commands transmitted over the RS-232 bus or Ethernet connection from a controller/computer.

## A. INPUTS

The Model 6634D accepts inputs from:

a. SE/PE: Single-Ended Piezoelectric Accelerometers
b. DIFF/PE: Differential Piezoelectric Accelerometers
c. EX CAL: External Calibration Signal (Voltage)
d. VEL/RCC: Velocity Coil or Remote Charge Converter (Selectable)

The Remote Charge Converter (RCC) input provides a constant current source to power Remote Charge Converter electronics or IEPE accelerometers. The External Calibration “EX CAL” input provides for inserting an externally supplied voltage signal for system gain verification and calibration.

## B. AMPLIFIERS AND FILTERS

The PE inputs (and the EX CAL input) are amplified by a fixed-gain charge amplifier. The Velocity Coil input is amplified by a fixed-gain instrumentation amplifier. The Remote Charge Converter input is amplified by the fixed gain voltage amplifier. Programmable switches configure these input stages to deliver the desired amplified signal to the Sensitivity Amplifier. This stage is programmed to normalize the signal for the sensitivity of the sensor. This normalized signal is delivered to the Broadband Output, where it can be filtered in the six-pole filter, or routed directly to the next stages. The corner frequency of the six-pole Filter is programmable from the front panel, or over the RS-232 bus or Ethernet. In addition to the internal six-pole filter, one can optionally connect their own external filter between BB OUT and BB IN (see Ext Filter menu to enable).

## C. INTEGRATORS AND ANALOG OUTPUTS

The filtered or unfiltered output can be integrated once (to provide velocity data) or twice (to provide displacement data). The filtered or unfiltered signals are delivered to the Accel-Out, Vel-Out, and Disp-Out Outputs. One of these signals is switch-selected to be routed to the programmable gain Range Amplifier. The output of the Range Amplifier is amplified in the fixed-gain AC Output Amplifier and delivered to the AC-Output. The Full-Scale amplitude of the AC-Output can be set to 1V pk, 5V pk, or 10V pk.

## D. DIGITAL OUTPUTS AND DISPLAY

The RMS value of the Range Amplifier output is converted to DC, which is then converted to 10-Bit digital data in the A/D Converter. The microprocessor converts that data into the proper units and sends the value to the front panel display. This same value is converted to an analog signal in the D/A Converter, amplified in the fixed gain DC Output Amplifier, and delivered to the DC Output. The Full-Scale amplitude of the DC-Output can be set to 1V, 5V, or 10V.

## E. ALARMS

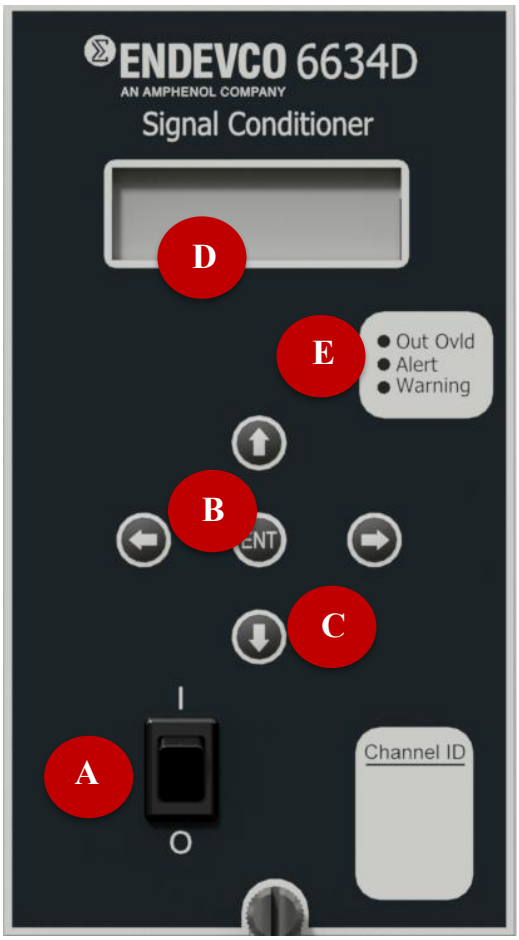
The digital amplitude data is compared to two pre-programmed alarm levels, and the microprocessor generates a Warning Alarm and/or an Alert Alarm when the appropriate level is exceeded. In addition, the microprocessor generates an Overload

Alarm if the output exceeds 100% of full scale, or if the input to the A/D converter exceeds the saturation level for more than 3 seconds.

# 4.0 User Interface

## 4.1. Front Panel

The 6634D front panel provides user control to modify instrument settings. See Figure 1: Front panel.




A — On/Off Switch

B — ENT (Enter) Button

C — Up, down, left, right navigation arrows

D — LCD Screen

E — LED Status Indicators

Figure 1: Front panel

In addition to controls, there are three fault indicators (red LEDs) located on the front panel.

- Out Ovld: Lights when the output exceeds 100% of full scale for more than 3 seconds.
- Alert: Lights when user-configured alert threshold is reached. See Alert Level Menu.
- Warning: Lights when user-configured warning threshold is reached. See Warning Level Menu.

## 4.2. Rear Panel

Inputs:

- SE/PE:  Single-Ended Piezoelectric Accelerometers (BNC)
- DIFF/PE: Differential Piezoelectric Accelerometers (Twinax BNC)
- EX CAL: External Calibration Source (BNC)
- VEL/RCC: Velocity Coil or Remote Charge Converter (Twinax BNC)
- EXT PWR: 12VDC Power Input (Barrel Jack)

Outputs:

- OUTPUT: DB25F connector (various output signals, as defined below in Section 4.3. Rear Panel Outputs Connector)

Remote control ports:

- Ethernet port – Instructions for the Web Interface via the Ethernet port is provided in this manual.  The Ethernet port is used for both the web interface and the SCPI remote control interface.
- RS-232 port - An RS-232 serial interface is available through a 9 pin D-sub connector located on the rear panel.

Figure 2: Rear panel

## 4.3. Rear Panel Outputs Connector

The rear panel output connector is a DB25F connector. The pin numbering is shown in Figure 3: Output connector pin numbering. The pin definitions are described in Table 1: Output pin definitions.

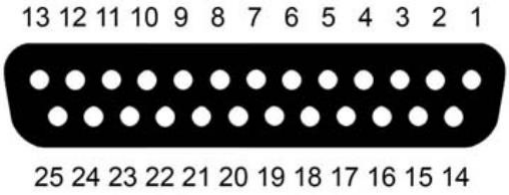



Figure 3: Output connector pin numbering

| Pin | Name | Direction | Description |
|---|---|---|---|
| 1 | ACCEL-OUT | Output | Acceleration output. |
| 2 | BB-OUT | Output | Broadband output. Input to the optional external filter. |
| 3 | VEL-OUT | Output | Output of the velocity integrator. |
| 4 | Analog Ground | n/a | |
| 5 | Analog Ground | n/a | |
| 6 | Analog Ground | n/a | |
| 7 | DISP-OUT | Output | Output of the displacement integrator. |
| 8 | A-IN | Input | Optional input to the velocity integrator. |
| 9 | V-IN | Input | Optional input to the displacement integrator. |
| 10 | Not Used | n/a | |
| 11 | AC-OUT | Output | The output of the AC signal chain. |
| 12 | DC-OUT | Output | The RMS, Average or Peak level of AC-OUT. |
| 13 | BB-IN | Input | Broadband input. Output from the optional external filter. |
| 14 | /OVERLOAD | Output | Goes low if any part of the signal chain exceeds the saturation level for more than 3 seconds. |
| 15 | /ALM-ALERT | Output | Goes low if DC output exceeds the alert alarm level. Alarms latch until reset. |
| 16 | /ALM-WARN | Output | Goes low if DC output exceeds the warning alarm level. Alarms latch until reset. |
| 17 | +5VDC | Output | Test only. |
| 18 | /SYS-CAL | Input | Pulse low for at least 100 ms to initiate calibration. |
| 19 | /ALM-RESET | Input | Pulse low for at least 100 ms to reset both the alert and warning alarms. |
| 20 | Digital Ground | n/a | |
| 21 | Digital Ground | n/a | |
| 22 | Digital Ground | n/a | |
| 23 | Reserved | n/a | Not used. |
| 24 | Not Used | n/a | Not used. |
| 25 | Not Used | n/a | Not used. |

Table 1: Output pin definitions

# 5.0 Front Panel

The 6634D is manually controlled from the front panel using the UP, DOWN, LEFT, RIGHT, and ENT push-buttons along with a two-row display of 16 characters per row.

The screen on the 6634D will display the current function selection centered on the top row. The bottom row displays the current value of the function.

For each function, there are two modes: “View” mode, and “Edit” mode. While in View mode, you can use the UP and DOWN buttons to scroll through the various functions of the 6634D. Using the UP and DOWN buttons in this way will place you in “View” mode for the other functions. When the unit is in View mode, an up and down arrow will be visible on the right side of the screen as illustrated in Figure 4: Input view mode.

To enter “Edit” mode for any function, press the ENT button. You will see that the up and down arrows on the right side of the screen disappear. Depending on the function, the bottom row will either be bookended with double-left angle brackets and double-right angle brackets, or a flashing cursor will appear. In addition, for all “Edit” modes, a carriage return symbol will appear in the top left corner of the screen. This symbol indicates that you can press ENT to return to the View screen of the current function.

Double angle brackets surrounding the bottom row (Figure 5: Input edit mode) indicate that the current Edit mode involves a discrete list of options. The list may be advanced in one direction using the UP or RIGHT buttons, and it may be advanced in the other direction using the DOWN or LEFT buttons. To change the value for this type of function, simply use UP, DOWN, LEFT, or RIGHT to scroll to the desired option, and press ENT. The 6634D will return to View mode for that function, and the bottom row will display the value for the function.


Figure 4: Input view mode


Figure 5: Input edit mode

A blinking cursor on the bottom row indicates that the current Edit mode involves numerical input. Use the LEFT and RIGHT buttons to change the cursor location. Use the UP and DOWN buttons to change the value of the current digit. To change the value for this type of function, simply use UP, DOWN, LEFT, and RIGHT to set the number to the desired option, and press ENT. The 6634D will return to View mode for that function, and the bottom row will display the value for the function.

See Figure 7: AC FSO edit mode.


Figure 6: AC FSO view mode


Figure 7: AC FSO edit mode

After power-up, the 6634D enters “Output”display  mode. The front panel shows a bar graph that indicates the DC output as a percentage of Full Scale.  See Figure 8: Output Screen. This can be used to get a visual impression of the DC output in real time, without the need for an outside DAQ.  During menu navigation, if no action is taken for 20 seconds (while in view mode), the screen will revert back to the “Output” display.


Figure 8: Output Screen

The message “Low Signal” is flashed on the front panel when no signal is detected. See Figure 9: Low Signal display.  For help with trouble shooting a “Low Signal” message, see section 8.0 Troubleshooting.

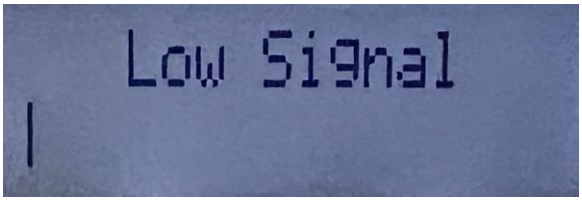



Figure 9: Low Signal display

The message “Overload” is flashed on the front panel when the signal chain is overloaded. See Figure 10: Overload display.

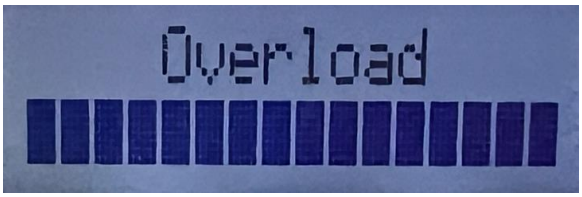



Figure 10: Overload display

## 5.1. Input Type Menu

Selects the transducer input type.


Options:

| Input Type | Rear Panel Connector | Description | Type |
|---|---|---|---|
| SE PE | SE/PE | Single-Ended (SE) Piezo-Electric (PE) | Charge |
| Diff PE | DIFF/PE | Differential Piezo-Electric (PE) | Charge |
| IEPE/RCC | VEL COIL | Integrated Electronics Piezo-Electric (IEPE) / Remote Charge Converter (RCC) | Volts |
| DRCC Accel | VEL COIL | Differential Remote Charge Converter (DRCC) Acceleration | Volts |
| DRCC Veloc | VEL COIL | Differential Remote Charge Converter (DRCC) Velocity | Volts |
| SE Vel Coil | VEL COIL | Single-Ended (SE) Velocity Coil | Volts |
| Diff Vel Coil | VEL COIL | Differential Velocity Coil | Volts |

N.B. Changing this setting may affect the full scale output setting. Be sure to verify the full scale setting after changing this setting.

## 5.2. Sensor Sensitivity Menu

Sets the transducer sensitivity.


Options:

| Transducer | Units | Minimum | Maximum |
|---|---|---|---|
| Single Ended and Differential PE | Imperial | 1.5 pC/g | 150 pC/g |
| | Metric | 0.15 pC/m/s$^2$ | 15 pC/m/s$^2$ |
| Single Ended and Differential Velocity Coil | Imperial | 15 mV/ips | 1500 mV/ips |
| | Metric | 0.65 mV/mm/s | 50 mV/mm/s |
| IEPE/RCC, DRCC Acceleration and Velocity | Imperial | 1.5 mV/g | 150 mV/g |
| | Metric | 0.15 mV/m/s | 15 mV/m/s |

Using the following abbeviations:

| Abbreviation | Description |
|---|---|
| pC | Picocoulombs |
| mV | Millivolt |
| m | Meter |
| mm | Millimeter |
| s | Second |
| ips | Inches per second |
| g | Gravitational constant |

N.B. Each “Input Type” has its own “Sensor Sensitivity” setting.

## 5.3. Ext Filter Menu

Enables/disables the external filter.


Options:

| Option | Description |
|---|---|
| Out | No external filter in connected |
| In | The transducer front-end circuitry drives BB-OUT (DB25 pin 2). An external filter is attached between BB-OUT and BB-IN (DB25 pin 13). The BB-IN signal drives the internal signal path.<br><br>N.B. If there’s no connection between BB-OUT and BB-IN, all 6634D outputs will be zero. |

## 5.4. Prog Filter Menu

Sets the Programmable Filter configuration.


Options:

| Option | Description |
|---|---|
| Bypass | The Programmable Filters are bypassed |
| LPF | The Low Pass Filter is enabled |

| | |
|---|---|
| HPF | The High Pass Filter is enabled |
| Bandpass | Both the Low Pass and High Pass filters are enabled |

## 5.5. HPF Menu

Sets the High Pass Filter cutoff frequency.


The High Pass Filter range is 5 Hz to 500 Hz.

## 5.6. LPF Menu

Sets the Low Pass Filter cutoff frequency.


The Low Pass Filter range is 50 Hz to 10 KHz.

## 5.7. Accel Input (to Velocity Integrator) Menu

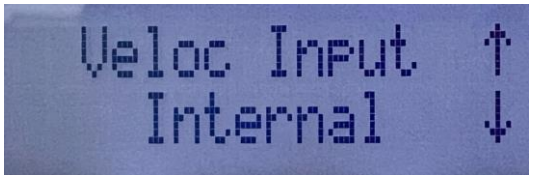
Selects the acceleration input to the velocity integrator.


Options:

| **Option** | **Description** |
|---|---|
| Internal | The Programmable Filter output is routed into the Velocity Integrator |
| DB25 pin 8 | A-IN (DB25 pin 8) is routed into the Velocity Integrator |

## 5.8. Veloc Input (to Displacement Integrator) Menu

Selects the velocity input to the displacement integrator.

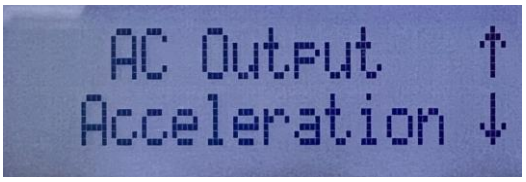



Options:

| Option | Description |
|---|---|
| Internal | The Velocity Integrator output is routed into the Displacement Integrator |
| DB25 pin 9 | V-IN (DB25 pin 9) is routed into the Displacement Integrator |

## 5.9. AC Output Menu

Selects the AC Output "AC-OUT" (DB25 pin 11).




Options:

| Option | Description |
|---|---|
| Acceleration | The Programmable Filter output (a.k.a. ACCEL-OUT on DB25 pin 1) is routed throught the gain stages to the RMS output and to AC-OUT (DB25 pin 11) |
| Velocity | The Velocity Integrator output (a.k.a. VEL-OUT on DB25 pin 3) is routed throught the gain stages to the RMS output and to AC-OUT (DB25 pin 11) |
| Displacement | The Displacement Integrator output (a.k.a. DISP-OUT on DB25 pin 7) is routed throught the gain stages to the RMS output and to AC-OUT (DB25 pin 11) |

N.B. Each "Input Type" has its own "AC Output" setting. Changing this setting may affect the full scale output setting. Be sure to verify the full scale setting after changing this setting.

## 5.10. AC FSO (AC Full Scale Output) Menu

Selects the AC Full Scale Output (volts).


Options:

| Option | Description |
|---|---|
| 1V | Sets the AC-OUT (DB25 pin 11) Full Scale Output (FSO) to ± 1 volt (by dividing the internal signal by 10) |
| 5V | Sets the AC-OUT (DB25 pin 11) Full Scale Output (FSO) to ± 5 volts (by dividing the internal signal by 2) |
| 10V | Sets the AC-OUT (DB25 pin 11) Full Scale Output (FSO) to ± 10 volts (by dividing the internal signal by 1) |

## 5.11. DC Output Menu

Selects the DC Output "DC-OUT" (DB25 pin 12).


Options:

| Option | Description |
|---|---|
| RMS | Sets the DC-OUT (DB25 pin 12) to the signal RMS |
| Average | Sets the DC-OUT (DB25 pin 12) to the signal Average |
| Peak | Sets the DC-OUT (DB25 pin 12) to the signal Peak |

N.B. Each "Input Type" has its own "DC Output" setting. Changing this setting may affect the full scale output setting. Be sure to verify the full scale setting after changing this setting.

## 5.12. DC FSO (DC Full Scale Output) Menu

Selects the DC Full Scale Output (volts).


Options:

| Option | Description |
|---|---|
| 1V | Sets the DC-OUT (DB25 pin 12) Full Scale Output (FSO) to ± 1 volt (by dividing the internal signal by 10) |
| 5V | Sets the DC-OUT (DB25 pin 12) Full Scale Output (FSO) to ± 5 volts (by dividing the internal signal by 2) |
| 10V | Sets the DC-OUT (DB25 pin 12) Full Scale Output (FSO) to ± 10 volts (by dividing the internal signal by 1) |

## 5.13. Full Scale Output Menu

Sets the Full Scale Output.


Options:

| DC Output | AC Output | Units | Minimum | Maximum |
|---|---|---|---|---|
| RMS | Acceleration | Imperial | 2 g's rms | 200 g's rms |
| | | Metric | 20 $m/s^2$ rms | 2000 $m/s^2$ rms |
| | Velocity | Imperial | 1 ips rms | 100 ips rms |
| | | Metric | 50 mm/s rms | 2000 mm/s rms |
| | Displacement | Imperial | 0.5 mils rms | 50 mils rms |
| | | Metric | 20 µm rms | 1000 µm rms |
| Average | Acceleration | Imperial | 2 g's avg | 200 g's avg |
| | | Metric | 20 $m/s^2$ avg | 2000 $m/s^2$ avg |
| | Velocity | Imperial | 1 ips avg | 100 ips avg |
| | | Metric | 50 mm/s avg | 2000 mm/s avg |
| | Displacement | Imperial | 0.5 mils avg | 50 mils avg |
| | | Metric | 20 µm avg | 1000 µm avg |
| Peak | Acceleration | Imperial | 2 g's peak | 200 g's peak |
| | | Metric | 20 $m/s^2$ peak | 2000 $m/s^2$ peak |
| | Velocity | Imperial | 1 ips peak | 100 ips peak |
| | | Metric | 50 mm/s peak | 2000 mm/s peak |

| | | | | |
|---|---|---|---|---|
| | Displacement | Imperial | 0.5 mils peak | 50 mils peak |
| | | Metric | 20 µm peak | 1000 µm peak |

N.B. Each “Input Type” / “DC Output” combination has its own “Full Scale Out” setting.

## 5.14. Excitation (Current) [mA]

Sets the excitation current for the IEPE/RCC device connected to the Sensor Input.

The following screen is displayed if the Input Type is not “IEPE/RCC”:


The options are available if the Input Type is “IEPE/RCC”:


Options:

| Option | Description |
|---|---|
| Off | No current excitation is provided |
| 8.5 mA | Excitation current is provided on VEL COIL connector pin A |

Never exceed the maximum current specified on the accelerometer’s datasheet. Use the minimum current (within the datasheet specifications) to ensure minimum heating of the transducer’s electronics and maximum life of the transducer. It may be necessary to use high current if driving long lines between the 6634D and the sensor.

## 5.15. DRCC Voltage Menu

Sets the excitation voltage for the DRCC device connected to the Sensor Input.

The following screen is displayed if the Input Type is not “DRCC Accel” or “DRCC Veloc”:


The options are available if the Input Type is “DRCC Accel” or “DRCC Veloc”.


Options:

| Option | Description |
|---|---|
| Off | No voltage excitation is provided |
| 24 VDC | Excitation voltage is provided on VEL COIL connector pin B |

## 5.16. Warning Level Menu

Sets the Warning alarm trigger level. The Warning alarm is latched when the RMS Percent Full Scale exceeds this level.


The range is 0% Full Scale to 100% Full Scale. Setting the level to 100% disables the Warning alarm.

N.B. Each “Input Type” / “AC Output” combination has its own “Warning Level” setting.

## 5.17. Alert Level Menu

Sets the Alert alarm trigger level. The Alert alarm is latched when the RMS Percent Full Scale exceeds this level.


The range is 0% Full Scale to 100% Full Scale. Setting the level to 100% disables the Alert alarm.

N.B. Each “Input Type” / “AC Output” combination has its own “Alert Level” setting.

## 5.18. Alarms Reset Menu

Resets the Warning and Alert alarms. Warning and Alert alarms are latched and must be reset from the one of the following interfaces.

- Select “Reset” from this menu
- Clicking the “Reset Alarms” button on the Settings web page
- The SCPI Remote Control command “`ALARM:RESET`”
- Pulsing the ALM-RESET discrete (DB25 pin 19)


This screen will display “Complete” when the alarms reset has completed.

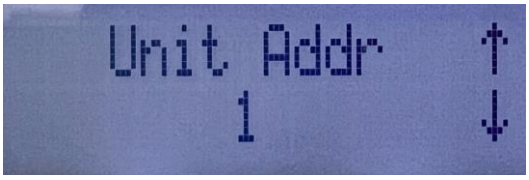
## 5.19. RS-232 Baud Rate Menu

Sets the RS-232 remote control interface baud rate. The 8-N-1 protocol is fixed.


Options: 1200, 2400, 4800, 9600, 14400, 19200, 38400, 57600, 115200

## 5.20. Unit Address Menu

Sets the unit address used by the legacy 6634C’s API. The 6634D’s SCPI API does not use this.




Options:

- Range: 1-16, inclusive
- 0 disables the remote control

## 5.21. IP Address

Sets the Ethernet IP address of the unit. Power must be cycled for changes to take effect.


Options**:**

- Range: 0.0.0.0 to 255.255.255.255

## 5.22. Netmask

Sets the Ethernet netmask of the unit. Power must be cycled for changes to take effect.


Options:

- Range: 0.0.0.0 to 255.255.255.255

## 5.23. Gateway

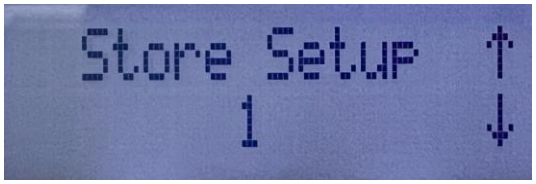
Sets the Ethernet gateway of the unit. Power must be cycled for changes to take effect.


Options:

- Range: 0.0.0.0 to 255.255.255.255

## 5.24. Store Setup Menu

Stores the current setup in non-volatile memory at the specified location.




Options: 1 – 10.

The following settings are stored in each Setup:

- Sensitivity (for each Input Type)
- AC Output (for each Input Type)
- DC Output (for each Input Type)
- Full Scale Output (for each Input Type / AC Output combination)
- HPF Hz
- LPF Hz
- Warning Level Percent (for each Input Type / AC Output combination)
- Alert Level Percent (for each Input Type / AC Output combination)

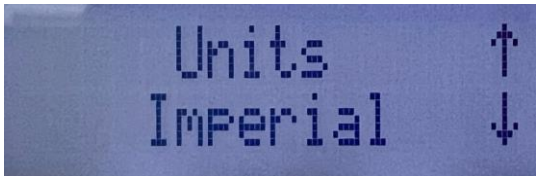
## 5.25. Recall Setup Menu

Recalls the setup stored in non-volatile memory at the specified location.


Options: 1 – 10.

## 5.26. Units Menu

Sets the system's units of measure.




Options: Imperial or Metric

N.B. Switching units will cause all settings to convert to the new units of measure.

## 5.27. Factory Restore Menu

Restores all settings to the factory settings.


Options:

- Yes, No

# 6.0 Web Interface

The 6634D may be controlled via its web interface. The factory web server IP address is 192.168.1.100. The factory web page address is http://192.168.1.100/. The IP address may be viewed and changed using the front panel.

For best performance, use the Google Chromium browser.

The main web page is shown in Figure 11: Main web page.

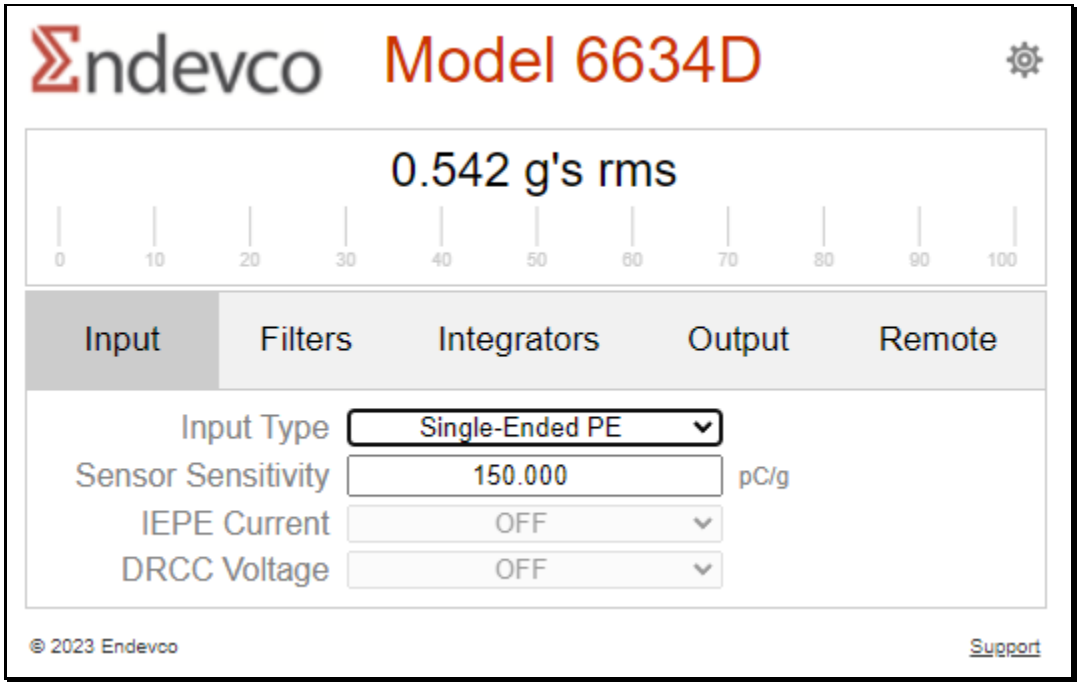



Figure 11: Main web page

## 6.1. Output Display

The output is displayed numerically in the selected units along with a bar graph showing percent full-scale. See example on Figure 12: Web page output display.

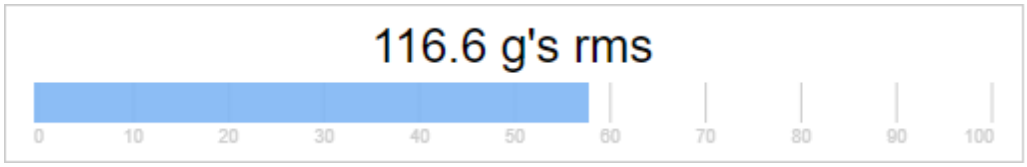



Figure 12: Web page output display

The message “Low Signal” is flashed when no signal is detected. See Figure 13: Web page Low Signal display.


Figure 13: Web page Low Signal display

The message “Overload” is flashed when the signal chain is overloaded. See Figure 14: Web page Overload display.

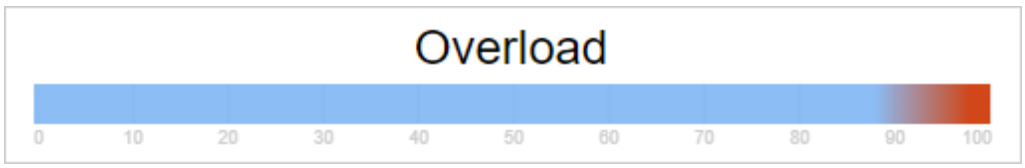



Figure 14: Web page Overload display

## 6.2. Input Tab

The Input tab is shown in Figure 15: Input tab.

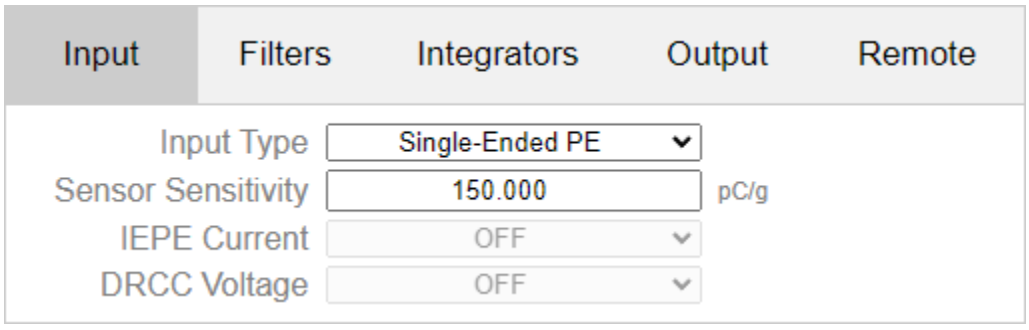



Figure 15: Input tab

The Input Type options are shown in Figure 16: Input Type options.

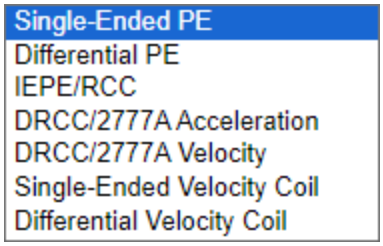



Figure 16: Input Type options

N.B. Changing this setting may affect the full scale output setting. Be sure to verify the full scale setting after changing this setting.

The IEPE Current options are shown in Figure 17: IEPE Current options

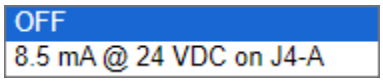



Figure 17: IEPE Current options

The DRCC Voltage options are shown in Figure 18: DRCC Voltage options.

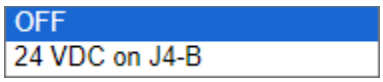



Figure 18: DRCC Voltage options

## 6.3. Filters Tab

The Filters tab is used to control the signal path filters. See Figure 19: Filters tab.

The external filter may be enabled or bypassed.

Any combination of programmable filters may be selected.

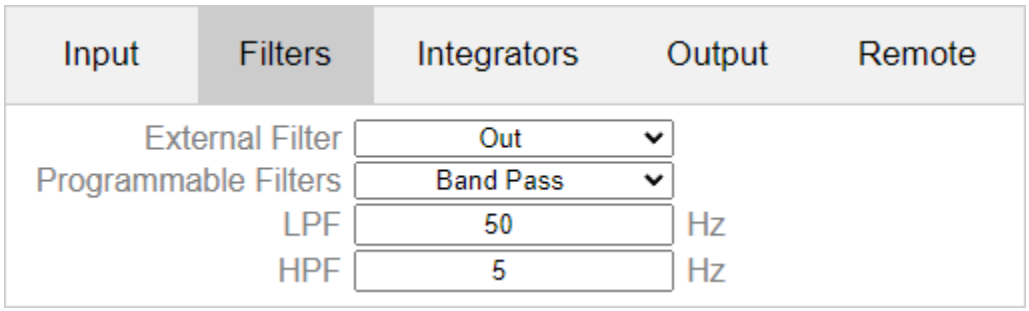



Figure 19: Filters tab

The External Filter options are shown in Figure 20: External Filter options

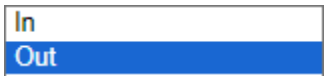



Figure 20: External Filter options

The Programmable Filters options are shown in Figure 21: Programmable Filters options.

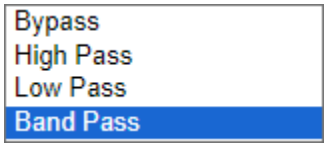



Figure 21: Programmable Filters options

## 6.4. Integrators Tab

The Integrators tab shows the inputs to the velocity and displacement integrators. See Figure 22: Integrators tab.

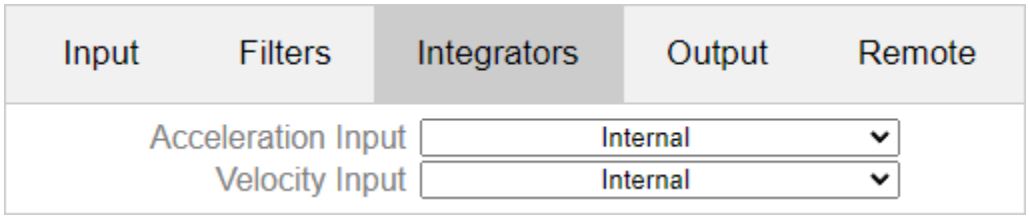



Figure 22: Integrators tab

The Acceleration Input (to the Velocity Integrator) options are shown in Figure 23: Acceleration Input (to the Velocity Integrator) options.

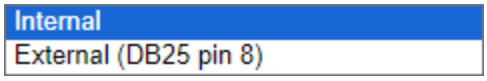



Figure 23: Acceleration Input (to the Velocity Integrator) options

The Velocity Input (to the Displacement Integrator) options are shown in Figure 24: Velocity Input (to the Displacement Integrator) options.

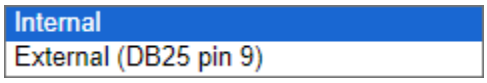



Figure 24: Velocity Input (to the Displacement Integrator) options

## 6.5. Output Tab

The Output tab controls the AC and DC output modes, as well as the full-scale outputs of the unit. See Figure 25: Output tab.

Note that changing these settings will change the system gain.

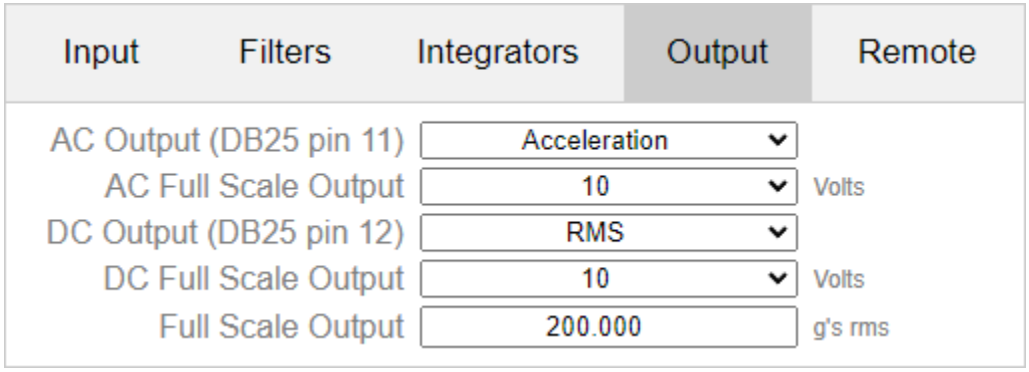



Figure 25: Output tab

The AC Output options are shown in Figure 26: AC Output options.

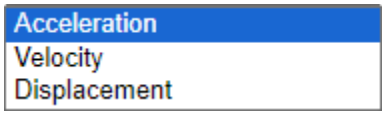



Figure 26: AC Output options

N.B. Changing this setting may affect the full scale output setting. Be sure to verify the full scale setting after changing this setting.

The AC Full Scale Output options are shown in Figure 27: AC Full Scale Output options.


Figure 27: AC Full Scale Output options

The DC Output options are shown in Figure 28: DC Output options.


Figure 28: DC Output options

N.B. Changing this setting may affect the full scale output setting. Be sure to verify the full scale setting after changing this setting.

The DC Full Scale Output options are shown in Figure 28: DC Output options.


Figure 29: DC Full Scale Output options

## 6.6. Remote Tab

The Remote tab displays the remote control configuration items. See Figure 30: Remote tab. The following remote control data items may be changed: the unit address, the Ethernet IP address, netmask and gateway, and the RS232 baud rate.

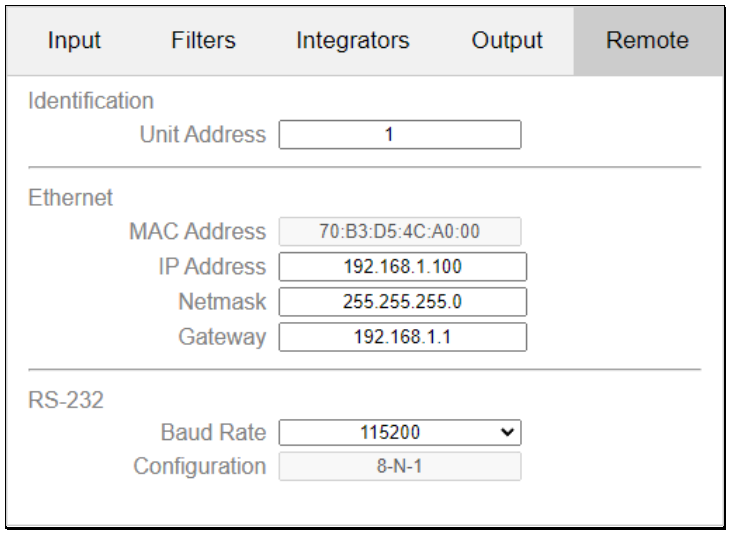



Figure 30: Remote tab

## 6.7. Settings Web Page

Click on the gear icon to display the system settings page. See Figure 31: Settings page. The settings page shows the setup, units, alarm levels and allows the user to return the unit to its factory settings.

Restoring the factory settings will change the IP address back to 192.168.1.100, which may cause the web page to become unresponsive.

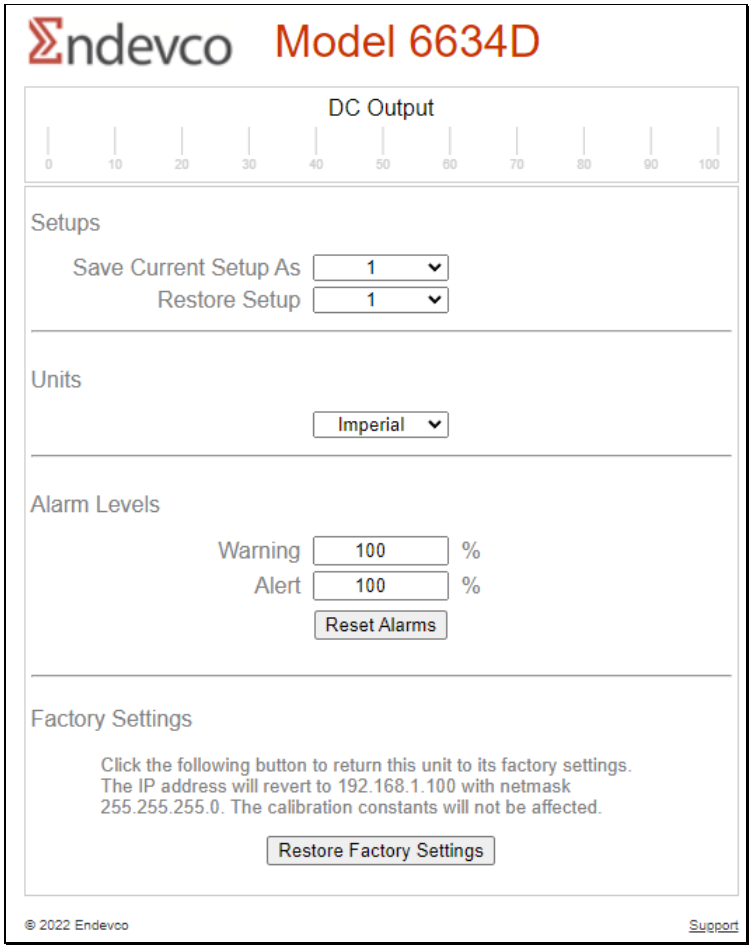



Figure 31: Settings page

# 7.0 Safety and Compliance

## 7.1. Safety Considerations

This product is intended for use by qualified personnel who recognize shock hazards and are familiar with the precautions required to avoid injury. While our equipment is designed with user safety in mind, the protection provided by the equipment may be impaired if equipment is used in a manner not specified by this manual.

## 7.2. Definition of Terms and Symbols

The following symbols may be found on the equipment described in this manual:

CAUTION 

Caution is necessary when operating the device close to where the symbol is placed. User should refer to the operating instructions located in the manual.

DIRECT CURRENT 

To indicate that the equipment is suitable for direct current only; and to identify relevant terminals.

ELECTRONIC WASTE 

To indicate that separate collection for waste electric and electronic equipment (WEEE) is required.

## 7.3. Ground the instrument

To minimize shock hazard and minimize electrical noise, the instrument chassis and cabinet must be connected to an earth - ground. The instrument's power supply is equipped with a three-conductor AC power plug. The power plug must either be plugged into an approved three-contact electrical outlet or used with a three-contact to two-contact adapter with the grounding wire (green) firmly connected to an electrical ground (safety ground) at the power outlet. The power jack and mating plug of the power cable meet International Electrotechnical Commission (IEC) safety standards.

## 7.4. ESD protection

This unit contains ESD sensitive parts. When the unit is opened, ensure service personnel observe all ESD precautions.

## 7.5. Do not substitute parts or modify the instrument

Because of the danger of introducing additional hazards, do not install substitute parts or perform any unauthorized modification to the instrument.

## 7.6. CE Compliance

For CE compliance, outputs must be filtered by a 1-pole, 120 kHz low-pass filter at the readout device.

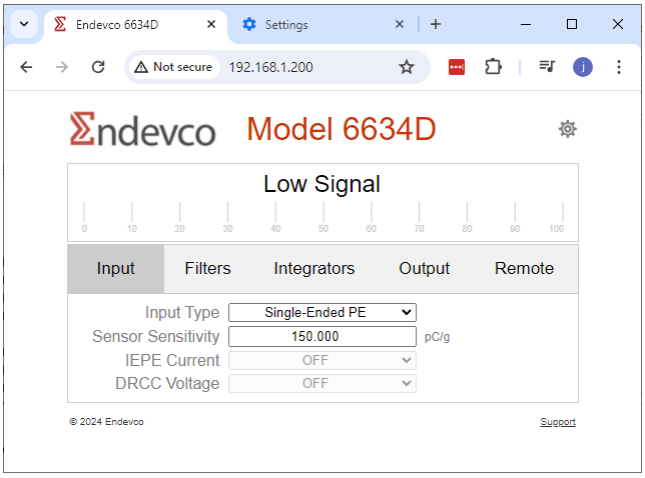
# 8.0 Troubleshooting

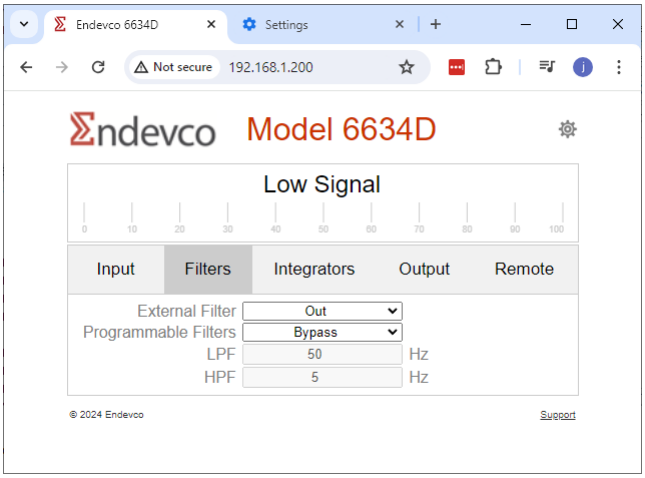
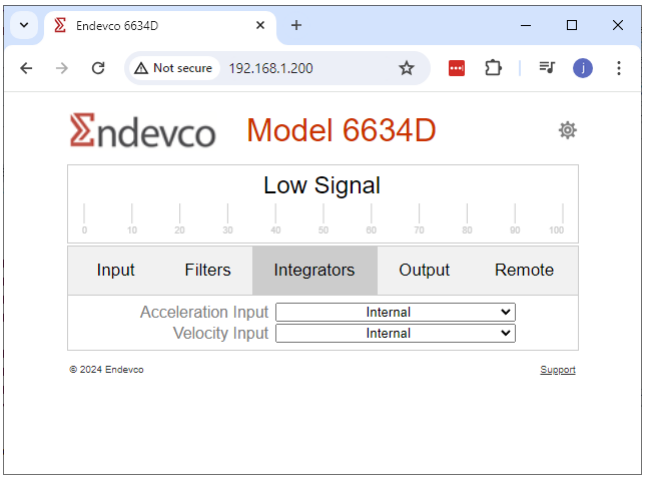
This section assumes the unit has the factory settings. The factory settings may be restored using the front panel or the web pages. For illustration purposes, the IP address has been changed to 192.168.1.200.

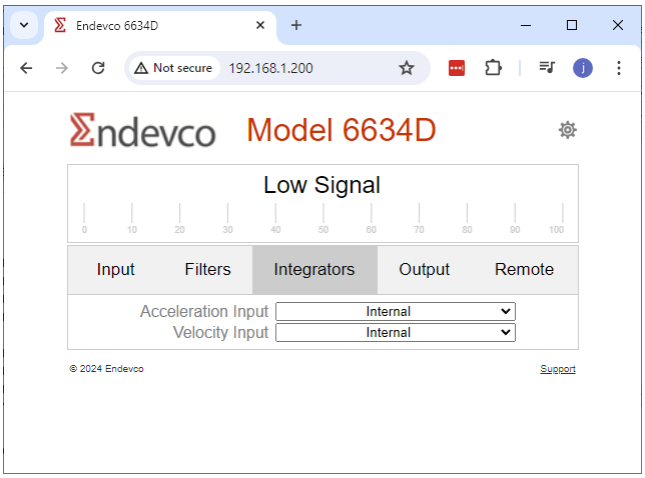
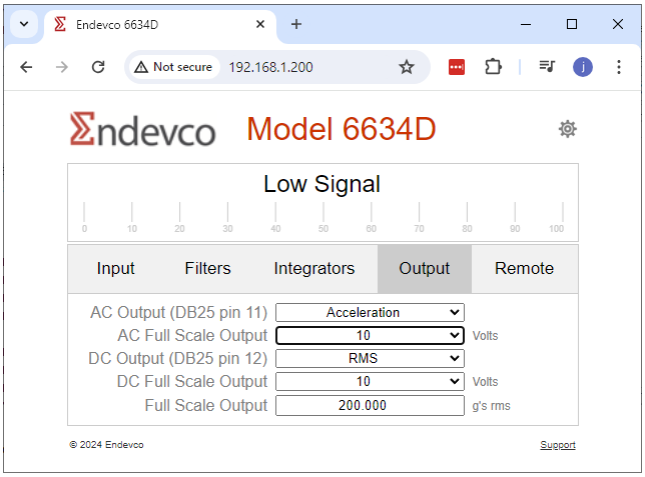
The sensor output should appear on the web pages and the front panel, both of which reflect the electrical signal on DC-OUT (DB25 pin 12).

The signal path is shown in figure 0 (block diagram).

If “Low Signal” appears on the front panel or web pages, use the following troubleshooting table.

| **Problem** | **Verify** |
|---|---|
| No signal on BB-OUT (DB25 pin 2) | Verify the following:<br><br>The Input Type<br>The Sensor Sensitivity<br>The sensor is connected to the proper jack<br>The sensor is properly excited<br>  |

| | |
|---|---|
| No signal on ACCEL-OUT (DB25 pin 1) | Verify the following:<br><br>The External Filter is Out (or BB-OUT is tied to BB-IN)<br>The Programmable Filters are set to Bypass<br><br>  |
| No signal on VEL-OUT (DB25 pin 3) | Verify the following:<br><br>The Acceleration Input is set to Internal<br><br>  |

| | |
|---|---|
| No signal on DISP-OUT (DB25 pin 7) | Verify the following:<br><br>The Velocity Input is set to Internal<br><br>  |
| No signal on AC-OUT (DB25 pin 11) | Verify the following:<br><br>The Full Scale Output matches the sensor's FSO<br><br>  |
| No signal on DC-OUT (DB25 pin 12) | Contact support. |

## 9.0 Repairs

For repair or replacement of a defective instrument, or calibration, contact Endevco and obtain an RMA number prior to returning the instrument.

# 10.0 Calibration

The following self-calibration procedure allows the 6634D to correct for error in its signal path:

1. Power up 6634D, allowing at least 15 minutes of warm-up time prior to initiating calibration.
2. Connect a signal generator to a calibrated voltmeter, EX CAL input, and (optionally) VEL COIL input (pin A) simultaneously.
    a. Partial calibration is possible using only EX CAL input, if the VEL COIL input is not used.
    b. If calibrating VEL COIL, also ground VEL COIL (pin B) to signal ground.
3. Set signal generator to output a 300 Hz, 3.5355 Vrms sine wave.
    a. Note: 6634D will load the input down. Be sure to adjust the input signal until the voltmeter reads (as close to) 3.5355 Vrms as possible.
4. On the 25-pin output connector, momentarily short pin 18 (SYS-CAL) to pin 20 (Digital Ground) to initiate self-cal.
5. Watch the display for errors until it flashes “Calibration Complete”.

# Appendix A: Using high temperature charge-mode accelerometers

The 6634D has a minimum source resistance of 10 MΩ, which is capable of supporting most accelerometers. When using accelerometers at high temperatures, the resistance of the sensing material drops below the minimum source (input) resistance of the 6634D.

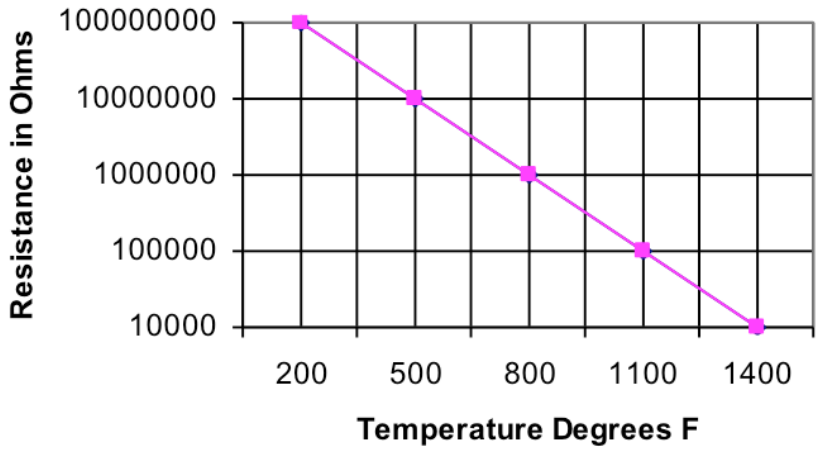



Figure 32 Temperature vs Resistance

Figure 32 Temperature vs Resistance is an example of a typical temperature vs. resistance plot. Note that the minimum source resistance is maintained up to approximately 500° F (260°C). Consult the accelerometer's datasheet for the actual resistance vs. temperature specifications.

For source resistance <10 MΩ, it is recommended that a model 2771C Remote Charge Converter (RCC) be used between the signal conditioner and the sensor. Since the 2771C RCC has a minimum input resistance of 100 kΩ, the accelerometer will operate well up to 1100°F.

# Appendix B: Factory Default Settings

The 6634D comes from the factory with the following settings.

| Data Item | Value |
|---|---|
| Unit Address | 1 |
| Ethernet Remote Control Port Number | 49808 |
| RS-232 Baud Rate | 115200 |
| Units of Measure | Imperial |
| IEPE Current | Disabled |
| DRCC Voltage | Disabled |
| Velocity Integrator Input | Internal (ACCEL-OUT) |
| Displacement Integrator Input | Internal (VEL-OUT) |
| AC FSO | 10 V |
| DC FSO | 10 V |
| Current Setup | 1 |

For each Setup:

| Data Item | Value |
|---|---|
| Input Type | Single Ended PE |
| Programmable Filters | Bypassed |
| HPF | 5 Hz |
| LPF | 50 Hz |

For each Setup and Input Type:

| Data Item | Value |
|---|---|
| Sensitivity | 150 pC/g Imperial<br>(15 pC/m/s$^2$ Metric) |
| AC Output Mode | Acceleration |
| DC Output Mode | RMS |

For each Setup, Input Type and AC Output Mode:

| Data Item | Value |
|---|---|
| FSO | 200 g's RMS Imperial<br>(2000 m/s$^2$ RMS Metric) |
| Warning Level | 100% |
| Alert Level | 100% |

The “Factory Restore” command restores these settings.

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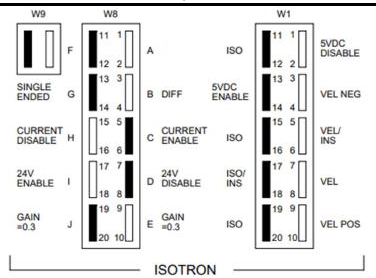
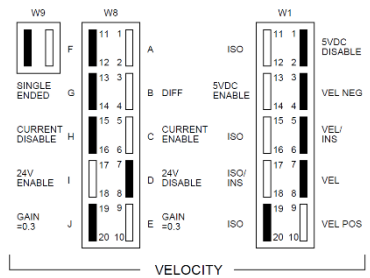
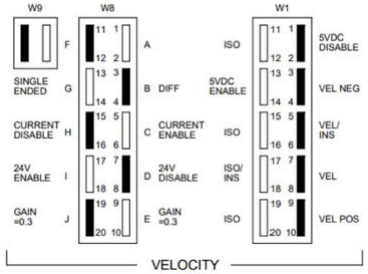
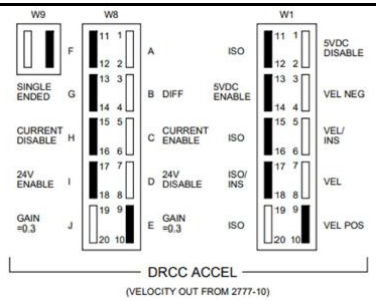
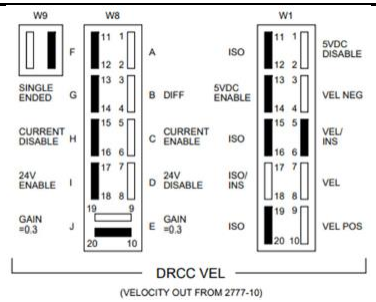
## Appendix C: 6634C/D Input Type Cross Reference

| Input Type | Rear Panel | 6634C Jumpers | 6634C Front Panel | 6634D Front Panel | Web Page | 6634C Remote 'T' cmd | 6634D Remote 'T' cmd | Remote 'T?XXXX' cmd |
|---|---|---|---|---|---|---|---|---|
| Single-Ended PE | SE | n/a | SEPE | SE PE | Single-Ended PE | 0 | 0 | 0 |
| Differential PE | DIFF | n/a | DIFF | Diff PE | Differential PE | 3 | 3 | 3 |
| IEPE / RCC | VEL COIL RCC |  | IEPE | IEPE | IEPE | 2 | 2 | 2 |
| Single-Ended Velocity Coil | VEL COIL RCC |  | VEL | SE Vel Coil | Single-Ended Velocity Coil | 1 | 1 | 1 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Differential Velocity Coil | VEL COIL RCC |  | VEL | Diff Vel Coil | Differential Velocity Coil | 1 | - | 1 |
| DRCC (e.g. 2777) Acceleration Output | VEL COIL RCC |  | IEPE | DRCC Accel | DRCC Acceleration | 2 | - | 2 |
| DRCC (e.g. 2777) Velocity Output | VEL COIL RCC |  | VEL | DRCC Veloc | DRCC Velocity | 1 | - | 1 |

## Appendix D: Usage Examples

6634D has re-defined output scaling for consistency and clarity. Below are some examples to demonstrate the new scaling scheme. Notable differences from 6634C:

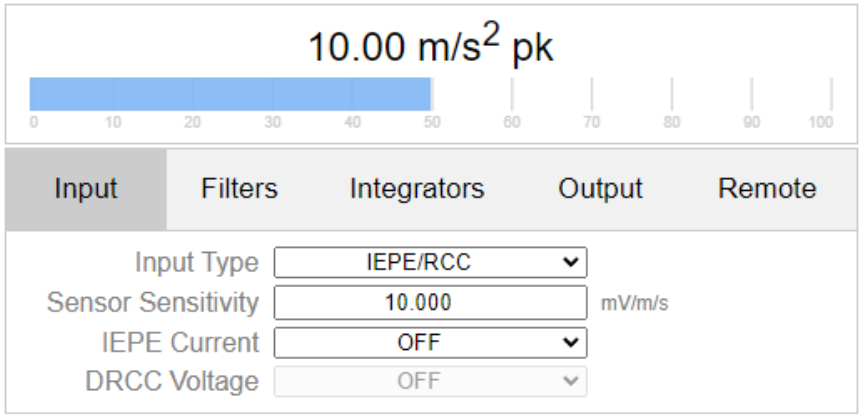
-AC and DC Full-Scale Output (FSO) are always 1/5/10 V. These do not change based on DC Output mode (rms, avg, peak).

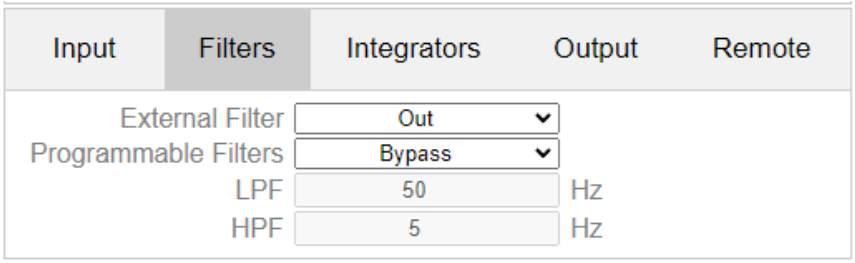
-All displacement outputs are now defined in peak rather than peak-peak.

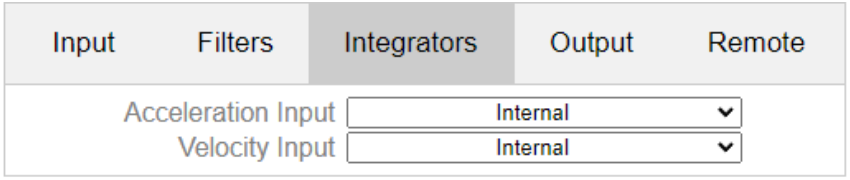
-AC OUT in displacement mode is now halved relative to 6634C (which defined displacement in peak-peak).

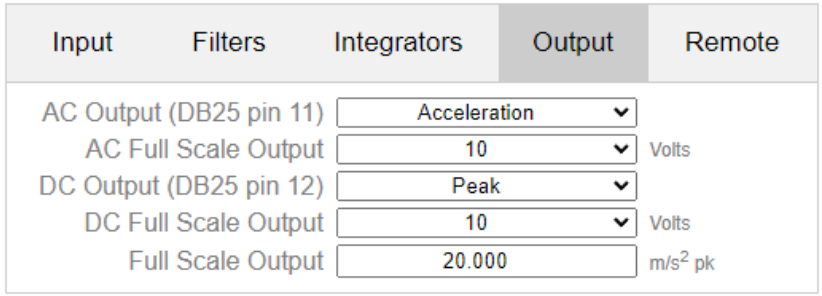
**Example 1A:** Measure 10 $m/s^2$ peak acceleration using scaled outputs DISPLAY, AC OUT, and DC OUT.

**Settings:**






**Input:** 159.2 Hz, 100 mVpk sine wave into VEL COIL input (pin A). Pin B grounded.

CALCULATED INPUT $m/s^2$ = Vin (pk) / Sensor Sensitivity

= 100 mVpk / (10 $mV/m/s^2$)

= 10 $m/s^2$ pk

**Outputs:**

DISPLAY = 10 $m/s^2$ pk

AC OUT $m/s^2$ = AC OUT Voltage (pk) / AC Full Scale Output * Full Scale Output

= 5 Vpk / 10 V * 20 $m/s^2$

= 10 $m/s^2$ pk Note: Peak units are derived from the AC OUT voltage measurement.

DC OUT $m/s^2$ = DC OUT Voltage (DC) / DC Full Scale Output * Full Scale Output

= 5 VDC / 10 V * 20 $m/s^2$

= 10 $m/s^2$ pk Note: Peak units are derived from the DC Output mode (rms, average, or peak)

**Example 1B:** Measure peak acceleration, velocity, and displacement using fixed outputs.

**Settings:** Same as example 1A.

**Input:** Same as example 1A.

Note: Acceleration, velocity and displacement intersect at 159.2 Hz in Metric units.

https://www.modalshop.com/rental/learn/vibration/why-shake-at-159-hz

**Outputs:**

ACCEL OUT $m/s^2$ = ACCEL OUT Voltage (pk) / ACCEL OUT Fixed Sensitivity (pk)

= 50 mVpk / (5 mVpk/$m/s^2$ pk)

= 10 $m/s^2$ pk

VEL OUT mm/s = VEL OUT Voltage (pk) / VEL OUT Fixed Sensitivity (pk)

= 38.61 mVpk / (3.8609 mVpk / mm/s pk)

= 10 mm/s pk

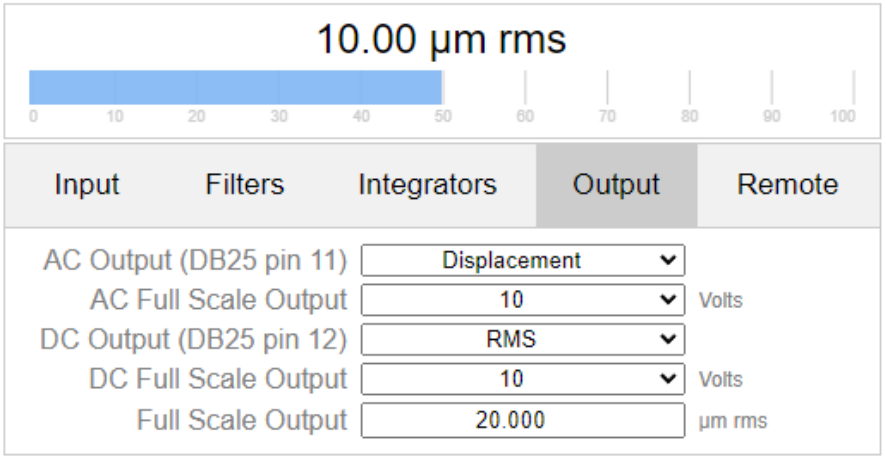
DISP OUT µm = DISP OUT Voltage (pk) / DISP OUT Fixed Sensitivity (pk)

= 154.436 mVpk / (15.4436 mVpk / µm pk)

= 10 µm pk

**Example 2:** Measure 10 µm rms displacement via DISPLAY, DISP OUT, AC OUT, DC OUT.

**Settings:** Same as example 1A, except for below settings:




**Input:** 159.2 Hz, 100 mVrms sine wave into VEL COIL input (pin A). Pin B grounded.

CALCULATED INPUT µm = Vin (rms) / Sensor Sensitivity

= 100 mVrms / 10 mV/m/s$^2$

= 10 m/s$^2$ rms (acceleration)

= 10 µm rms (displacement @ 159.2 Hz)

**Outputs:**

DISPLAY = 10 µm rms

DISP OUT µm = DISP OUT Voltage (rms) / DISP OUT Fixed Sensitivity (converted to rms)

= 154.436 mVrms / ((15.4436 mVpk / µm pk) / SQRT(2))

= 154.436 mVrms / (10.92 mVrms / µm pk)

= 14.14 µm pk / SQRT(2)

= 10 µm rms

AC OUT µm = AC OUT Voltage (rms) / AC Full Scale Output * Full Scale Output

= 5 Vrms / 10 V * 20 µm

= 10 µm rms Note: RMS units are derived from the AC OUT voltage measurement.

DC OUT µm = DC OUT Voltage (DC) / DC Full Scale Output * Full Scale Output

= 5 VDC / 10 V * 20 µm

= 10 µm rms Note: RMS units are derived from the DC Output mode (rms, avg, or peak)