



Operator Manual

AT2040 PORTABLE TRANSDUCER TEST SET

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Introduction

This manual is intended to inform the operating user on product specifications, setup, troubleshooting, and operation procedures for the AT2040. The AT2040 is designed as a rugged, completely self-contained, battery-powered, vibration sensor test set. The AT2040 is meant for use in the field or laboratory, for the verification of control room working conditions, or to verify the performance of vibration transducers.

Product Technical Support

For technical support for the AT2040, email us at help@agatetechnology.com or call us at 951-719-1032. Training webinars are also available; contact technical support for more information.

2-Year Limited Warranty

Agate Technology LLC warrants this product against defects in material and workmanship for normal use following published product documentation for a period of TWO (2) years following the date of purchase. The limited warranty includes drift/accuracy. Product documentation includes, but is not limited to, the product manual, datasheet, technical specifications, and communication with our service department. This warranty does not cover damage caused by operator negligence, misuse, abuse, accident, use inconsistent with product documentation, or unauthorized repair or modification by anyone other than Agate Technology and its authorized service providers. Any defective product meeting the above limited warranty requirements will be repaired or replaced at no charge.

Disclaimer

Agate Technology LLC will not be liable for any indirect, special, incidental, or consequential damages, including but not limited to, damages for loss of profit or revenue, loss or interruption of business, loss of use, loss of data, or other intangible losses arising from any defect or error in this manual or product.

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Safety information

Please keep this manual in a safe location for reference.



WARNINGS



- AT2040 is designed for vertical use. Operating in the horizontal position is possible as the AT2040 element has linear bearings for support, but the load should not exceed 400 grams.
- This instrument may shake violently at high amplitude and low frequency. Always make sure to keep the unit secure and operate on a stable surface.
- When amplitude or frequency have exceeded their acceptable ranges, the unit will issue a warning or shut down, depending on the operating conditions.
- Even when closed, this instrument is not waterproof. Never use near water.
- Failure to hold the accelerometer with the short-handle wrench when attaching and removing transducers can cause permanent damage to the AT2040.

Primary functions

- Shake or excite a transducer under test**
 In shake mode, the AT2040 can be used as a variable frequency and variable amplitude shaker. In this mode, the frequency and amplitude are set manually by the user while the computer provides high-accuracy measurement signals.
- Calculate transducer sensitivity**
 By comparing signals sent to the reference accelerometer by the signal generation board and the signals returned by the transducer under test, the AT2040 can automatically determine the test transducer's sensitivity to a high level of accuracy.
- Produce a NIST-traceable calibration certificate**
 Once the sensitivity has been calculated and saved across the test transducer's frequency range, the AT2040 will produce a NIST-traceable certificate and graph in PDF format. This certificate is stored in the computer's memory and may be recalled and exported at any time to a USB memory drive.
- Simulate a transducer using a precision signal generator (function generator)**
 The AT2040 is capable of producing signals over a wide amplitude and frequency using its built-in amplifiers to simulate a variety of charge and voltage signals. This allows the user to simulate a working transducer and is the ideal tool for electronics testing, troubleshooting, or calibrating condition monitoring systems.

Maximum weight recommendations

Frequency	Maximum Weight in Grams			
	0–100 g	100–250 g	250–500 g	500–750 g
10–100 Hz	10	4	2	1
100–1,000 Hz	7	4	2	1
1,000–10,000 Hz	3	1.5	0	0

Table 1. Maximum weight recommendations in grams

Specifications and performance

Performance		
Frequency Range (operating) ^[1]	5Hz to 10kHz	360 to 600000 CPM
Maximum Amplitude (100 Hz, with no payload)	20g pk 15in/s pk 50mils p-p	196m/s ² pk 380mm/s pk 1270µm p-p
Maximum Payload ^[2]	800grams	
Sensor Test Method	Automatic sweep or manual operation	
Test Types	Manual sensitivity Automatic sweep	Sensor simulation Certification
Sensor Select	Built-in transducer library	
Calibration Sheets	Automatic creation to memory Export to USB drive in PDF or CSV format No spreadsheet or user input required Certificate includes test point with graph	
Memory	16GB (internal storage) MicroSD slot for additional storage	

Vibration Signal Accuracy	
Acceleration (5 Hz to 9 kHz)	± 4%
Acceleration (10Hz to 10kHz)	± 2.5%
Displacement (30Hz to 150Hz)	± 3%
Amplitude Linearity (100gram payload, 100Hz)	< 1% up to 10g pk
Waveform Distortion (100gram payload, 30Hz to 2kHz)	< 5% THD (typical) up to 5g pk

Simulation Performance		
Frequency Range	1 to 11,000Hz	
Maximum Amplitude	1V	1000pF
Examples:	100g at 10mV/g 10g at 100mV/g	10pF/g @ 100g 100pF @ 10g
Test Type	Manual	
Accuracy	< 1% error at 10g	
Simulator Sensor Types Supported	Accelerometer: • Voltage	• Charge • IEPE
	Velocity 4-20mA vibration transmitters Proximity probes	

Input/Output		
Test Sensor Inputs	Accelerometer: • Voltage	• Charge • IEPE
	Velocity 4-20mA vibration transmitters Proximity probes	
Bias Measurement	Yes	
Built-in Excitation Current and Supply Voltages for Transducers	IEPE current source -24V proximity driver source +24V 4-20mA supply Variable voltage output supply 5–10V	
External Source In (Max)	1V AC RMS	

Readout		
Acceleration	g pk m/s ² pk	g RMS m/s ² RMS
Velocity	mm/s pk in/s pk	mm/s RMS in/s RMS
Displacement (peak to peak)	mils p-p	µm p-p
Frequency	Hz	CPM

Power		
Internal Battery (sealed solid gel lead acid)	12V DC	6 amp hours
AC Power (for recharging battery)	100–240V	50–60Hz
Operating Battery Life	100gram payload, 100Hz 1g pk 100gram payload, 100Hz 10g pk	12 hours 3 hours

Physical		
Sensor Connectors	BNC Terminal strip	DIN
Display	4.3" TFT LCD with 480 × 272 resolution	
Controls	2 dials with touch screen	
Dimensions (H × W × D)	8.5 × 12 × 10 in	22 × 30.5 × 28 cm
Weight	15.2lbs	6.9kg
Sensor Mounting Platform Thread Size	¼-28	
Operating Temperature	32–122°F	0–50°C
Agency Requirements and Certifications	A2LA Accredited ^[3] NIST Traceable EMC: EN61326-1 LVD: EN61010-1 ISO/IEC 17025:2017 RoHS	

Accessories		
Included Accessories	<ul style="list-style-type: none"> Power cable Micro dot (10-32) ¼-28 stud 2-56 UNC adapter Universal Velocity Adapter Disc Universal Accelerometer Adapter Disc 	<ul style="list-style-type: none"> Short-handle wrench 10-32 UNF stud 6-32 UNC adapter 10-32 UNF adapter USB drive: loaded with setup software for custom sensor
Optional Accessories ^[4]	<ul style="list-style-type: none"> Proximity Probe Adapter Kit (digital or manual micrometer) Chadwick-Helmuth Velocimeter Cable Triaxial Accelerometer Adapter 	
Warranty	2 years (includes drift/accuracy)	
Tech Support	Training webinars, email support	

[1] 100 gram payload.

[2] Maximum weight recommendations:

Frequency	0–100 Grams	100–250 Grams	250–500 Grams	500–800 Grams
10–100Hz	10g	4g	2g	1g
100–1000Hz	7g	4g	2g	1g
1000–10000Hz	3g	1.5g	0	0

[3] Vibration simulator not part of A2LA scope.

[4] For a comprehensive list, please consult the Product Spec Sheet or contact sales.

Instrumentation and control system

The AT2040 consists of an internal charger, battery, main power amplifier, charge converter, electrodynamic shaker, NIST-traceable reference accelerometer, internal computer, signal generation board, and LCD display screen (Figure 1).

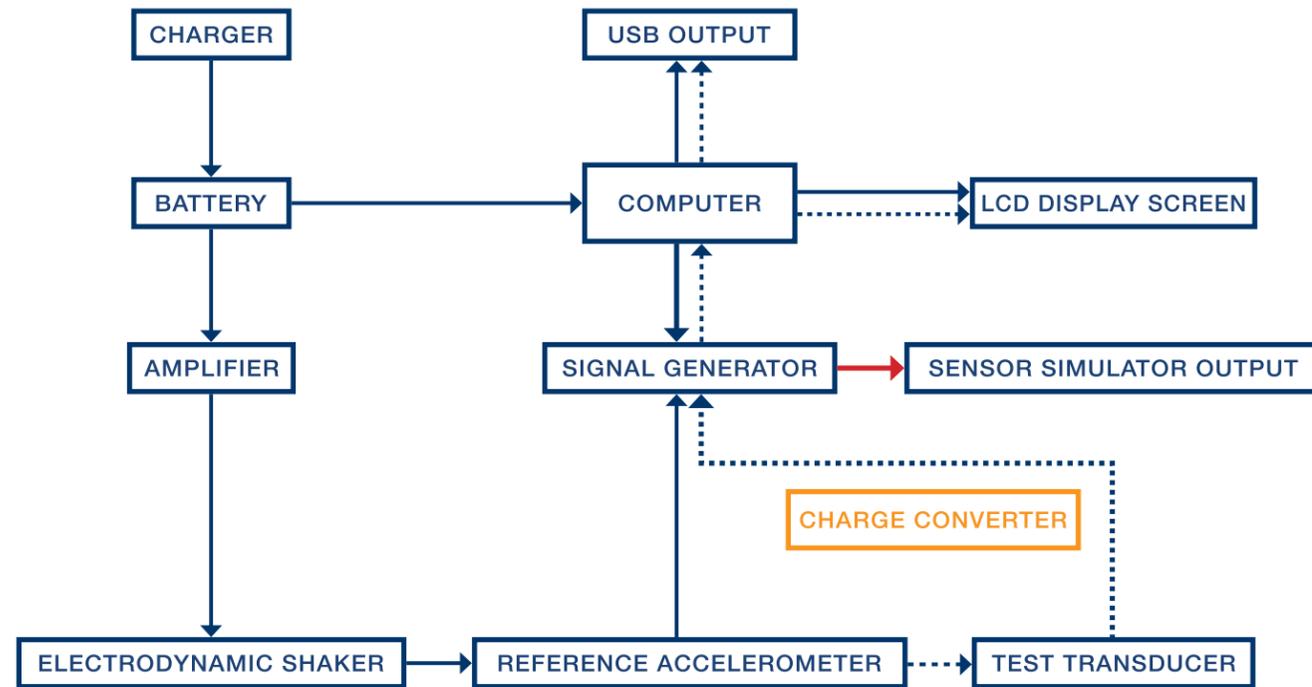


Figure 1. AT2040 block diagram

Charger: Internal charger which operates between 100 V and 220 V for worldwide power support.

Battery: 6 amp hour, sealed lead acid rechargeable battery. FAA-transport approved.

Power Amplifier: Takes the input signal from the signal generator and is used to drive the electrodynamic shaker.

Electrodynamic Shaker: Produces 4.5 lbf pk of sine force and is made with carbon-fiber composite and isolated linear bearings. This provides low distortion when shaking the transducer load.

Reference Accelerometer: NIST-traceable calibration standard accelerometer with ¼-28 tapped mounting hole.

Test Transducer: Calculate sensitivity output.

Signal Generation Board: Consists of multiple amplifiers and channels selectable by internal relays. This is categorized into three different applications:

- **Power Amplifier Output:** Controls the vibration of the electrodynamic shaker at the amplitude and frequency set by the user.
- **Input:** Reads the sensitivity of multiple transducer types.
- **Signal Generator:** Outputs a wide range of simulated voltage and current measurements.

Charge Converter: For direct input of charge mode accelerometers.

Sensor Simulator Output: Generate artificial transducer signal.

Computer: 1 GHz Cortex-A8 processor, 512 MB DDR3 RAM, 20GB of storage memory included, with USB and network connectivity.

LCD Display Screen: Color 4.3" LCD 480x272 resolution display with resistive touchscreen.

USB Output: Export previous tests to a USB drive in PDF or CSV format.

Physical overview

See Figure 2:

- A. **On / Off Button:** Press and hold for 1 second to power on. Press and hold for 5 seconds to power off.
- B. **Electromagnetic Shaker and Reference Accelerometer:** Mounting location for transducer under test (TUT). Always use the short-handle wrench provided, otherwise twisting force will be applied directly to the electrodynamic shaker.
- C. **Proximity Probe Mounting Locations (2):** Proximity Probe Kit is sold as an add-on accessory.
- D. **Dual USB Ports (2):** Plug in peripheral devices, such as a network adapter or a USB memory drive, for importing and exporting files, connecting to a network, and factory calibration.
- E. **100–240 V Power Plug Receptacle**
- F. **LCD Display Screen:** 4.3" LCD 480x272 resolution display with resistive touchscreen.
- G. **Frequency Knob:** Turn the knob to adjust frequency. During screen navigation, turn the knob to move up and down through the onscreen options and press the knob to select.
- H. **Amplitude Knob:** Turn the knob to adjust amplitude. During screen navigation, press the knob to go back.
- I. **BNC Sensor Simulator Output:** Simulates a variety of transducer types using adjustable voltage and supply currents through an on-board signal generator. Data provided by the built-in sensor library includes: charge, IEPE, -24V proximity probe, 4-20mA supply.
- J. **BNC Sensor Input:** Supports sensitivity testing for charge, IEPE, proximity probes, and velocity sensors.
- K. **Custom Sensor In / Out:** See Rear-View Pinout Diagram (*Figure 3*) on next page.
- L. **Proximity Probe Output Simulator:** Capable of providing a test signal between 0 and -24 volts.
- M. **4-20 mA Sensor Output Simulator:** Capable of providing a test signal between 4 and 20 milliamps.
- N. **4-20 mA Input:** Input for sensitivity test of 4-20ma transducers and vibration transmitters. Also supplies +24 volt power.
- O. **Proximity Probe Driver Input and Power:** Input for radial and axial measurements and built-in -24V power for driver.

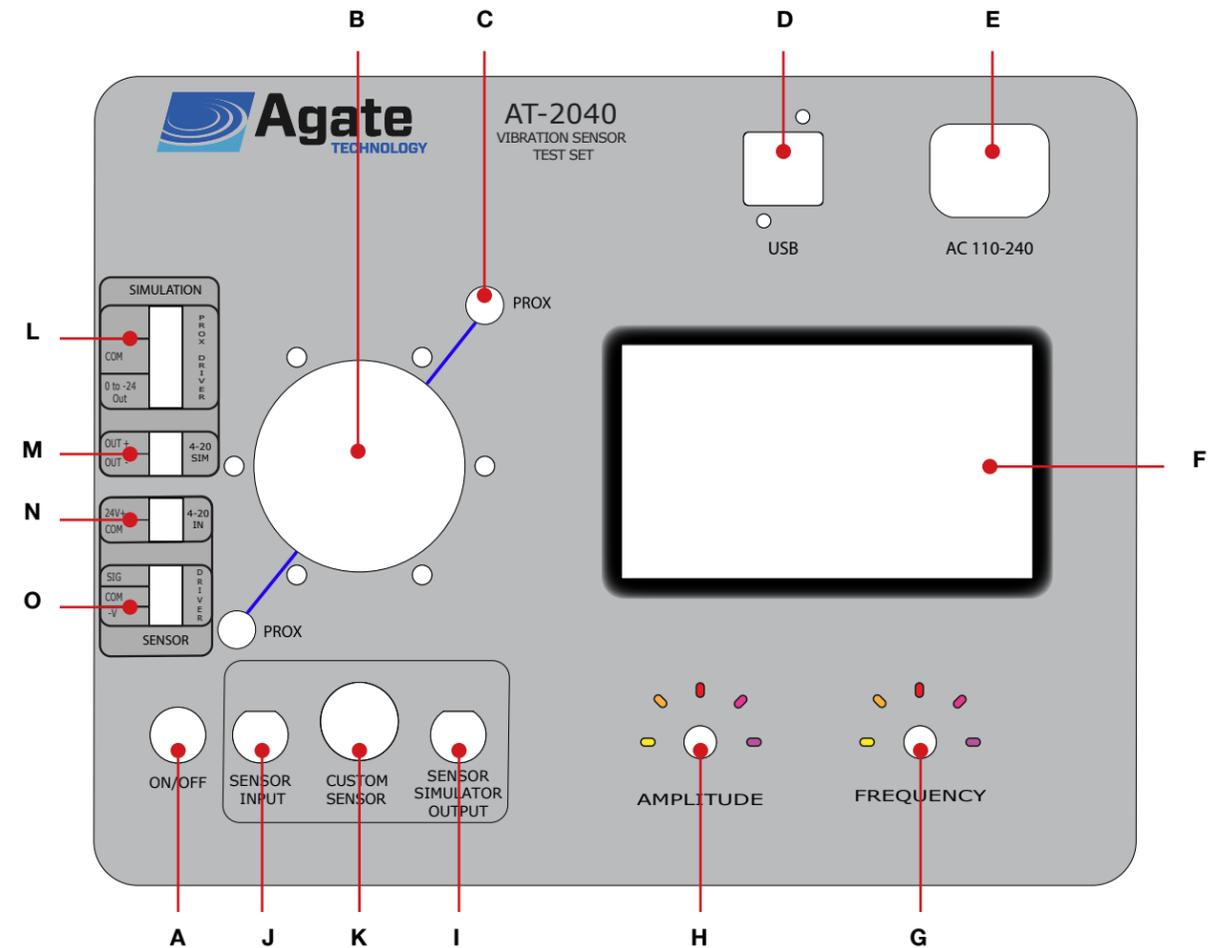


Figure 2. Physical diagram of the AT2040

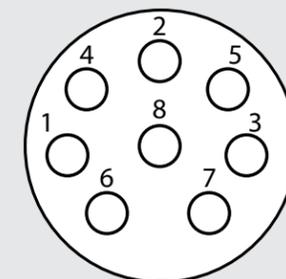


Figure 3. Rear-view pinout diagram

- 1. **Charge**
- 2. **Ground**
- 3. **5–10 Volt Output (Adjustable)**
- 4. **Channel A:** Input for transducers that provide voltage outputs
- 5. **Channel B:** Triax
- 6. **Channel C:** Triax
- 7. **Test Signal**
- 8. **Displacement Input**

AT2040 accessories

Description	Part No.	Quantity
Short-Handle Aluminum Wrench	ACC-100	1
5/32 Hex L-Wrench	ACC-101	1
1/4-28 Stud	MNT-104	1
1/4-28 to 10-32 Stud	MNT-105	1
1/4-28 to 2-56 Adapter	MNT-106	1
1/4-28 to 6-32 Adapter	MNT-107	1
1/4-28 to 10-32 Adapter	MNT-111	1
Universal Velocity Mounting Adapter with 1/4-28 Mounting Hex Screw	MNT-112	1
Universal Accelerometer Mounting Adapter with 1/4-28 Mounting Hex Screw	MNT-113	1
3-Position Terminal Block Plug, Female	PL-3-04	1
2-Position Terminal Block Plug, Female	PL-2-05	2
Custom Input DIN Terminal Block Plug, Female	PL-DIN-8M	1
10-32 to BNC Low-Noise Adapter Cable	CAB-101	1
AC Power Cord (120 V or 220–240 V)	PWR-100 or 101	1
USB Memory Drive	N/A	1

Table 2. AT2040 standard accessories

Description	Part No.	Quantity
IEPE Accelerometer 2-Pin Mil to BNC Adapter Cable	CAB-102	1
IEPE Accelerometer 3-Pin Mil to BNC Adapter Cable	CAB-103	1
Chadwick-Helmuth/Honeywell Velocimeter Cable	CAB-107	1
Replacement Studs (3 of each): 1/4-28, 10-32; Adapters: 2-56, 6-32, 10-32	MNT-100	1
1/4-28 Adapter	MNT-108	1
Mounting Stud 1/4-28 to 8-32	MNT-109	1
Adapter 1/4-28M to 3/8-24F	MNT-110	1
Proximity Probe Adapter Kit	PRX-100	1
Proximity Probe Proximity Adapters M6 to 3/8	PRX-101	1
Steel Target (4041)	PRX-102	1

Table 3. AT2040 optional accessories ^[5]

[5] Custom cables or platform mounts can be made to your specifications based on transducer sample or datasheet. Please contact us for more information.

Battery operation

The AT2040 is powered by one 6 amp hour, sealed lead acid, rechargeable battery as its primary power source. This battery is designed to be continuously charged at a trickle rate once the battery reaches 100%. Battery life will depend on USB plug-ins, payload weight, along with shaker driving force.

In low power conditions, the AT2040 uses approximately 0.4 amps of power making it possible to achieve 13 hours of battery power. However, the AT2040 will shut down premature to full discharge preventing damage and ensuring long-term battery life.

During long periods of high power consumption, the AT2040 may only last up to one hour.

A battery light indicator is located in the top menu bar and turns from green to red as the battery becomes low on energy. Next to the battery bar, is an approximate percentage of battery remaining. See the included voltage chart (Table 4).

The AT2040 may be operated with the power plugged in. The AC charger will supply battery charge when plugged in; however, the charge rate will be greatly increased when the AT2040 is powered off.

NOTES:

- For best results use the AT2040 when the battery is fully charged.
- Automatic power management will automatically turn off before full battery discharge. This is a protective measure to ensure longer battery operating life.
- If deep discharge occurs, the battery charger is set to recharge over two or more days. This is normal operation to prevent battery damage.

Voltage	State of Charge
12.6+	100%
12.5	90%
12.42	80%
12.32	70%
12.20	60%
12.06	50%
11.9	40%
11.75	30%
11.58	20%
11.31	10%
10.5	0%

Table 4. Battery remaining by voltage

Operation instructions

Powering the AT2040 on and off:

- Press and hold the red **On/Off button** for 1 second. The AT2040 will begin its startup sequence.
- Press and hold the red **On/Off button** for 5 seconds to power off. When the screen goes blank, the AT2040 has powered down.

Main Menu Screen Overview

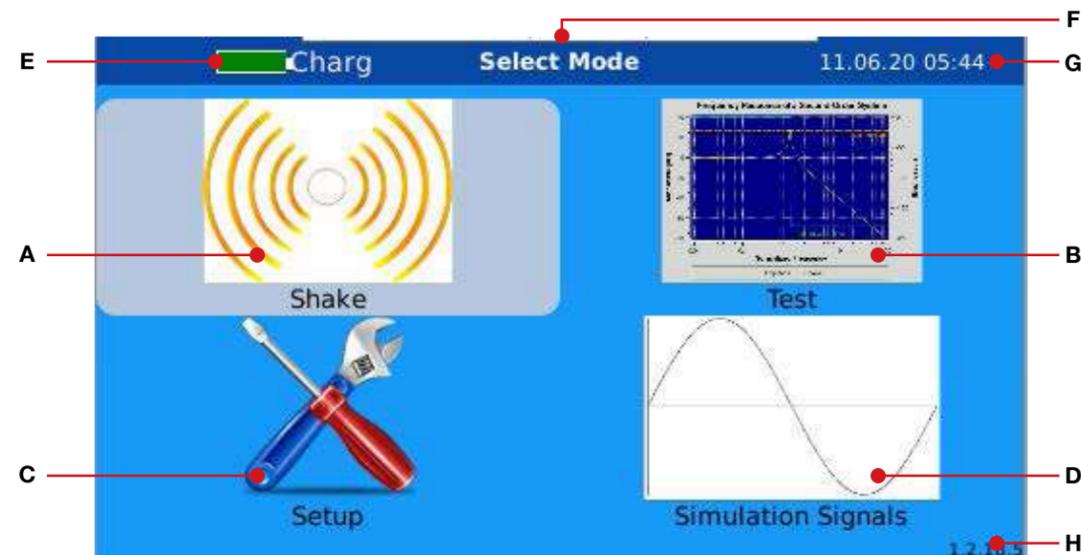


Figure 4. AT2040 main menu screen

- A. **Shake Button:** Select to manually test a transducer or equipment using only variable frequency and amplitude.
- B. **Test Button:** Select to test transducer sensitivity, using either manual adjustment or automatic plot.
- C. **Setup Button:** Select to customize the AT2040 options to your preferences.
- D. **Simulation Signals Button:** Select to simulate the signal of a transducer.
- E. **Battery Indicator:** Shows remaining battery level. See [Battery Operation](#) on page 13.
- F. **Screen Title:** Indicates action(s) to be performed on the current screen.
- G. **Date / Time:** Shows the current date and time.
- H. **Software Version:** Shows the current software version.

AT2040 Menu	
Main Menu Screen	Submenu Screens Available
Shake Button	<ul style="list-style-type: none"> • Run Manual Shake Screen
Test Button	<ul style="list-style-type: none"> • Sensor Type Selection Menu <ul style="list-style-type: none"> • Manufacturer Selection Menu <ul style="list-style-type: none"> • Sensor Model Selection Menu <ul style="list-style-type: none"> • Sensor Profile Screen / Auto or Manual Test Selection <ul style="list-style-type: none"> • Run Auto Test Screen • Run Manual Test Screen
Setup Button	<ul style="list-style-type: none"> • Previous Test List / Export PDF or CSV to USB Screen • Location / Time Setup Screen • Network Configuration Screen • Company / Touchscreen Setup Screen • Certification Template Import / Export Screen
Simulation Signals Button	<ul style="list-style-type: none"> • Sensor Type Selection Menu <ul style="list-style-type: none"> • Manufacturer Selection Menu <ul style="list-style-type: none"> • Sensor Model Selection Menu <ul style="list-style-type: none"> • Run Simulation Screen

Table 5. AT2040 menu and submenus

Navigating the AT2040 Menu

The AT2040 interface may be navigated using the touchscreen, the two knobs on the front panel, or a combination of these two methods.

Using the Frequency and Amplitude Knobs

In addition to adjusting the frequency (right knob) and the amplitude (left knob), the two knobs can be used to navigate the onscreen menu:

1. Turn the frequency knob to move up or down through the onscreen options.
2. Press the frequency knob to choose the currently selected (highlighted) submenu, button, text field, check box, list option, or adjustable display window.
3. Press the amplitude knob to go back to the previous screen.

Using the Touchscreen

Tap a submenu, button, text field, check box, list option, or adjustable display on the touchscreen to select it.

Using the Adjustable Displays

Tap the adjustable display on the touchscreen, for example the amplitude display, to bring up the number pad and type in the desired test point.

Editing a Text Field

1. Tap the white editable text field you wish to edit, or use the frequency knob to select it.
2. Use the keyboard that opens to enter the desired text.

Using the Keyboard and Number Pad

1. Tap the  key on the keyboard or the  key on the number pad to clear one character, or tap the  key on the number pad to reset the current entry.
2. Tap the  key on the keyboard or the  key on the number pad to save the entry and close the keyboard or number pad.
3. Tap the  key on the keyboard or the  key on the number pad to cancel.

Using Toggle Buttons

Toggle buttons have labels which change depending on their state, for example, the "Start/Stop" button. Before a test begins, the button label reads "Start", during a test, the label reads "Stop".

Shake Mode

Shake mode is used to manually test a transducer or equipment using only variable frequency and amplitude control. Shake mode can be used to set up a new system, verify an existing system, or troubleshoot an alarm.

In this mode, the frequency and amplitude are set manually by the operator, while the computer provides high-accuracy measurement signals.

1. From the main menu, select **Shake** to open the shake mode screen (*Figure 5*).

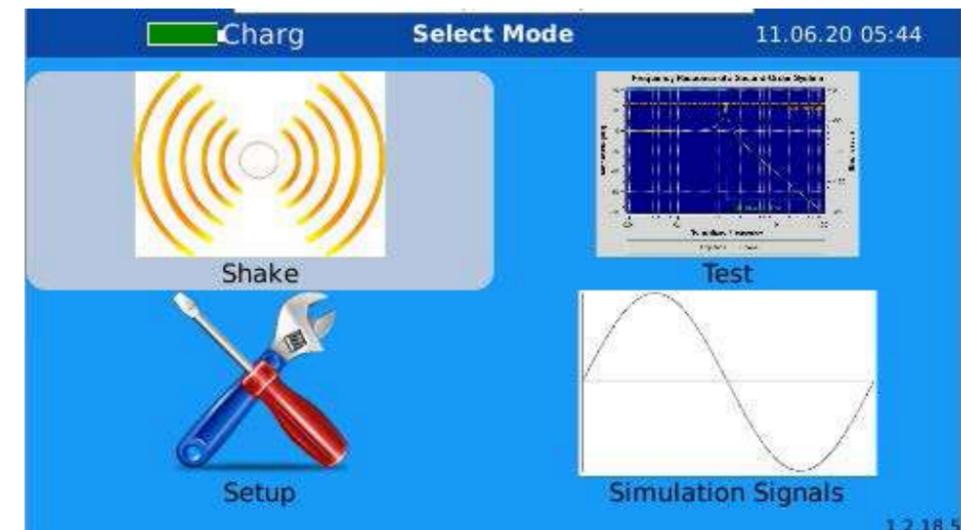


Figure 5. Choose "Shake" from the main menu

2. Select your sensor and mount it to the 1/4-28 drill hole in the reference accelerometer.
 - a. Hold the reference accelerometer with the provided short-handle wrench and screw in the sensor at the same time.
 - b. When necessary, use the correct sensor adapter for your size.

Shake Mode Screen Overview



Figure 6. Shake mode screen

- A. **Amplitude Display:** Turn the amplitude knob to adjust, or tap the touchscreen display to bring up the number pad and type in the desired amplitude test point.
- B. **Frequency / RPM Display:** Turn the frequency knob to adjust, or tap the touchscreen display to bring up the number pad and type in the desired frequency or RPM test point.
- C. **Units Button:** Tap the onscreen button to toggle through the units available for the amplitude display: gs, IPS, UM, MM, MILS, MMS, and MSS.
- D. **Hz / RPM Button:** Tap the onscreen button to toggle between the available units for the frequency/RPM display: Hz and RPM.
- E. **RMS / Reference Display:** Displays the RMS value and the reference output (the actual amplitude at which the calibrator is shaking).
- F. **AT2040 Output Information:**
- **Out:** Percentage of amplifier output capability.
 - **Mils:** Displacement of the electromagnetic shaker in mils.
 - **THD:** Total harmonic distortion.
- G. **Start / Stop Button:** Tap the onscreen button or use the frequency knob to select the button to start or stop the test.

Conducting a Test in Shake Mode

- To begin the test (*Figure 6*):
 - Turn the frequency knob until the **Start button** is highlighted, then press down on the knob to select the button and begin the test, **OR**
 - Tap the **Start button** on the touchscreen to begin the test.

During the test the amplitude and frequency may be adjusted (*Figure 6*).

- To adjust the amplitude:
 - Turn the amplitude knob, **OR**
 - Tap the amplitude display on the touchscreen to bring up the number pad and input the desired amplitude.
- To adjust the frequency:
 - Turn the frequency knob, **OR**
 - Tap the frequency/RPM display on the touchscreen to bring up the number pad and input the desired frequency or RPM.

During the test, the values shown in the onscreen amplitude display and frequency/RPM display may be adjusted (*Figure 6*):

- Tap the **Units button** to toggle through the available units for the amplitude display: gs, IPS, UM, MM, MILS, MMS, and MSS.
- Tap the **Hz/RPM button** to toggle between the available units for the frequency/RPM display: Hz and RPM.
- Tap the **Stop button**, or use the frequency knob to select it to conclude the test.
- At completion of the test, the test data is automatically saved in the on-board memory and can be recalled and exported to the USB drive at a later time.

Purewave™ Overview

Purewave is the AT2040 distortion compensation algorithm. The status of Purewave is indicated by the color of the Reference data point (*Figure 6*):

- **Orange** = Not ready.
- **Blue** = Adjusting.
- **Green** = Complete.

Test Mode

Test mode is used to calculate transducer sensitivity by comparing known accurate signals sent by the internal signal generator board and the signals received by the transducer under test. A sensitivity test can be performed either manually or automatically to a high level of accuracy.

To begin a sensitivity test:

1. Select **Test** from the main menu (*Figure 7*).
2. Select the type of transducer you want to test by turning the frequency (right) knob and pressing it to select **OR** by tapping the transducer type on the touchscreen (*Figure 8*).

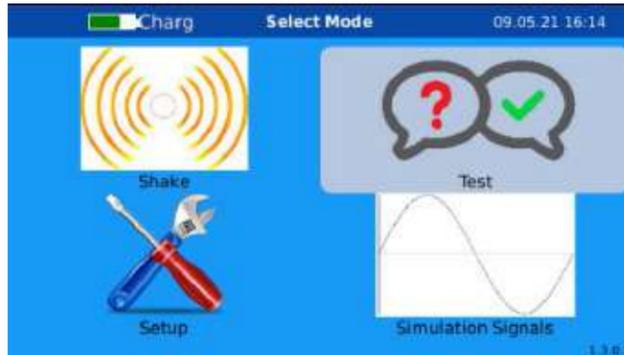


Figure 7. Select "Test"

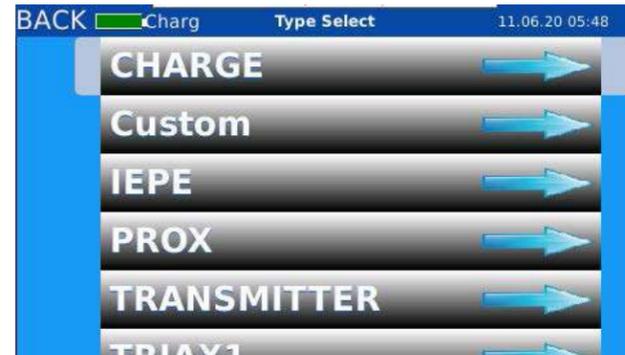


Figure 8. Select sensor type

AT2040 uses internal-switching relays to change between channels. All sensor support systems are built into the unit, including a charge amplifier. AT2040 supports sensitivity inputs for the following sensor types:

- IEPE accelerometer
- Charge mode accelerometer
- Customized accelerometer
- Proximity probe
- 4-20 mA transmitter
- Voltage
- Triaxial accelerometer, channel 1, 2, and 3

3. Select the manufacturer (*Figure 9*).
4. Select the model and sensitivity (*Figure 10*).



Figure 9. Select manufacturer

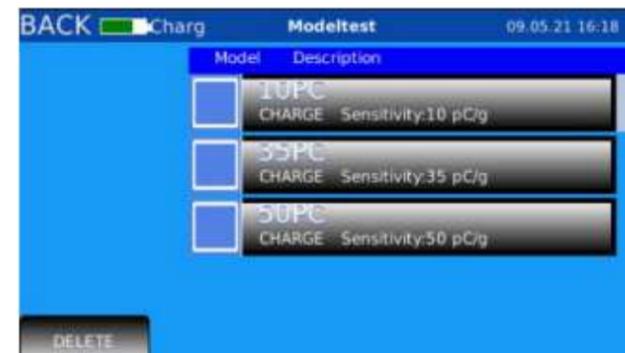


Figure 10. Select model

5. When the model and sensitivity are selected, detailed information about the sensor, called the sensor profile screen, is loaded from the on-board library (*Figure 11*).

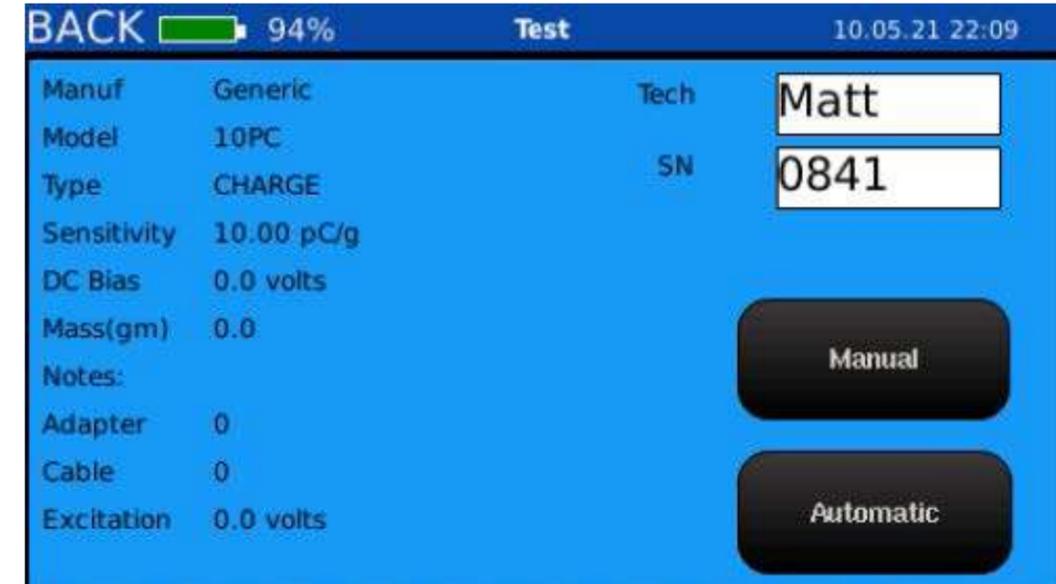


Figure 11. Sensor profile screen

6. Select the white **Tech field** if you wish to change the technician's name. This will bring up the keyboard so you can type in the new technician name (*Figure 12*).
7. Select the white **SN field** if you wish to change the sensor serial number (*Figure 13*).

NOTE: The tech name and sensor serial number fields are automatically populated into the PDF calibration certificate.



Figure 12. Technician Name



Figure 13. Sensor serial number

8. Tap the **Manual button** or **Automatic button** on the sensor profile screen to select either manual or automatic testing mode (*Figure 11*). See [Testing in Manual Mode](#) on page 22 and [Testing in Automatic Mode](#) on page 23 for additional instructions.

Testing in Manual Mode

1. Select the **Manual button** on the sensor profile screen.
2. Manually select the amplitude and frequency to perform a sensitivity check (*Figure 14*):
 - a. Use the left knob to adjust the amplitude or the right knob to adjust the frequency.
 - b. Alternately, tap the amplitude or frequency/RPM display to bring up the number pad where you may type in the desired frequency or amplitude test point.
3. At completion of the test, the test data is automatically saved in the on-board memory and can be recalled and exported to the USB drive at a later time.

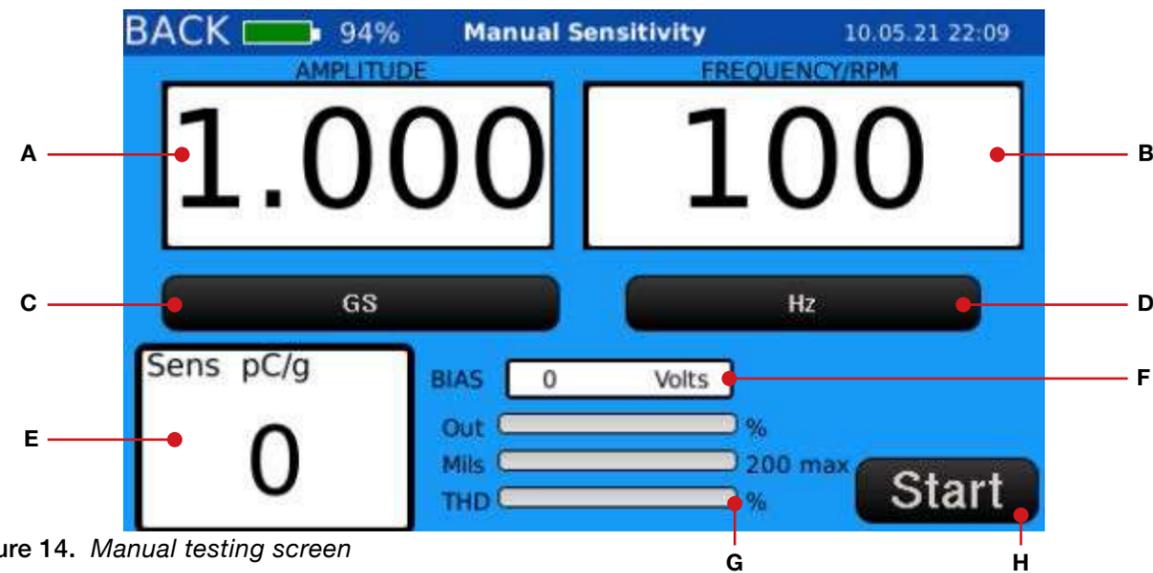


Figure 14. Manual testing screen

- A. **Amplitude Display:** Turn the amplitude knob or tap the display to adjust it.
- B. **Frequency / RPM Display:** Turn the frequency knob or tap the display to adjust it.
- C. **Units Button:** Indicates unit of measurement of the value shown in the amplitude display.
- D. **Hz / RPM Button:** Indicates whether value shown in frequency/RPM display is Hz or RPM.
- E. **Sensitivity Display:** Displays sensitivity in mV/g, pC/g, mV/mils, or IPS/FS.
- F. **Bias / Gap V Display:** Bias or gap voltage of transducer under test.
- G. **AT2040 Output Information:**
 - **Out:** Percentage of amplifier output capability.
 - **Mils:** Displacement of the electromagnetic shaker in mils.
 - **THD:** Total harmonic distortion.
- H. **Start / Stop Button:** Select the button to start or stop the test.

Testing in Automatic Mode

1. Select the **Automatic button** on the sensor profile screen. The sensor will automatically perform a sweep of all pre-defined points loaded in the library.
2. At completion of the test, the test data is automatically saved in the on-board memory and can be recalled and exported to the USB drive at a later time.

Reviewing Automatic Test Data

During an automatic test, the test status bar and graph show progress information (*Figure 15*):

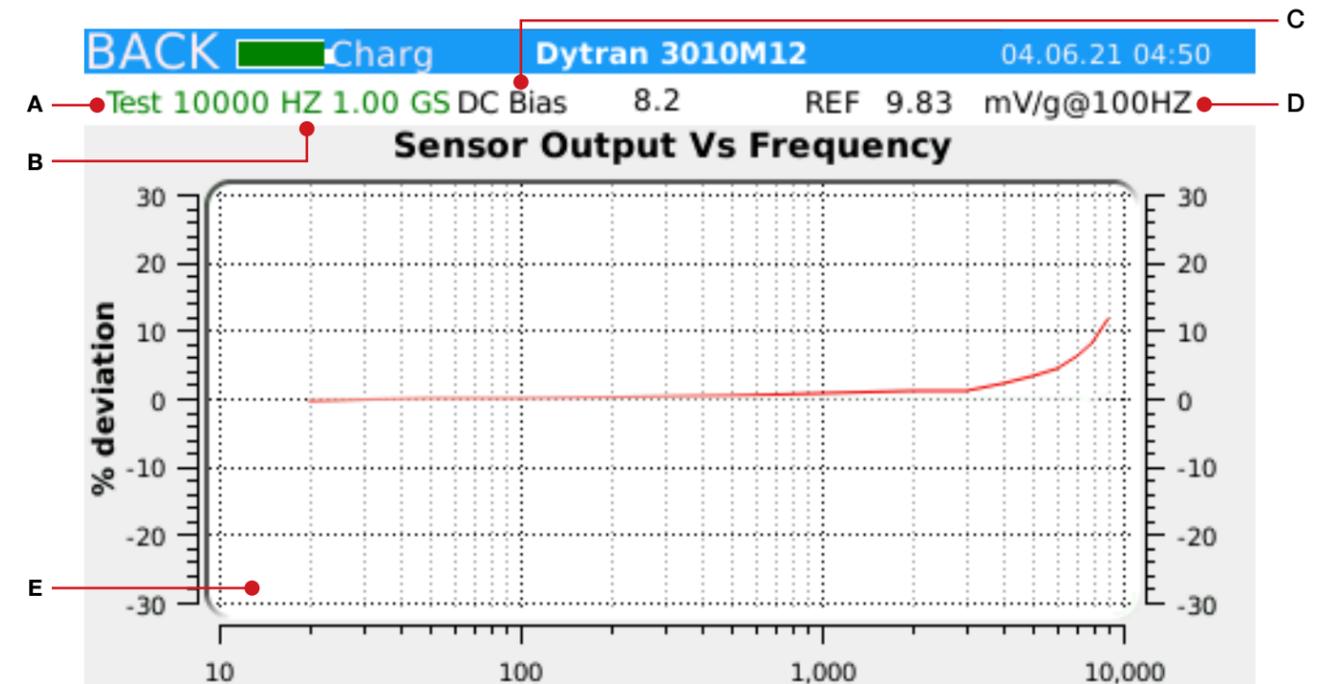


Figure 15. Automatic testing screen

- A. **Test Status:** Provides information about the test as the calibrator automatically sweeps through pre-defined points.
- B. **Current Measurement:** Shown in frequency and amplitude. Status is indicated by color:
 - **Red** = Changing frequency and/or amplitude.
 - **Blue** = Taking measurement.
 - **Green** = Writing data.
- C. **Bias / Gap V:** Bias or gap voltage of sensor under test.
- D. **REF:** Reference measurement taken at the start of the test.
- E. **Graph:** Shows deviation relative to the reference sensitivity.

Calibrating IEPE Accelerometers

1. Mount the sensor and connect it to the BNC Sensor Input connector.
2. In the Test menu, select **IEPE** from the sensor type list (Figure 16).
3. Select the manufacturer (Figure 17).



Figure 16. Select sensor type



Figure 17. Select manufacturer

4. Select the model and sensitivity (Figure 18).
5. Select the **Manual button** or **Automatic button** on the sensor profile screen (Figure 19).

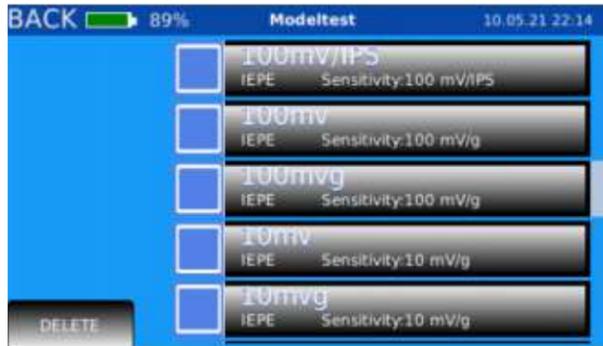


Figure 18. Select model

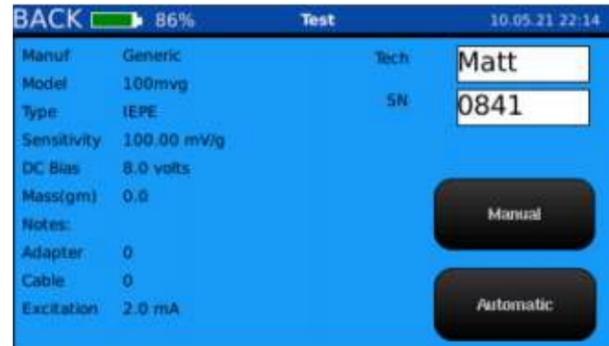


Figure 19. Sensor profile screen

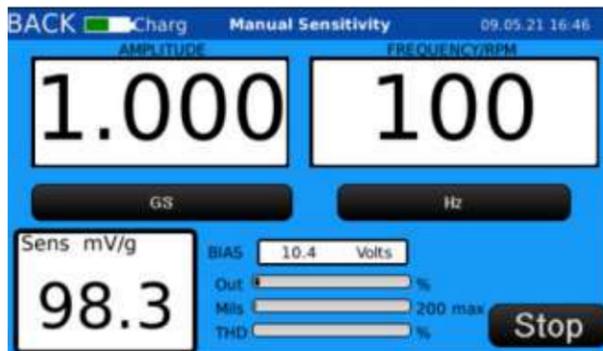


Figure 20. Testing an IEPE sensor in manual mode

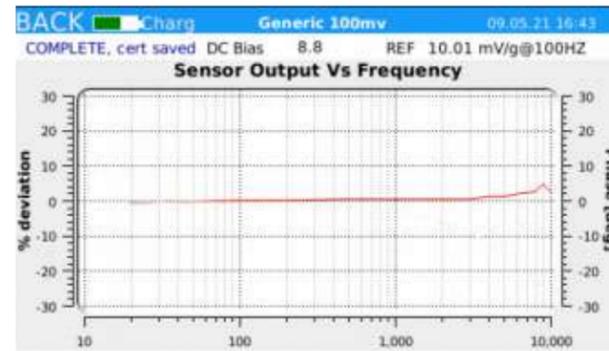


Figure 21. Testing an IEPE sensor in auto mode

Calibrating Charge Accelerometers

1. Mount the sensor and connect it to the BNC Sensor Input connector.
2. In the Test menu, select **Charge** from the sensor type list (Figure 22).
3. Select the manufacturer (Figure 23).



Figure 22. Select sensor type



Figure 23. Select manufacturer

4. Select the model and sensitivity (Figure 24).
5. Select the **Manual button** or **Automatic button** on the sensor profile screen (Figure 25).

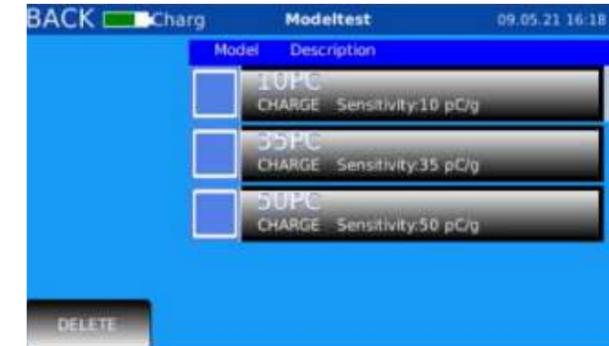


Figure 24. Select model



Figure 25. Sensor profile screen

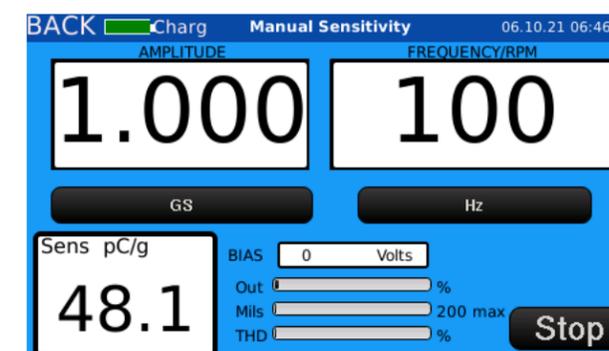


Figure 26. Testing charge sensor in manual mode

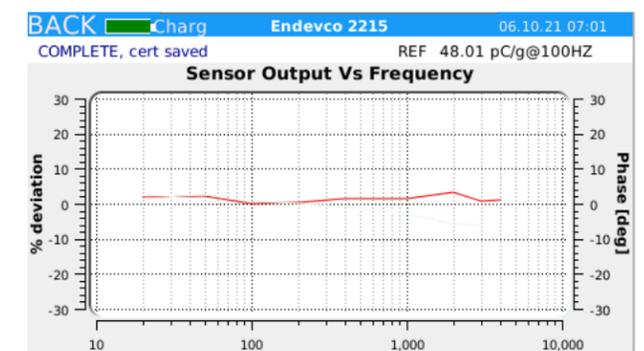


Figure 27. Testing charge sensor in auto mode

Calibrating 4-20mA Transmitters

1. Mount the sensor (Figure 28).



Figure 28. Sensor mounted to the AT2040

2. Connect the sensor to the **4-20 Input** (the connector labeled "2" in Figure 29):
 - a. Connect +24 volts to "24V+".
 - b. Connect Common to "Com".



Figure 29. Connect the sensor to connector "2"

3. Choose **Test** from the main menu.

4. Select **Transmitter** as the sensor type and select the manufacturer (Figures 30 and 31).



Figure 30. Select sensor type



Figure 31. Select manufacturer

5. Select the transmitter model and sensitivity (Figure 32).

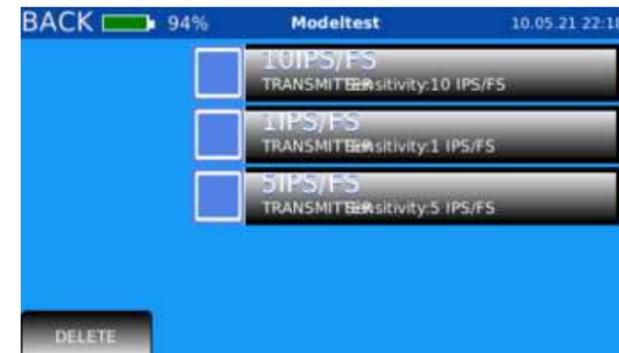


Figure 32. Select model



Figure 33. Sensor profile screen

6. Select the **Manual button** or **Automatic button** on the sensor profile screen (Figure 33).

AT2040 will provide +24 volts to power the sensor and read back current from the transmitter.

NOTE: When connected with no vibration, the transmitter will display 4 mA. If the transmitter is connected and the current reads 0 mA of current, the sensor is faulty or not connected.

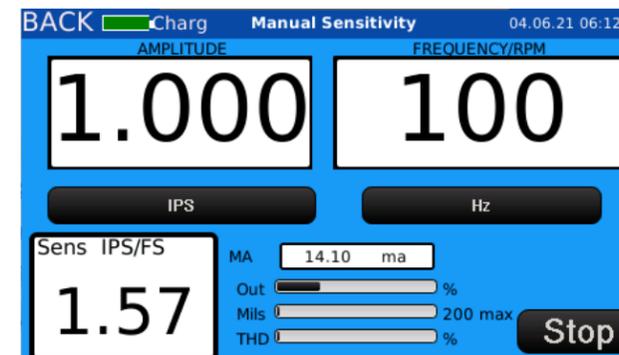


Figure 34. Testing a transmitter in manual mode

Calibrating Triaxial Sensors

Calibrating triaxial sensors is done in the same way as a uniaxial sensor, but the measurements are taken three times on three different axes.

Recommended method: Plug the sensor into AT2040's 8-pin DIN connector to change between axes using the calibrator's electronics and internal relays. Using this method, the operator only needs to change the positioning of the sensor and not the cable.

Alternate method: If the operator would prefer to use BNC breakouts instead of the internal electronics, AT2040 supports that as well.

To calibrate a triaxial accelerometer:

1. Mount and connect the accelerometer (*Figure 36*).
2. Choose **Test** from the main menu.
3. Choose the appropriate channel.
4. Select the sensor model and sensitivity.
5. Take the first set of readings for the X-axis.
6. Rotate the sensor 90-degrees (*Figure 36*) and select the next triaxial channel in the AT2040 menu screen.

NOTE: If using BNC breakouts, the operator must stay on Triax Channel A and change the connector manually instead.

4. Take second set of readings
5. Repeat step 3.
6. Take third set of readings.



Figure 36. Sensor positioning and connection method

Calibrating Proximity Probes

Proximity Probe Kit Contents



Figure 37. Proximity probe kit installed on AT2040

Proximity Probe Adapter Kit Contents - Part No. PRX-100			
Description		Quantity	Part No.
Steel Target (AISI 4140)		1	PRX-102
Proximity Probe Adapter Arm	3/8" Clamp	1	PRX-103
	1/4" Clamp	1	PRX-104
	6mm Clamp	1	PRX-105
	8mm Clamp	1	PRX-106
	10mm Clamp	1	PRX-107
Mounting Leg	1.5"	2	PRX-108
	2.0"	2	
	3.0"	2	
Proximity Probe Mounting Bar		1	PRX-109
Micrometer with Non-Rotating Spindle		1	PRX-110
Stainless-Steel Thumbscrew		2	PRX-111
Panel Adapter		2	PRX-112

Table 6. Proximity probe adapter kit contents

Installing the Proximity Probe Kit

To assemble and install the proximity probe kit (*Figure 38*):

1. Install the AISI-4140 steel target (**A**) by screwing it into the reference accelerometer.
2. Install the two panel adapters (**B**) into the screw locations labeled "PROX" on the front panel.
3. Insert the micrometer (**C**) through the large central hole in the proximity probe mounting bar (**D**).
4. Loosely tighten the set screw (**E**) on the rear of the mounting bar to hold the micrometer in place.
5. Find the correct size proximity probe adapter arm (**F**) and attach it to the end of the micrometer.
6. Loosely tighten the 8-32 set screw (**G**) on the rear of the adapter arm to secure it to the micrometer.
7. Insert the proximity probe (**H**) through the mounting bar (**D**) and into the adapter arm (**F**).
8. Tighten the clamp around the proximity probe using the 8-32 socket head screw (**I**) in the adapter arm.
9. Extend the micrometer about halfway and select the correct-size mounting legs (**J**) based on the distance from the proximity probe tip to the target:
 - a. Measure the probe or check the probe datasheet for sizing.
 - b. Once assembled, the probe must be able to contact the target and move 100 mils away from the target.
10. Screw the mounting legs (**J**) into the panel adapters (**B**).
11. Align the proximity probe assembly with the top of the mounting legs.
12. Screw the two stainless-steel thumbscrews (**K**) through the top of the mounting bar and into the mounting legs.

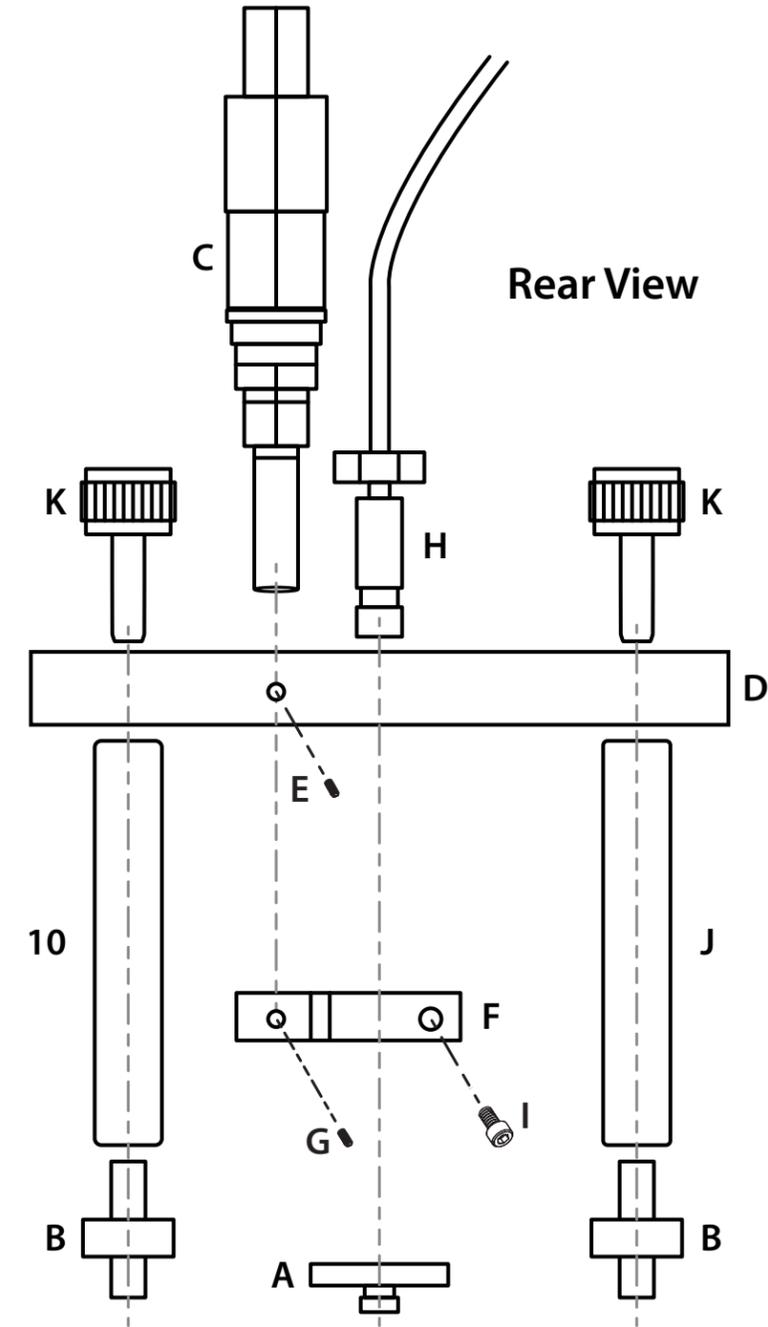


Figure 38. Rear view of the proximity probe kit installation

Connecting the Proximity Probe Driver

1. Connect the driver to the **Proximity Probe Driver Input** (labeled "1" in *Figure 39*), see also *Figure 40*:
 - a. Connect Signal to "Sig".
 - b. Connect Common to "Com".
 - c. Connect -24 volts to "-V".



Figure 39. Proximity probe driver input

NOTE: The driver receives power from the AT2040.

NOTE: The AT2040 reads in both AC and DC voltage from the driver.

Choosing Between a Dynamic and Linear Test



Figure 40. Proximity probe driver connected to AT2040

AT2040 provides the needed -24 volts to power output for proximity probe drivers. It also reads in both AC and DC values. This allows the operator to conduct probe/driver tests without any add-on power supplies or external volt meters.

Proximity probes can be checked by conducting a dynamic or linear test:

- A dynamic (AC) test is done by reading in the AC voltage during vibration and performing a sensitivity test at a fixed-gap voltage.
- In a linear (DC) test, the gap voltage is adjusted over a linear range and the Proximity Probe Test Template spreadsheet included on the USB drive is completed showing the incremental scale value. A linear test can be performed with or without vibration from the AT2040.

It is recommended to perform a linear test rather than a dynamic test. A linear test will show the ISF over the entire range of a probe/driver, whereas a dynamic test shows increasing amplitude (sine wave size) at a fixed-gap voltage.

Conducting a Linear Test

During a linear (DC) test, the probe is set at the 0 position and adjusted using the micrometer from 0–10–20–30, and so on, covering the entire linear range. Linear tests are done in manual mode and the amplitude is not adjusted.

To conduct a linear test:

1. Assemble and install the proximity probe kit, per instructions in [Installing the Proximity Probe Kit](#) on page 30.
2. Connect the proximity probe driver, per instructions in [Connecting the Proximity Probe Driver](#) on page 32.
3. Choose **Test** from the main menu.
4. Select **Prox** as the sensor type, then select the proximity probe manufacturer and model.
5. Select the **Manual button** on the sensor profile screen.
6. Adjust the probe to 10 mils from the target.
7. Using the Proximity Probe Test Template spreadsheet on the included USB drive (see example spreadsheet on next page), create a test over the span of 10 mil test increments. The Proximity Probe Template in Excel format is provided to assist you with these calculations.
8. Start by filling in "Test 1" data in the Excel spreadsheet at cell 6C (yellow cell in *Table 7*).
9. Rotate the spindle to 20 mils and record the voltage in cell 7C (green cell in *Table 7*).
10. Continue in 10 mil-increments until the upper-end of the linear scale, completing column C in the Excel spreadsheet ("Test 1" column in *Table 7*).
11. Calculate the voltage change by using the spreadsheet to fill in test points H6–H14 ("ISF Test 1 mV/mil" column in *Table 8*)

NOTE: It is always a good idea to perform the test a second time, completing column D in the Excel spreadsheet ("Test 2" column in *Table 7*).

12. Log and analyze data by looking for the linear relation between travel and voltage.
13. Locate the ISF and measurement tolerance printed on the proximator and housing. For example, 200 mV over 10 mil-increments results in 2 volt (200 millivolt) changes.
14. Compare the ISF on the driver housing to the results of your test ("ISF Test 1" or "ISF Test 2" columns in *Table 8*).

NOTE: Example test data is provided in the two "EXAMPLE" columns in *Tables 8 and 9*.

Example Agate Technology Proximity Probe Test Template

	Test 1	Test 2	EXAMPLE
Mils	Volts	Volts	Volts
10			1.000
20			3.000
30			5.000
40			7.000
50			9.000
60			11.000
70			13.000
80			15.000
90			17.000
100			19.000

Table 7. Record test data

Incremental Scale Factor (mV/mil)			
Mils	ISF TEST 1 (mV/mil)	ISF Test 2 (mV/mil)	EXAMPLE ISF (mV/mil)
20	0	0	200
30	0	0	200
40	0	0	200
50	0	0	200
60	0	0	200
70	0	0	200
80	0	0	200
90	0	0	200
100	0	0	200

Table 8. ISF data auto-populates based on test data

Conducting a Dynamic Test

During a dynamic (AC) test, the AT2040 takes on the role of simulating a rotating shaft. The 4140 steel target will produce the same vibration signals as a steel shaft. In this test, the operator will set the probe gap voltage and adjust the amplitude. With the AT2040 this can be performed in either manual or automatic mode.

1. Choose **Test** from the main menu.
2. Select **Prox** as the sensor type.
3. Select the proximity probe manufacturer and model.
4. Locate the recommended gap setting on the proximity probe driver spec sheet:

Example Driver Spec Sheet (for 200 mV/mil probe/driver combination)

Recommended Gap Setting	1.27mm (50 mils)
-------------------------	------------------

5. Determine the exact voltage at the center of the linear range, using the recommended gap setting and the following formula: ^[6]

$$(\text{recomm. gap setting in mils} \times 0.2) - 1 = \text{volts DC} \quad [(50 \times 0.2) - 1 = -9 \text{ volts}]$$

6. **If a recommended gap setting is not available**, locate the linear range listed on the driver spec sheet (most probe and driver combinations are 200 mV/mil, where every 10 mils is equal to 2 volts):

Example Driver Spec Sheet (for a 200 mV/mil probe/driver combination)

Linear Range	2 mm (80 mils). Linear range begins at approximately 0.25 mm (10 mils) from the target and is from 0.25 to 2.3 mm (10 to 90 mils) (approximately -1 to -17 Vdc).
--------------	--

7. Determine the exact voltage at the center of the linear range, using the following formula: ^[6]

$$((\text{range}/2 + 10) \times 0.2) - 1 = \text{volts DC} \quad [((80/2 + 10) \times 0.2) - 1 = -9 \text{ volts}]$$

[6] Both formulas will equate the voltage at the center of the linear range. In both examples shown above, our result is -9 volts DC.

NOTE: Always remember that linear range does not begin until the probe is 10 mils from the target.

8. Assemble and install the proximity probe kit, per instructions in [Installing the Proximity Probe Kit](#) on page 30.
9. Connect the proximity probe driver, per instructions in [Connecting the Proximity Probe Driver](#) on page 32.
10. Locate the gap voltage, shown as "GAP V", on the sensor profile screen (*Figure 41*). The gap voltage is the DC voltage measurement from the probe/driver and is shown as a negative value.

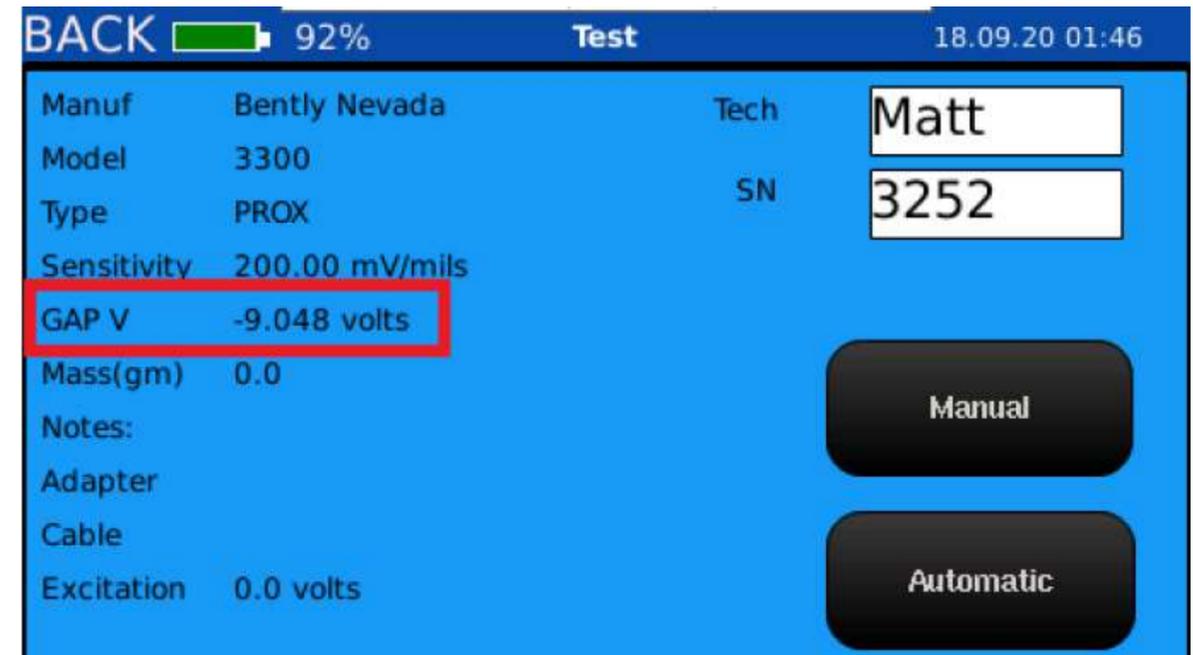


Figure 41. Sensor profile screen for the proximity probe

11. Rotate the micrometer clockwise to push the probe all the way down until it contacts the steel target.

NOTE: The GAP V (DC voltage value) on your calibrator should read less than -1 volt.

12. Rotate the micrometer counterclockwise to retract the probe tip until the GAP V reads the previously calculated value. In our example, we determined a gap voltage of -9 volts.
13. Select the **Manual button** or **Automatic button** on the sensor profile screen (*Figure 41*).
 - a. In automatic mode, the AT2040 will conduct the test without the need for further adjustments.
 - b. In manual mode, adjust the speed to the same RPM as the driveshaft you would like to simulate. Then, increase the amplitude over a range of 1 to 10 mils.

Setup Mode

The Setup menu consists of five submenus to accommodate user preferences (*Figure 42*):

1. **Export PDF:** Export previous test(s) to PDF, export all records to CSV, delete previous test(s).
2. **Clock:** Set date, time, location.
3. **Network:** Set up the wireless network.
4. **Unit Configuration:** Set company name, reconfigure the touchscreen.
5. **Import Cert:** Export default PDF certification template, import operator customized PDF certification template and logo image file.



Figure 42. Setup menu screen

Deleting and Saving Previous Test Records

IMPORTANT: To export or delete previous test records, the USB memory drive must be inserted into the USB port **BEFORE** the AT2040 is powered on. Otherwise, AT2040 will not be able to load the USB drive.

If AT2040 is having problems reading the USB memory drive, restart the device with the USB drive plugged in.

At completion of a test, the test data is automatically saved in the on-board memory and can be recalled and exported to the USB drive at any time. To delete or export saved tests (as PDF or CSV files), the first step is to open a list of the previous tests:

1. Power the AT2040 off.
2. Insert the USB drive into the USB slot (*Figure 43*).



Figure 43. USB memory drive loaded in USB port

3. Power on the AT2040 and select **Setup** from the main menu.
4. In the Setup menu, select **Export PDF**.

This will bring up the Test Review screen where previous test records may be exported or deleted.

Export Previous Tests to the USB Drive

To export selected tests:

1. Tap the check box to the left of the test record(s) you want to export to the USB drive, or use the frequency knob to select (Figure 44).
2. Select the **Save to PDF** button (Figure 44).



Figure 44. Select test records to export

NOTE: Alternately, you may select the **Export All to CSV** button to export all saved test records as a CSV file to the USB drive.

3. You will be notified of a successful export by the onscreen message "Save Complete".
4. Remove the USB drive and review the test(s) on your computer. See the example test record on the next page (Figure 45).

Example:

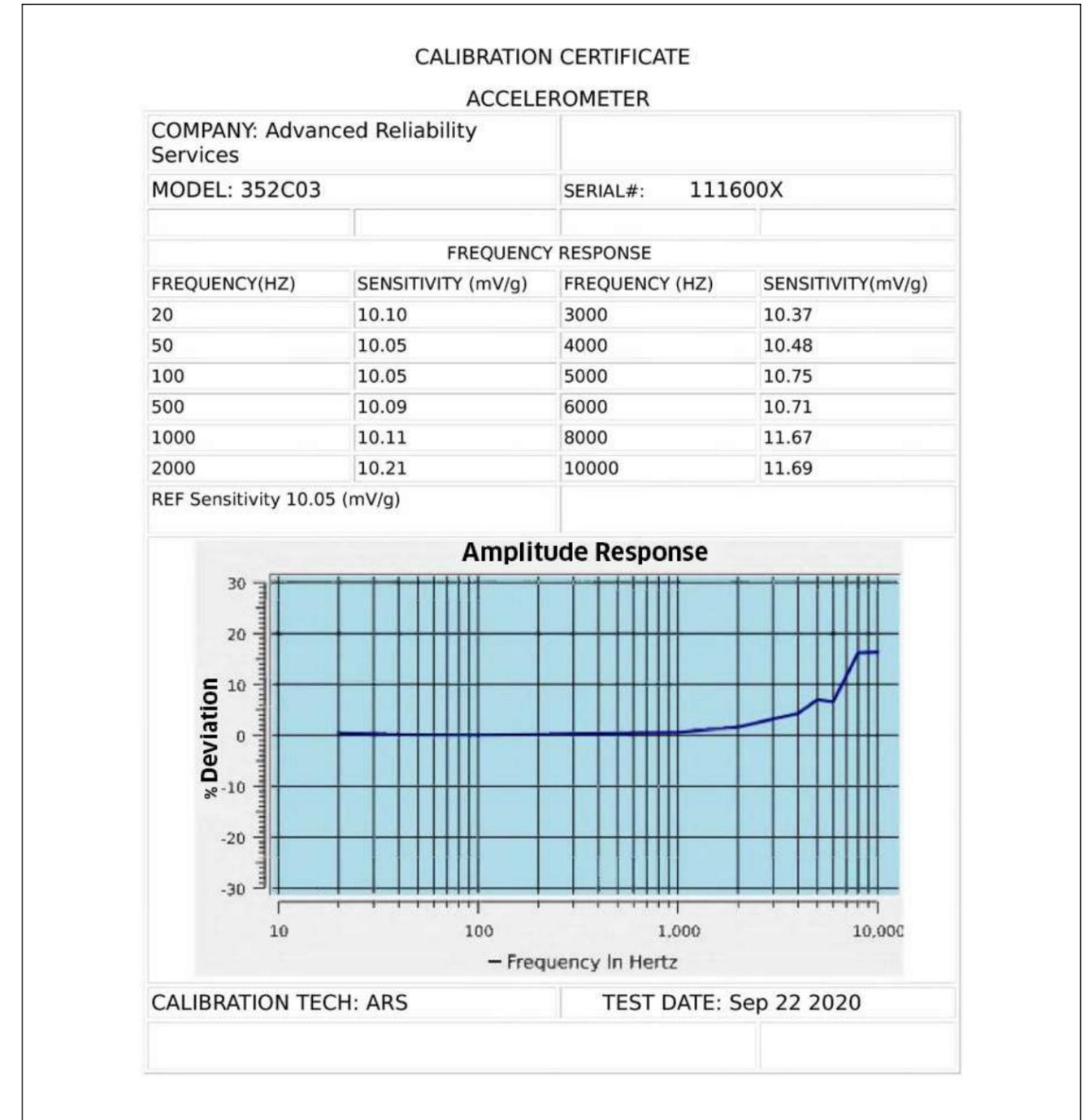


Figure 45. Example exported test record

Delete Previous Tests

1. On the Test Review screen, select the test record(s) you want to delete (*Figure 46*).



Figure 46. Select test records to delete

2. Select the **Delete button** (*Figure 46*) and all selected test records will be deleted from the AT2040 on-board memory.

Adjusting Date and Time Zone

1. In the Setup menu, select **Clock** (*Figure 47*).



Figure 47. Select "Clock"

2. Adjust the time, date, and location, as needed (*Figure 48*).



Figure 48. Set time, date, and location

3. Select the **Save button** when complete.

Network Setup

1. In the Setup menu, select **Network** (Figure 49).



Figure 49. Select "Network"

2. Select the **ESSID field** and enter the identifying name of your wireless network (Figure 50).

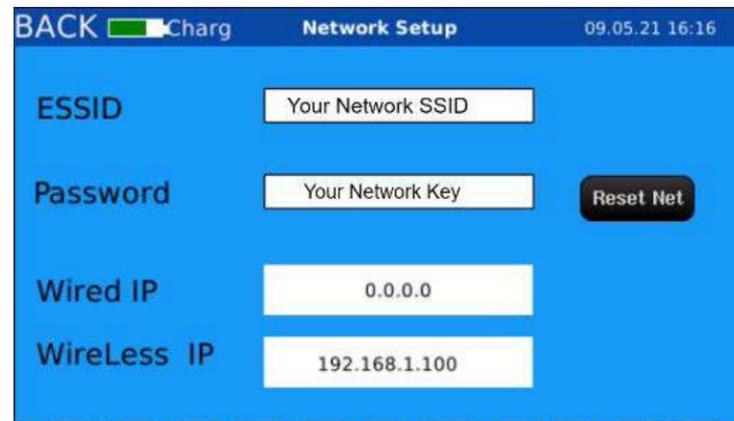


Figure 50. Enter wireless network credentials

3. Select the **Password field** and enter the wireless network password (Figure 50).
4. Select the **Reset Net button** to reset the network.

Calibration and Company Name

1. In the Setup menu, select **Unit Configuration** (Figure 51).



Figure 51. Select "Unit Configuration"

Change the Company Name

1. Select the **Company field** and enter the company name (Figure 52).



Figure 52. Enter company name and calibrate touchscreen

Calibrate the Touchscreen

If the touchscreen is not responding consistently or accurately, it can be re-calibrated:

1. Select the **Calibrate TouchScreen button** to calibrate the touchscreen (Figure 52).
2. Follow the prompts on the screen to complete the calibration.

Exporting and Importing PDF Certificate Files

AT2040 can automatically generate a sensor calibration certificate. The calibration certificate can be customized to specific business needs and branding. To customize the certificate:

1. Power the AT2040 off.
2. Insert the USB drive into the USB slot.
3. Power on the AT2040, and select **Setup** from the main menu.
4. In the Setup menu, select **Import Cert** (Figure 53).



Figure 53. Select "Import Cert"

5. Select the **Export Cert** button to export the AT2040's default calibration certificate template files, **seismic_cert.html** and **logo.png**, to the USB memory drive (Figure 54).



Figure 54. Select "Export Cert" button

6. Plug the USB memory drive into your computer and customize the **seismic_cert.html** file as desired. See [Customizing the PDF Certificate Format](#) on page 60 for detailed HTML customization information and tips.
7. Once the HTML certificate template file has been customized, save it to the USB memory drive. **Do not change the name of the HTML file.**
8. Save your company logo to the USB drive.
9. Rename your company logo: **logo.png**.
10. If prompted by your computer, choose to replace the old logo.png file with the new logo.png file you are saving now.
11. Power the AT2040 off.
12. Re-insert the USB drive into the AT2040 USB slot.
13. Power on the AT2040, and select **Setup** from the main menu.
14. In the Setup menu, select the **Import Cert** submenu.
15. Select the **Import Cert** button to import the customized HTML certificate template file, **seismic_cert.html**, and the company logo file, **logo.png** (Figure 55).



Figure 55. Select "Import Cert" button

Simulation Mode

AT2040 has the ability to simulate a transducer signal without the actual sensor being present. The simulator has a significant advantage over the electrodynamic shaker when calibrating analyzers and control equipment because it is not bound by mechanical limitations. The simulator feature can provide high-output signals at low frequency that would otherwise not be possible due to shaker displacement limitations. Similarly, AT2040 can provide high-frequency signals that otherwise would not be possible due to weight limitations. The simulator output by itself is far more accurate than using the electrodynamic shaker in combination with an accelerometer. This makes AT2040 simulation mode the ideal tool for testing, troubleshooting, and calibrating signal conditioners, analyzers, and control room equipment. Simulation mode allows the operator to connect the AT2040 simulator directly to control equipment to verify its working conditions.

To begin a simulation:

1. Choose **Simulation Signals** from the main menu (*Figure 56*).
2. Select the transducer type to be tested (*Figure 57*).

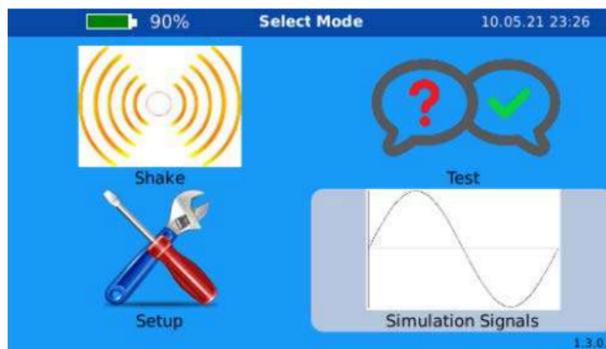


Figure 56. Select "Simulation Signals"



Figure 57. Select sensor type

3. Select the sensor manufacturer from the built-in library of manufacturers. (*Figure 58*).
4. Select your sensor model from the list of sensors (*Figure 59*).



Figure 58. Select manufacturer

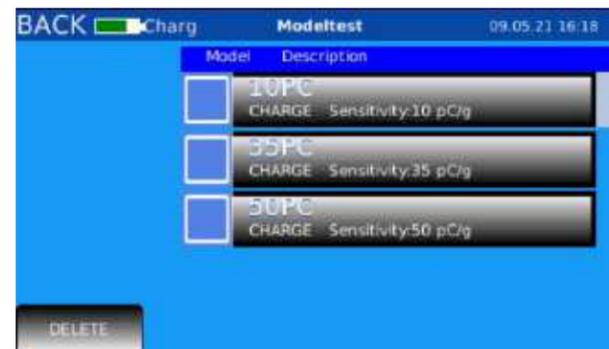


Figure 59. Select model

5. Connect your equipment to the sensor simulator output.
 - a. If simulating a IEPE or charge mode accelerometer, use the BNC Sensor Simulation Output jack.
 - b. If simulating a 4-20mA or proximity probe (*Figure 60*):
 - i. Use the 4-20mA Sensor Output Simulator (labeled "3") for a 4-20mA simulator.
 - ii. Use the Proximity Probe Output Simulator (labeled "4") for a prox simulator.



Figure 60. 4-20mA ("3") and proximity probe simulator connectors ("4")

6. Select the **Start button** on the Simulation screen to begin the simulation (*Figure 61*).



Figure 61. Simulation screen

7. Adjust the amplitude or frequency, as needed, via the amplitude and frequency displays (*Figure 61*).

While the simulation is running, AT2040 will precisely mimic a transducer being operated at the chosen amplitude and frequency.

8. Select the **Stop button** to conclude the simulation.

Controlling the AT2040 remotely

AT2040 can be controlled remotely using a wireless-connected or Ethernet-connected computer and VNC Viewer.

Install and Setup VNC Viewer

1. Download and install the VNC Viewer from VNC Connect/Real VNC (Figure 62): <https://www.realvnc.com/en/connect/download/viewer>.

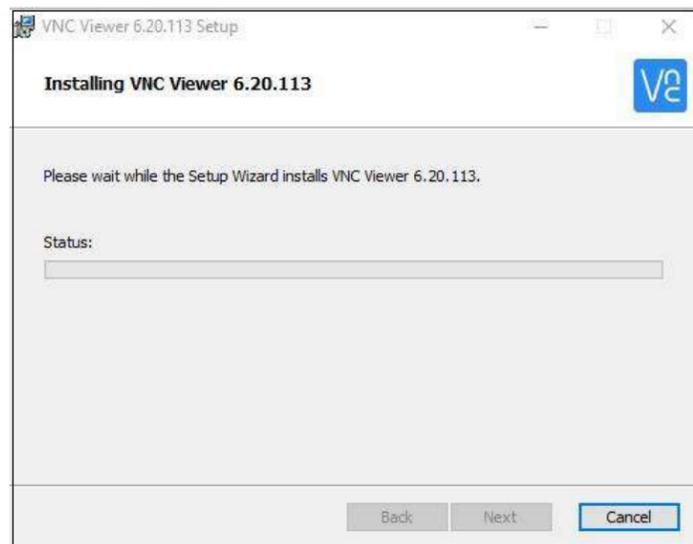


Figure 62. Install VNC Viewer

2. Start the VNC Viewer (Figure 63).



Figure 63. Open VNC Viewer on computer

3. Setup the wireless connection (optional step):

NOTE: Skip step 3 if you are using a hard-wired Ethernet connection.

- a. In the Setup menu, select **Network**.
- b. Enter the identifying name of the wireless network in the **ESSID field** (Figure 64).
- c. Enter the wireless network password in the **Password field** (Figure 64).

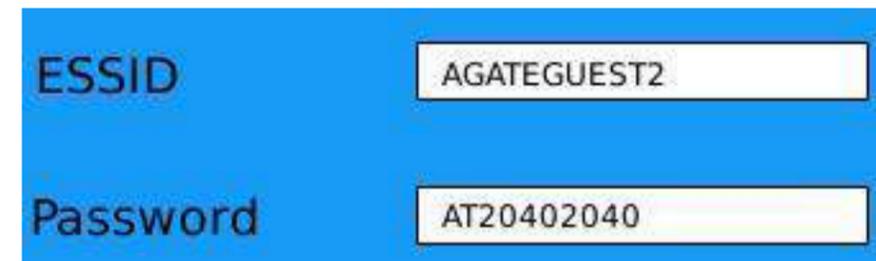


Figure 64. Enter wireless network configurations

- d. Plug a wireless network adapter into one of the USB ports and restart the AT2040.
4. Locate the AT2040 IP address ("Wired" or "Wireless", depending on your setup) in the Network submenu (Figure 65).

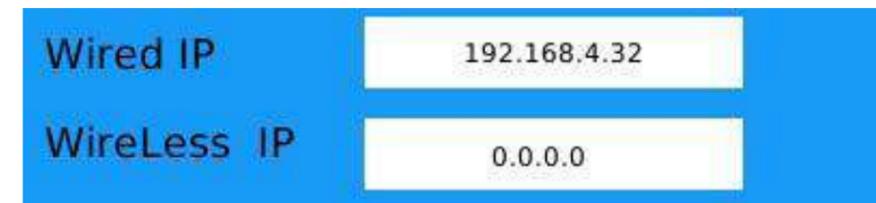


Figure 65. Locate device IP address

5. Select **File > New Connection** from the VNC Viewer menu.
6. Enter the AT2040 IP address in the **VNC Server field** to complete the login setup (Figure 66).

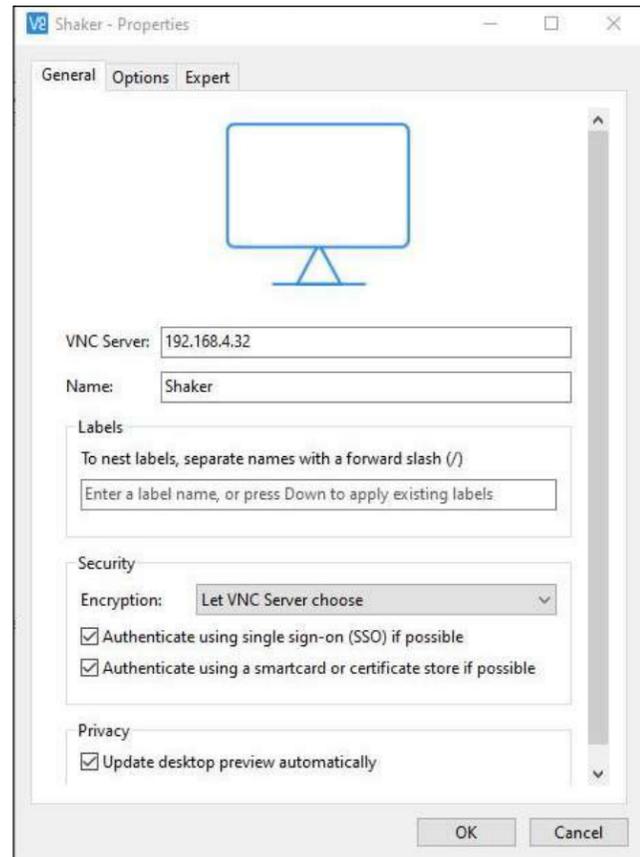


Figure 66. Enter IP address and name

7. Enter an identifying name in the **Name field**, such as "AT2040" or "Shaker" (optional).

NOTE: There is no login or password required for the VNC Viewer setup.

VNC Viewer is now connected and the AT2040 is available to be controlled on remote computer.

8. Right-click on the thumbnail for the AT2040 and choose **Connect** to open a remote connection to the AT2040.

Setting up a custom sensor

Designing a Custom Sensor

1. Open the Sensor Setup application (saved on the USB memory drive), on your computer.

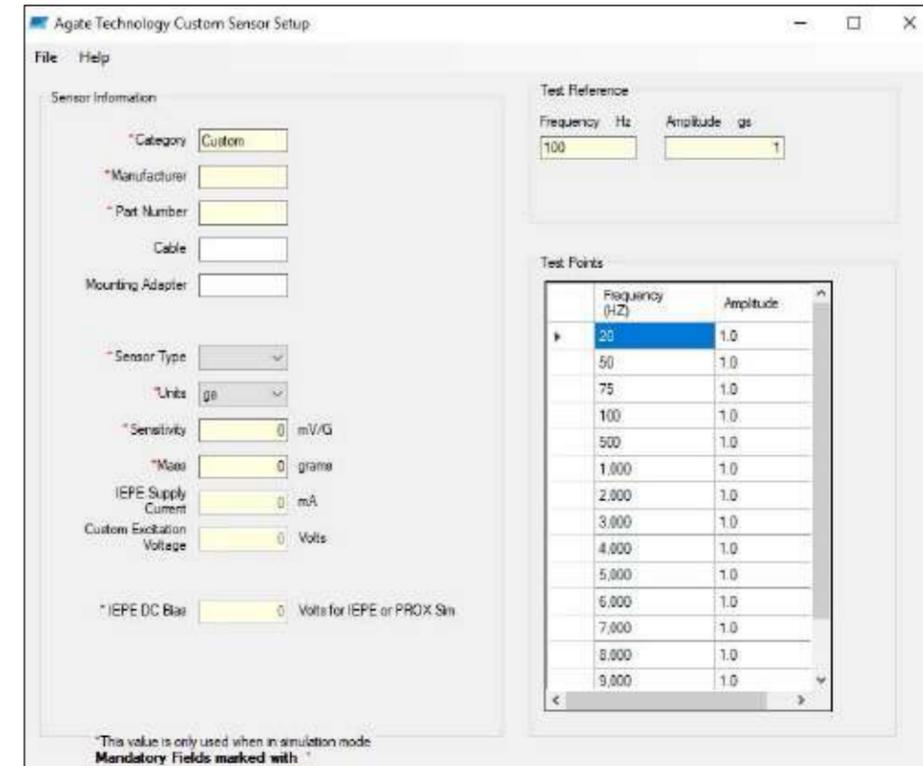


Figure 67. Custom sensor software setup screen

2. Enter the sensor information in the **Sensor Information**, **Test Reference**, and **Test Points** sections (Figure 67):
 - a. **Category** refers to the sensor type. Entries are case sensitive (e.g. CHARGE and Charge will appear as two separate categories).
 - b. **Manufacturer** refers to the manufacturer of the sensor. Entries are case sensitive (e.g. DYTRAN and Dytran will appear as two separate manufacturers).
 - c. **Part Number** refers to the designated part number for the sensor.
 - d. Fields marked with a red asterisk (*) are required fields and must be filled in.
 - e. Fields marked with a black asterisk (*) are only used in simulation mode.

NOTE: If a new entry has an identical Category, Manufacturer, and Part Number as a sensor already saved in the database, the newest entry will overwrite the original sensor.

Adding a Test Point

1. Enter the new test point values into the blank row at the bottom of the Test Points table (Figure 68).

Frequency (HZ)	Amplitude
20	2.0
50	5.0
75	5.0
100	5.0
500	5.0
1,000	5.0
2,000	5.0
3,000	5.0
4,000	5.0
0	1.0

Figure 68. Add new test point values

Frequency (HZ)	Amplitude
20	2.0
50	5.0
75	5.0
100	5.0
500	5.0
1,000	5.0
2,000	5.0
3,000	5.0
4,000	5.0
5,000	5.0

Figure 69. Select a row to delete

Deleting a Test Point

1. Select the empty cell in the column to the left of the test point you wish to delete. This will highlight the test point values in that row (Figure 69).
2. Press the **Delete** key on your keyboard to delete this row of test point values.

Sample Custom Sensor Setup:

Agate Technology Custom Sensor Setup

File Help

Sensor Information

- * Category: CHARGE
- * Manufacturer: Endevco
- * Part Number: 2215
- Cable:
- Mounting Adapter:
- * Sensor Type: CHARGE
- * Units: gs
- * Sensitivity: 47.3 mV/G
- * Mass: 28 grams
- IEPE Supply Current: 0 mA
- Custom Excitation Voltage: 0 Volts
- * IEPE DC Bias: 0 Volts for IEPE or PROX Sim

Test Reference

Frequency Hz	Amplitude gs
100	1

Test Points

Frequency (HZ)	Amplitude
20	2.0
50	5.0
75	5.0
100	5.0
500	5.0
1,000	5.0
2,000	5.0
3,000	5.0
4,000	5.0
5,000	5.0

*This value is only used when in simulation mode
Mandatory Fields marked with *

Figure 70. Example custom sensor setup

Saving a Custom Sensor

1. When finished setting up a custom sensor, select **File > Save As**.
2. Save the custom sensor file to your computer, as well as to the USB drive.
 - a. Save as type: "setup files (*.json, *.jsn)"
 - b. Name the file so that it can be distinguished from other custom sensors (*Figure 71*).

Name	Date modified	Type	Size
 Endevc0 2215	3/27/2019 11:43 AM	Adobe Acrobat D...	2 KB

Figure 71. Example of saving a custom sensor setup file to computer

Uploading a Saved Custom Sensor

1. Turn off the AT2040.
2. Insert the USB drive containing the saved custom sensor setup(s) into the USB port.
3. Turn on the AT2040.
4. Select **Test** from the main menu (*Figure 72*).

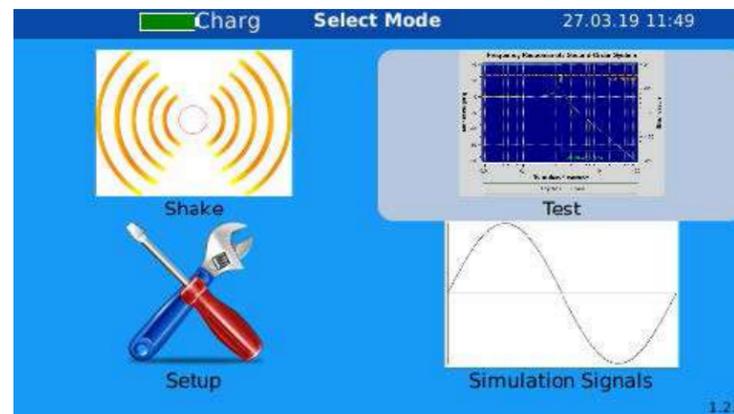


Figure 72. Choose "Test" from the main menu

5. An **Import Avail** button will appear in the bottom-left corner of the screen, indicating that an import is available from the USB drive. Select the **Import Avail** button to import the custom sensor(s) (*Figure 73*).



Figure 73. "Import Avail" appears in the bottom-left corner

6. Once the import is finished, "Import Done" will appear in the bottom-left corner, indicating that the custom sensor has been imported successfully (*Figure 74*).
7. To select an imported sensor for testing, choose the sensor type (*Figure 74*).



Figure 74. Choose sensor type after the sensor imports

8. Select the desired manufacturer from the list (Figure 75).



Figure 75. Select the manufacturer

9. Imported sensors belonging to the category and manufacturer selected will appear. Select the check box to the left of a sensor to choose it for testing (Figure 76).



Figure 76. Select the imported sensor

Deleting a Custom Sensor

1. To delete a custom sensor from the database, select the check box to the left of its part number.
2. Select the **Delete button** in the bottom-left corner (Figure 77).



Figure 77. Select the sensor to be deleted

3. The sensor will be deleted from the AT2040 database (Figure 78) and will no longer appear unless re-imported.

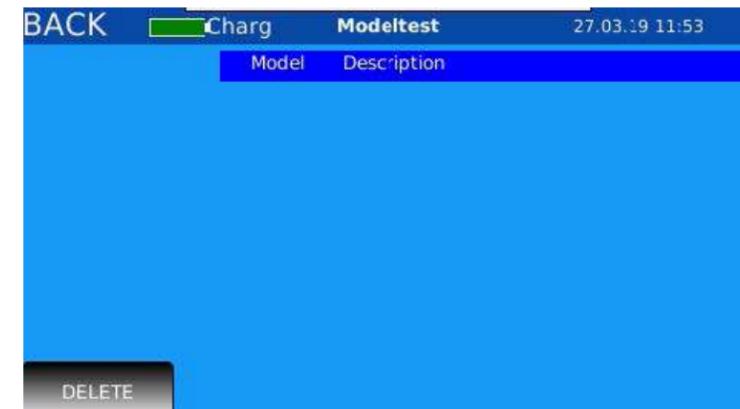


Figure 78. Imported sensor was deleted

Customizing the PDF certificate template

AT2040 can automatically generate a sensor calibration certificate. The calibration certificate can be customized to specific business branding and certification needs.

The customizable certificate template is a file written in HTML. The template file name is **seismic_cert.html**. To customize the calibration certificate contents and layout, the operator will need to download the HTML template, edit it as desired, and upload the customized template to the AT2040.

In addition to the customizable HTML file, the AT2040 supports uploading one image file for your company logo. The logo file, **logo.png**, can be added to the certificate template via the "logo" keywords (e.g. %logox1%, %logox2%). See [HTML Keywords](#) on page 62.

To customize the PDF certificate template:

1. Export the HTML template and logo image template from the AT2040 to the USB memory drive, per instructions in [Exporting and Importing PDF Certificate Files](#) on page 46.
2. Customize the HTML template file:
 - a. The HTML certificate template is made up of:
 - i. **HTML tags** which provide the structure of the certificate PDF. See [HTML Tags](#) on page 61.
 - ii. **Keywords** which AT2040 will use to populate the certificate with data. See [HTML Keywords](#) on page 62.
 - iii. **Static text** which may be added to the template, as needed.
 - b. HTML files are commonly edited in text editors, such as the default text edit application on your computer, Notepad ++, Atom, or Sublime Text. If you are new to HTML, we recommend using Adobe CC Dreamweaver, CoffeeCupHTML editor, or another visual HTML editor.
 - c. See the example HTML and keyword structures and example customized certificates on the following pages.
3. Save the customized HTML template file and your company logo file to the USB memory drive, per instructions in [Exporting and Importing PDF Certificate Files](#) on page 46.
4. Import the customized HTML template file and company logo file to the AT2040, per instructions in [Exporting and Importing PDF Certificate Files](#) on page 46.

HTML Tags

HTML tags give an HTML file its structure. Below is a list of common HTML tags you might use to customize your certificate template.

Commonly-Used HTML Tags	
<table></table>	Table
<tr></tr>	Table Row Within a Table
<td></td>	Table Data Cell Within a Table Row
<p></p>	Paragraph of Text
 OR 	Bolded Text
<i></i>	Italicized Text
<u></u>	Underlined Text
 	Line Break
 	Non-Breaking Space

Table 9. HTML tags for use in certification template

HTML Tips

1. Always make sure HTML tags are paired. An opening tag, such as **<table>**, must have a corresponding closing tag, **</table>**, at the end of the HTML element.
2. HTML tags nest within each other. Indenting nested HTML tags will help you keep track of the HTML structure. See *Figure 80* for an example of a simple HTML structure.
3. Use the non-breaking space tag, ** **, to prevent important information from breaking across lines, for example: Agate** **Technology.
4. Further customize your certificate template by adding HTML style attributes. Style attributes allow you to control the color, size, weight, and alignment (center, left, right) of text, the size of margins and padding around text, and more. Style attributes are inserted inside the opening tag (e.g. **<p>**), started with "style=", separated by semicolons (;), and contained in quotation marks ("). For example:

<p style="color: red; font-size: 125%; font-weight: bold; text-align: center; margin-top: 20px;">This is an example line of text styled in HTML.</p>

This is an example line of text styled in HTML.

HTML Keywords

Keywords are added to the HTML document where you would like the AT2040 to populate data. For example, %F1% will be populated by the AT2040 with the frequency of the first reading.

Below is a list of keywords, or data, that the AT2040 will populate as it performs an automatic test.

Keyword	Description	Other
%logox1%	Company Logo	Size = 1 times original
%logox2%	Company Logo	Size = 2 times original
%logox4%	Company Logo	Size = 4 times original
%logox8%	Company Logo	Size = 8 times original
%units%	Sensor Units	Gs, IPS, Mils, etc.
%manufacturer%	Sensor Manufacturer Name	
%sensorSerial%	Serial Number of Sensor	
%model%	Sensor Model	
%company%	Company Name	
%refSens%	Sensitivity at Reference Frequency	
%biasV%	Test Bias Voltage for IEPE Sensors, Test DC Voltage for Proximity Probes	
%shakerdate%	Calibration Date of AT2040	Not yet available
%shakerserial%	Serial Number of AT2040	
%testdate%	Calibration Date	MM DD YYYY
%RefFreqHz%	Reference Point Test Frequency	
%RefFreqRPM%	Reference Point Test RPM	
%graphx2%	Larger Graph	
%graph%	Smaller Graph	
%F1%....%F19%	Test Point Frequencies	
%S1%....%S19%	Test Point Sensitivities	
%A1%....%A19%	Test Point Amplitudes	

Table 10. Supported HTML keywords for populating the certification template

Example 1:

COMPANY: %company%		MANUFACTURER: %manufacturer%
MODEL: %model%		SERIAL #: %sensorSerial%
FREQUENCY RESPONSE		
Frequency (HZ)	Sensitivity (%units%)	
%F1%	%S1%	%graph%
%F2%	%S2%	
%F3%	%S3%	
%F4%	%S4%	
%F5%	%S5%	
%F6%	%S6%	
%F7%	%S7%	
%F8%	%S8%	
%F9%	%S9%	

Figure 79. Example HTML keyword structure in table format

Example 2A:

```

<html>
  <table>
    <tr>
      <td>COMPANY: %company%</td>
    </tr>
    <tr>
      <td>MANUFACTURER: %manufacturer%</td><td>MODEL: %model%</td>
      <td>SERIAL #: %sensorSerial%</td>
    </tr>
    <tr>
      <td><b>Frequency</b></td><td><b>Sensitivity</b></td><td><b>Amplitude</b></td>
    </tr>
    <tr>
      <td>%F1%</td><td>%S1%</td><td>%A1%</td>
    </tr>
    <tr>
      <td>%F2%</td><td>%S2%</td><td>%A2%</td>
    </tr>
  </table>
</html>

```

Figure 80. Example of a simple HTML table structure

Example 2B:

COMPANY: %company%		
MANUFACTURER: %manufacturer%	MODEL: %model%	SERIAL #: %sensorSerial%
Frequency	Sensitivity	Amplitude
%F1%	%S1%	%A1%
%F2%	%S2%	%A2%

Figure 81. HTML table resulting from sample HTML table structure shown in Figure 80 above

Example 3:

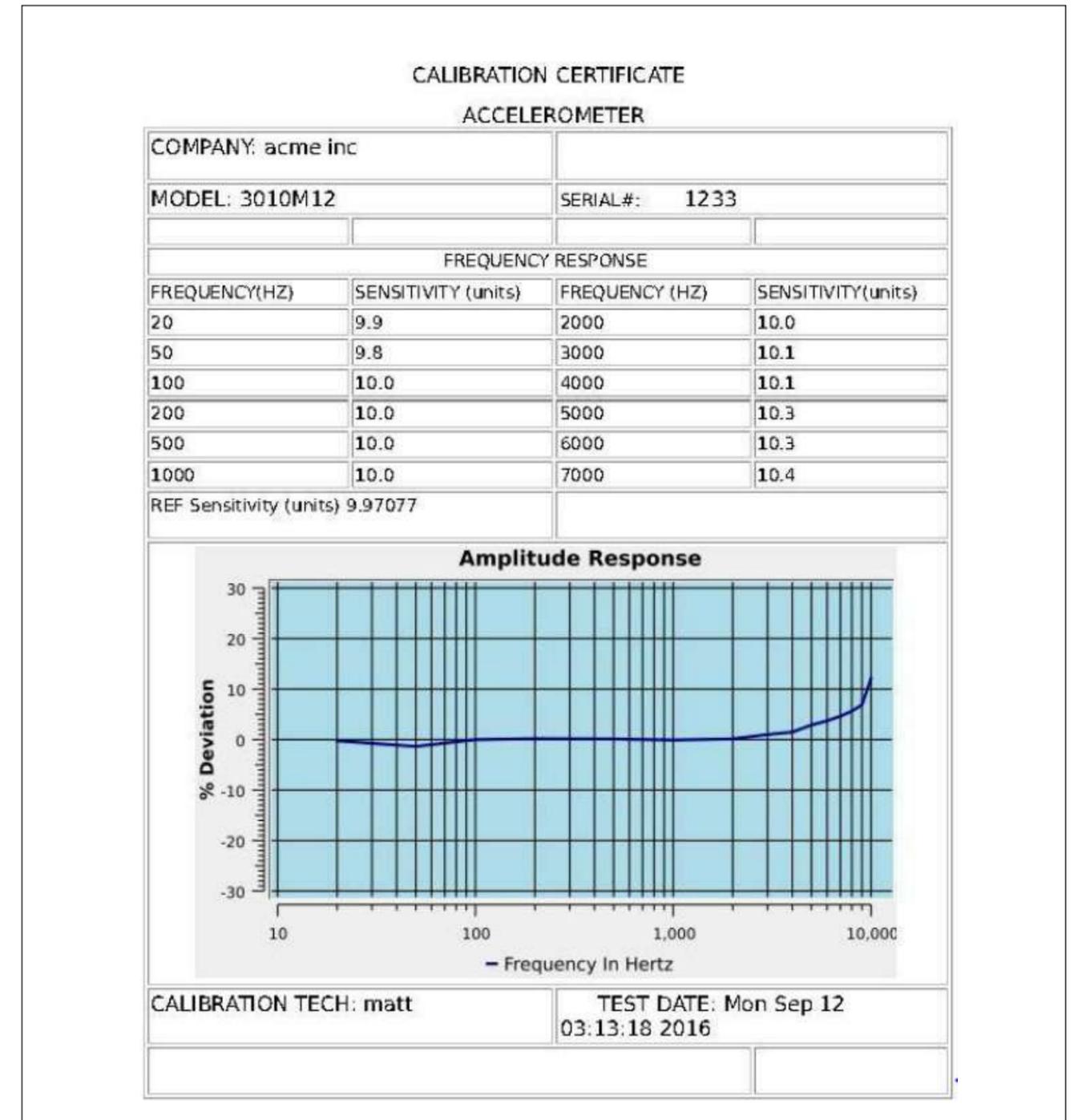


Figure 82. Custom PDF certificate example

Example 4:



Declaration of Conformity

Application of Council Directive: 2014/35/EU

Standards to which conformity is declared:	EN61010-1:2010
Manufacturer's Name:	Agate Technology
Manufacturer's Address:	41743 Enterprise Circle N, 105B Temecula, CA 92592
Equipment Description:	Vibration Sensor Test Set
Equipment Class:	Class II
Model Number:	AT-2040 (Inclusive of AT-2035 & AT-2030)

I, the undersigned, hereby declare that the equipment specified above conforms to the above Directive(s) and Standard(s):

Place:	_____	Temecula, California, USA
Full Name (Printed):	_____	Matthew Cornwell
Signature:	_____	<i>Matthew Cornwell</i>
Position:	_____	Product Manager



Figure 83. Custom PDF certificate example

Example 5:



Declaration of Conformity

Application of Council Directive: 2014/30/EU

Standards to which conformity is declared:	EN61326-1: 2013 EN55011 Class A Group 1 EN61000-4-2 EN61000-4-3 EN61000-4-4 EN61000-4-5 EN61000-4-6 EN61000-4-8 EN61000-4-11
Manufacturer's Name:	Agate Technology
Manufacturer's Address:	41743 Enterprise Circle N, 105B Temecula, CA 92592
Equipment Description:	Vibration Sensor Test Set
Equipment Class:	Electrical Equipment Measurement Control & Laboratory Use – Industrial
Model Number:	AT-2040 (Inclusive of AT-2035 & AT-2030)

I, the undersigned, hereby declare that the equipment specified above conforms to the above Directive(s) and Standard(s):

Place:	_____	Temecula, California, USA
Full Name (Printed):	_____	Matthew Cornwell
Signature:	_____	<i>Matthew Cornwell</i>
Position:	_____	Product Manager



Figure 84. Custom PDF certificate example

Product maintenance

AT2040 Recalibration

Recalibration is recommended once per year.

Battery

Battery life averages five years. We will replace the battery for free, as needed, during recalibration. The battery can only be replaced at the Agate Technology factory. Third-party attempts to replace the battery will void the two-year limited warranty.

Service Notes

Service Performed: Recalibration Battery Replaced Date: _____

Operator notes

A2LA accreditation



Figure 85. A2LA accredited laboratory certification for Agate Technology



AGATE TECHNOLOGY LLC

41743 Enterprise Circle N. 105B
Temecula, CA 92590

For the latest product news and insights, visit our website at [agatetechnology.com](https://www.agatetechnology.com).

For more information, call Agate Technology at 951-719-1032
or email us at info@agatetechnology.com.

 [youtube.com/agatetechnology](https://www.youtube.com/agatetechnology)

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