AT2030

Portable Vibration Calibrator

Operator Manual

agatetechnology.com | 951-719-1032

AT2030
Released 08/16/2024

Table of Contents

Introduction

This manual is intended to inform the operating user on product specifications, setup, troubleshooting, and operation procedures for the AT2030. This shaker is designed to be a rugged, completely self-contained, battery-powered, vibration sensor test set. The shaker 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 AT2030, call us at 951-719-1032 or email us at help@agatetechnology.com. Training webinars are also available; contact technical support for more information.

2-Year Limited Warranty

Agate Technology LLC warranties 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 ⚠

- The shaker is designed for vertical use. Operating in the horizontal position is possible as the shaker 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 shutdown, 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 shaker.

Released 08/16/2024

Primary functions

1. **Shake or excite a transducer under test**
   In shake mode, the AT2030 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.

2. **Verify Control Room Validity**
   By comparing vibration signals sent to the control room, the user can determine if there is a machinery error.

3. **Test Wiring and Connections**
   Using methods similar to testing control room equipment, the user may also input a known good signal to cabling and connectors. The result on the other end of the connection should be the same as AT2030.

Maximum weight recommendations

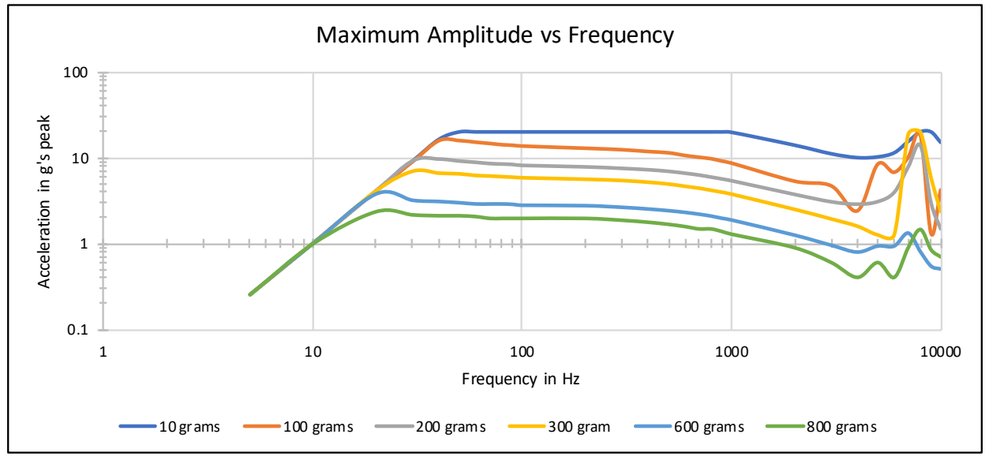

Figure 1. *Maximum weight recommendations in grams*

Battery operation

The shaker is powered by one 6 amp hour lithium iron phosphate ($LiFePO_4$) 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 shaker uses approximately 0.4 amps of power making it possible to achieve 13 hours of battery power. However, the shaker will shut down premature to full discharge preventing damage and ensuring long-term battery life.

During long periods of high power consumption, the shaker 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.

The shaker 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 shaker is powered off.

NOTES:

- Charging time is 1 hour.
- For best results use the shaker 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.
- The battery lifespan is 5,000 cycles at 80% depth of discharge, or up to 10 years.

LiFePO4 Batteries vs Lead-Acid Batteries:

- Are safer, compact, lightweight, and have a greater capacity and longer lifespan.
- Can tolerate temperature extremes and rough conditions.
- Are more structurally stable which means that they are much safer; they will not overheat and, even if mishandled or accidentally punctured, they will not explode or catch fire.
- Are also a better choice for the environment as they are non-toxic, do not contain rare earth or toxic metals, and their components—many of which are recyclable—will not leech into the soil or ground water if improperly disposed.

AT2030 Specifications and performance

Performance		
Frequency Range (operating) [1]	5 Hz to 10,000 Hz	300 to 600,000 RPM
Maximum Amplitude (100 Hz, with no payload)	20 g pk 15 in/s pk 50 mils p-p	196 m/s² pk 380 mm/s pk 1270 µm p-p
Maximum Payload [2]	800 grams	

Vibration Signal Accuracy	
Acceleration (5 Hz to 9 Hz)	±3.2 %
Acceleration (10 Hz to <5 kHz)	±2.2 %
Acceleration (5 kHz to 10 kHz)	±3.0 %
Displacement (30 Hz to 150 Hz)	±2.2 %
Amplitude Linearity (100 gram payload, 100 Hz)	<1 % up to 10 g pk
Waveform Distortion (100 gram payload, 30 Hz to 2 kHz)	<1 % THD (typical) up to 5 g pk

Physical		
Sensor Connectors	N/A	
Display	4.3" TFT LCD with 480×272 resolution	
Controls	2 dials with touch screen	
Dimensions (H × W × D)	10.6 × 9.7 × 6.9 in	27 × 24.6 × 17.4 cm
Weight	14.4 lb	6.5 kg
Sensor Mounting Platform Thread Size	¼-28	
Operating Temperature	32–122 °F	0–50 °C
Agency Requirements and Certifications[4]	A2LA Accredited NIST Traceable EMC:EN61326-1 LVD:EN61010-1 ISO/IEC17025:2017 RoHS Z540	

Readout		
Acceleration	g pk m/s² pk	g RMS m/s² RMS
Velocity	mm/s pk in/s pk	mm/s RMS in/s RMS
Displacement (peak to peak)	mils p-p	µm p-p

Power		
Internal Battery	12 V DC	6 amp hours
Battery Type [3]	LiFePO4	
Battery Charge Time	1 hour	
Battery Life Expectancy	5,000 cycles @ 80% depth-of-discharge, or 10 years	
AC Power (for recharging battery)	100–240 V, 50–60 Hz, internal, standard plug	
Operating Battery Life 100 gram payload, 100 Hz 1 g pk 100 gram payload, 100 Hz 10 g pk	 10 hours 1 hours	
Charger Type	Internal / Built-in	
Plug Type	Standard PC Wall Plug	

Accessories		
Included Accessories	• Power cable • 2-56 adapter • ¼-28 stud • 2-56 UNC adapter • Universal Velocity Adapter Disc • Universal Accelerometer Adapter Disc	• Short-handle wrench • 10-32 UNF stud • 6-32 UNC adapter • 10-32 UNF adapter • USB drive:
Optional Accessories [4]	• 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] See ***Figure 1***, Maximum Amplitude vs Frequency chart, on page 6 for maximum weight recommendations. Limited at lower frequencies to 0.1 inch (2.54mm) Peak displacement.

[3] Lead-acid battery is an available option.

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

Accessories

Description	Part No.	Qty
Short-Handle Aluminum Wrench	ACC-100	1
5/32 Hex L-Wrench	ACC-101	1
¼-28 Stud	MNT-104	1
¼-28 to 10-32 Stud	MNT-105	1
¼-28 to 2-56 Adapter	MNT-106	1
¼-28 to 6-32 Adapter	MNT-107	1
¼-28 to 10-32 Adapter	MNT-111	1
Universal Velocity Mounting Adapter with ¼-28 Mounting Hex Screw	MNT-112	1
Universal Accelerometer Mounting Adapter with ¼-28 Mounting Hex Screw	MNT-113	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 1. *Standard accessories*

Description	Part No.	Qty
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): ¼-28, 10-32; Adapters: 2-56, 6-32, 10-32	MNT-100	1
¼-28 Adapter	MNT-108	1
Mounting Stud ¼-28 to 8-32	MNT-109	1
Adapter ¼-28M to ⅜-24F	MNT-110	1
Proximity Probe Adapter Kit	PRX-100	1
Proximity Probe Proximity Adapters M6 to ⅜	PRX-101	1
Steel Target (4041)	PRX-102	1

Table 2. *Optional accessories*[1]

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

Instrumentation and control system

The shaker consists of an internal charger, battery, main power amplifier, electrodynamic shaker, NIST-traceable reference accelerometer, internal computer, signal generation board, and LCD display screen (*Figure 2*).

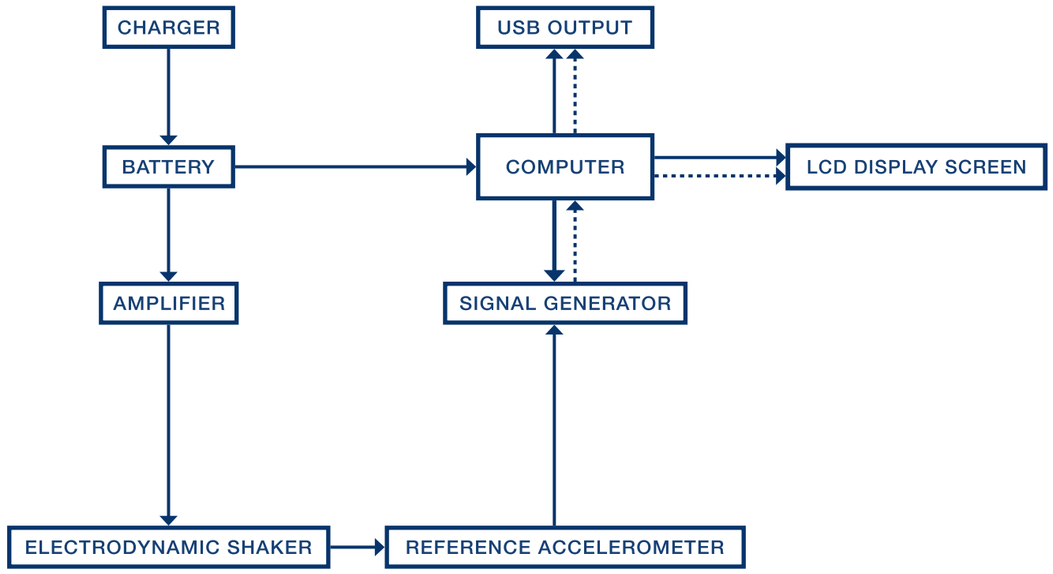

Figure 2. *Block diagram*

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

Battery: 6 amp hour sealed lithium iron phosphate rechargeable battery.

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.

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

Signal Generation Board: Consists of multiple amplifiers and channels selectable by internal relays.

- **Power Amplifier Output:** Controls the vibration of the electrodynamic shaker at the amplitude and frequency set by the user.

LCD Display Screen: Color 4.3″ LCD 480×272 resolution display with resistive touchscreen.

Released 08/16/2024

AT2030 physical overview

See *Figure 3*:

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 480×272 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 to the Setup Menu screen.

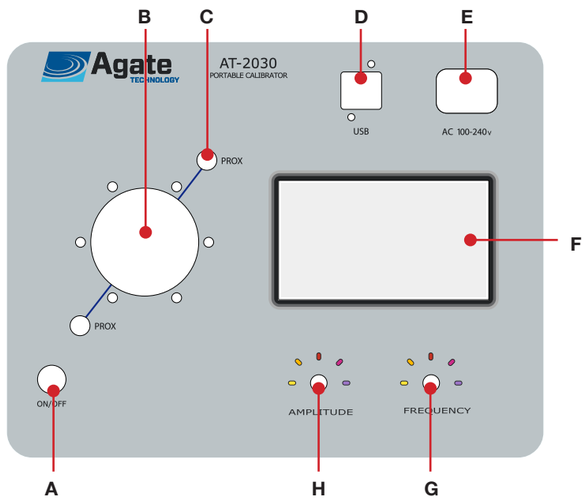

Figure 3. *Physical diagram of the AT2030*

Software Update Installation

AT2030 features software update support to load in sensor information, custom databases, bug fixes, software add-ons, and more. To update your unit to the most current software:

1. Plug the included USB drive into your laptop or computer.
2. Download the update file from **agatetechnology.com/upgrades** and save it to the USB drive.
3. Power the shaker off. Then, plug the USB drive into the shaker.
4. Turn on the shaker and wait for the upgrade prompt.
5. Select "Yes" to upgrade and the software will begin to unpack and install.
6. When the update is complete, remove the USB drive and the AT2030 will automatically restart.

Operation instructions

Powering the shaker on and off:

- Press and hold the red **On/Off button** for 1 second. The shaker 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 shaker has powered down.

Navigating the Shaker Interface

The shaker's two screens, Shake and Setup may be navigated using the touchscreen, the two knobs on the front panel, or a combination of these two methods.

Menu	
Main Menu Screen	**Submenu Screens Available**
Shake Button	• Run Manual Shake Screen
Setup Button	• Previous Test List / Export PDF or CSV to USB Screen • Location / Time Setup Screen • Network Configuration Screen • Import / Export Certification Template Screen • Unit Configuration Screen • Unit Information Screen

Table 3. *Menu and submenus*

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 to the Setup Menu 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 AC key on the number pad to reset the current entry.
2. Tap the ✓ key on the keyboard or the OK 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 EXIT 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 Screen

The shaker can be use 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. The frequency and amplitude are set manually by the operator, while the computer provides high-accuracy measurement signals.

1. Power on the shaker. The Shake screen will load after the startup sequence.
2. Select your sensor and mount it to the ¼-28 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 Screen Overview

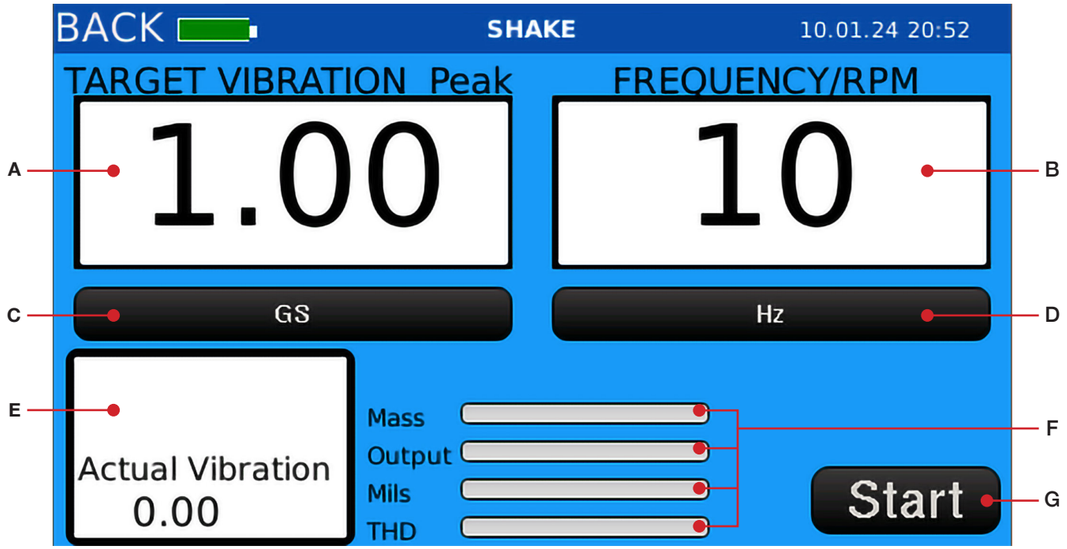

Figure 4. *Shake mode screen*

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. **Shaker Output Information:**

- **Mass:** Automatic mass payload calculation. The shaker uses this value to automatically calculate mass loading correction.
- **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 on the Shake Screen

1. To begin the test (*Figure 4*):
   a. 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**
   b. Tap the **Start button** on the touchscreen to begin the test.

During the test the amplitude and frequency may be adjusted (*Figure 4*).

2. To adjust the amplitude:
   a. Turn the amplitude knob, **OR**
   b. Tap the amplitude display on the touchscreen to bring up the number pad and input the desired amplitude.
3. To adjust the frequency:
   a. Turn the frequency knob, **OR**
   b. 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 4*):

4. Tap the **Units button** to toggle though the available units for the amplitude display: gs, IPS, UM, MM, MILS, MMS, and MSS.
5. Tap the **Hz/RPM button** to toggle between the available units for the frequency/RPM display: Hz and RPM.
6. Tap the **Stop button**, or use the frequency knob to select it to conclude the test.
7. 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 distortion compensation algorithm. The status of Purewave is indicated by the color of the Reference data point (*Figure 4*):

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

Conducting a Linearity Test

1. Tap the **Start button** on the touchscreen to begin the test.
2. Turn the amplitude knob go through the desired amplitudes.
3. Tap the **Stop button** to conclude the test.

Calibrating Accelerometers and Proximity Probes (External Equipment Needed)

The AT2030 can be used to calibrate IEPE and charge accelerometers, triaxial sensors, and proximity probes with the use of external equipment, such as a data collector or meter.

1. Mount the sensor.
2. On the Shake screen, tap the **Start button** to begin the test.
3. Select the g level and amplitude, depending on the sensor/application.
4. Tap the **Stop button** to conclude the test.

Calibrating Proximity Probes (Optional Accessory; External Equipment Needed)

Proximity Probe Kit Contents

Figure 5. *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	⅜" Clamp	1	PRX-103
	¼" 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 4. *Proximity probe adapter kit contents*

Installing the Proximity Probe Kit

To assemble and install the proximity probe kit (*Figure 66*):

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.

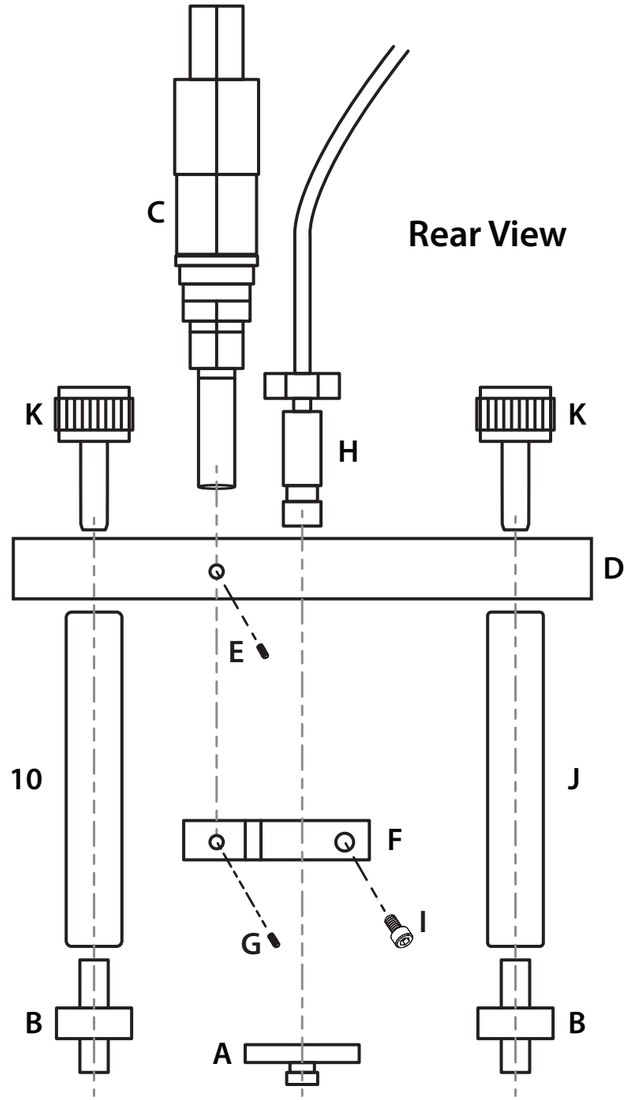

Figure 6. *Rear view of the proximity probe kit installation*

Choosing Between a Dynamic and Linear Test

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 shaker.

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 20.
2. Connect the proximity probe driver to a multimeter and connect the multimeter to an external power supply.
3. Adjust the probe to 10 mils from the target.
4. 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.
5. Start by filling in "Test 1" data in the Excel spreadsheet at cell 6C (yellow cell in *Table 5*).
6. Rotate the spindle to 20 mils and record the voltage in cell 7C (green cell in *Table 5*).
7. 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 5*).
8. Calculate the voltage change by using the spreadsheet to fill in test points H6–H14 ("ISF Test 1 mV/mil" column in *Table 6*).

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 5*).

9. Log and analyze data by looking for the linear relation between travel and voltage.
10. Locate the ISF and measurement tolerance printed on the proximitor and housing. For example, 200 mV over 10 mil-increments results in 2 volt (200 millivolt) changes.
11. Compare the ISF on the driver housing to the results of your test ("ISF Test 1" or "ISF Test 2" columns in *Table 6*).

NOTE: Example test data is provided in the two "EXAMPLE" columns in *Table 5* and *Table 6*.

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 5. *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 6. *ISF data auto-populates based on test data*

Conducting a Dynamic Test

During a dynamic (AC) test, the shaker 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.

1. Connect volt meter set to DC voltage in line with proximity driver signal.
2. 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)

3. Determine the exact voltage at the center of the linear range, using the recommended gap setting and the following formula:[2]

(recomm. gap setting in mils*0.2)-1 = volts DC [(50*0.2)-1 = –9 volts]

4. **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).

5. Determine the exact voltage at the center of the linear range, using the following formula:[4]

((range/2+10)*0.2)-1 = volts DC [((80/2+10)*0.2)-1 = –9 volts]

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

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

6. Assemble and install the proximity probe kit, per instructions in **Installing the Proximity Probe Kit** on page 20.
7. Locate the gap voltage on the DC volt meter. The gap voltage is the DC voltage measurement from the probe/driver and is shown as a negative value.

Setup Menu Screen

Press the Amplitude (left) knob to open the Setup menu. The Setup menu consists of four submenus to accommodate user preferences (*Figure 7*):

1. **Clock:** Set date, time, location.
2. **Network:** Set up the wireless network.
3. **Unit Configuration:** Set company name, change the vibration units, or reconfigure the touchscreen.
4. **Unit Info:** View the shaker serial number, firmware and FGPA version, and more information.

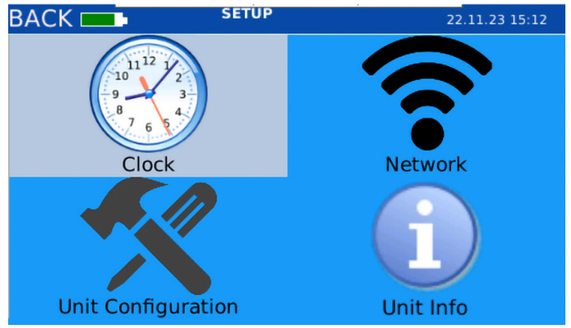

Figure 7. *Setup menu screen*

Adjusting Date and Time Zone

1. In the Setup menu, select **Clock** (*Figure 8*).

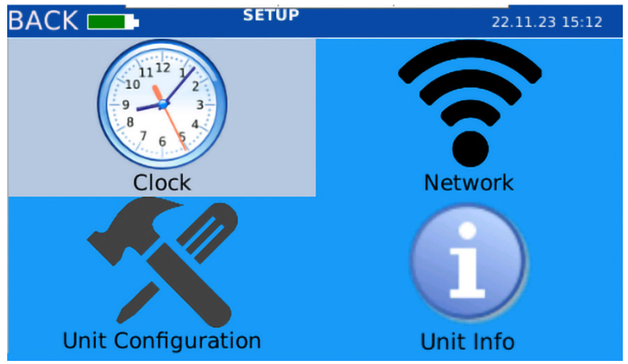

Figure 8. *Select "Clock"*

2. Adjust the time, date, and location, as needed (*Figure 9*).

Figure 9. *Set time, date, and location*

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

Network Setup

1. In the Setup menu, select **Network** (*Figure 10*).

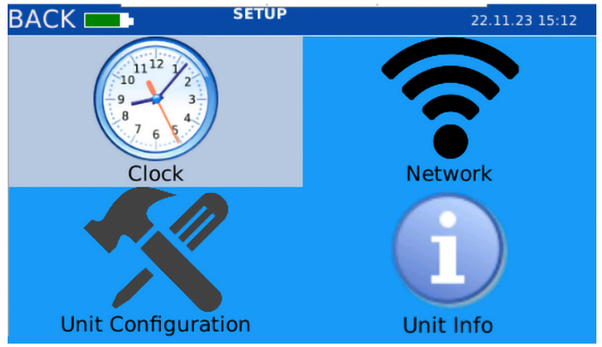

Figure 10. *Select "Network"*

2. Select the **ESSID field** and enter the identifying name of your wireless network (*Figure 11*).

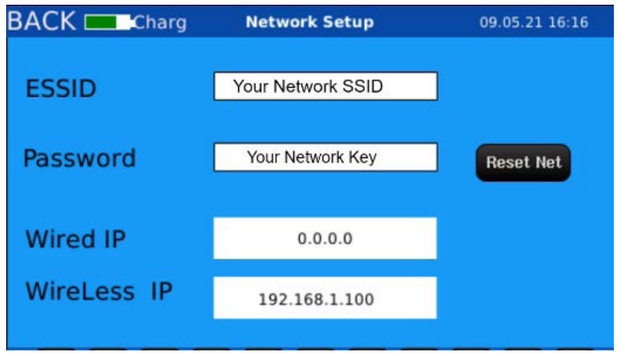

Figure 11. *Enter wireless network credentials*

3. Select the **Password field** and enter the wireless network password (*Figure 11*).
4. Select the **Reset Net button** to reset the network.

Unit Configuration

1. In the Setup menu, select **Unit Configuration** (*Figure 12*) to open the configuration screen (*Figure 13*).

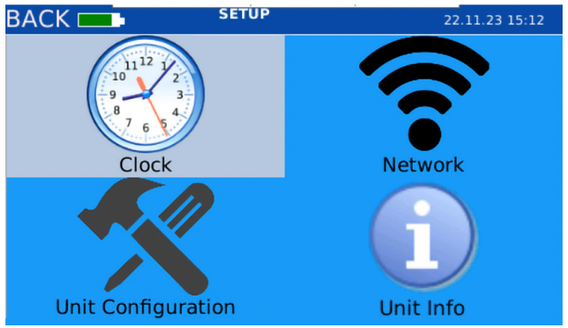

Figure 12. *Select "Unit Configuration"*

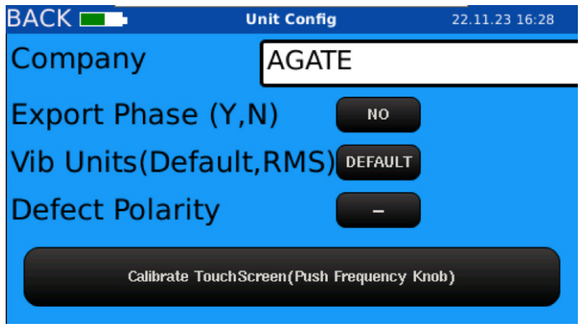

Figure 13. *Unit configuration screen options*

Change the Company Name

1. On the Unit Configuration screen, select the **Company field** and enter the company name (*Figure 13*).

Calibrate the Touchscreen

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

1. On the Unit Configuration screen, select the **Calibrate TouchScreen button** (*Figure 13*).
2. Follow the prompts on the screen to complete the calibration.

Toggle Vibration Units

Toggle the shaker's output between default and RMS units.

1. On the Unit Configuration screen, select the **Default button** next to Vib Units (*Figure 14*) to switch to the default units (*Figure 15*).

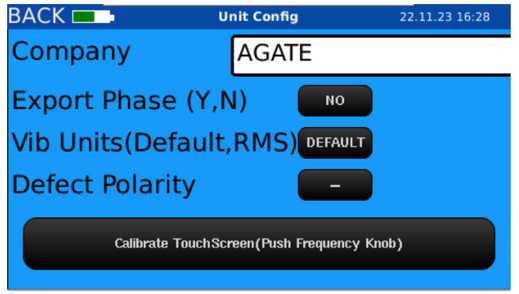

Figure 14. *Unit configuration screen*

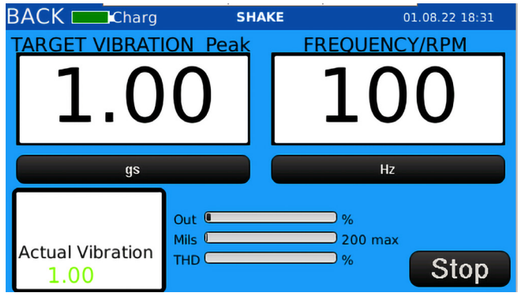

Figure 15. *Default units showing on Shake Screen*

2. Select the **RMS button** next to Vib Units (*Figure 14*) to choose RMS units (*Figure 16*).

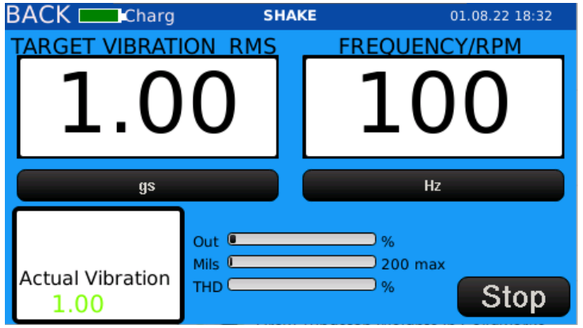

Figure 16. *RMS units showing on Shaker Screen*

Unit Info

1. In the Setup menu, select **Unit Info** (*Figure 17*).

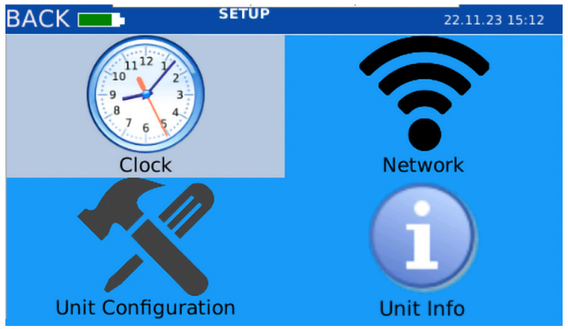

Figure 17. *Select "Unit Info"*

2. The following information is displayed on the Unit Information screen (*Figure 18*):
   a. **FW Version:** Firmware version
   b. **Unit Serial #:** Unit serial number
   c. **Calibration Date:** Last factory calibration date
   d. **FGPA Version:** FGPA version
   e. **Battery Type:** SLA (sealed lead acid) or LiFePO4 (lithium iron)
   f. **Battery Volts:** Battery voltage
   g. **Ref BIAS Volts:** Internal reference bias voltage. Used for determining any drift in the reference accelerometer's DC bias voltage. The first unit is the measured voltage at calibration, the second unit is the measured value at time of calibration. NOTE: If no measurement was taken at the time of calibration the second unit will show a value of “00”.

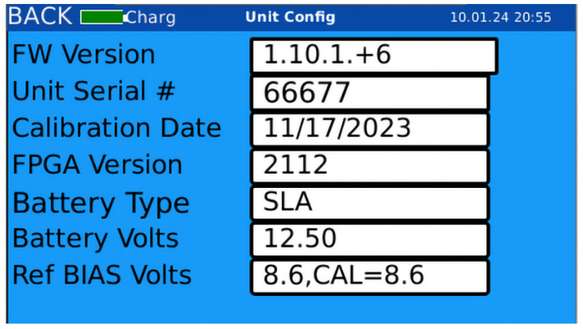

Figure 18. *Unit information screen*

Controlling the shaker remotely

The shaker 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 19*): https://www.realvnc.com/en/connect/download/viewer.

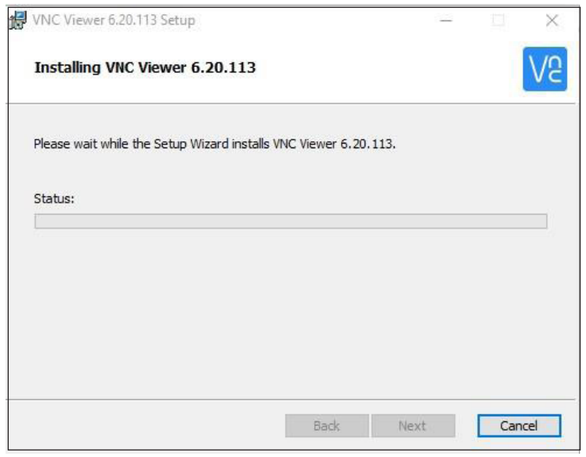

Figure 19. *Install VNC Viewer*

2. Start the VNC Viewer (*Figure 20*).

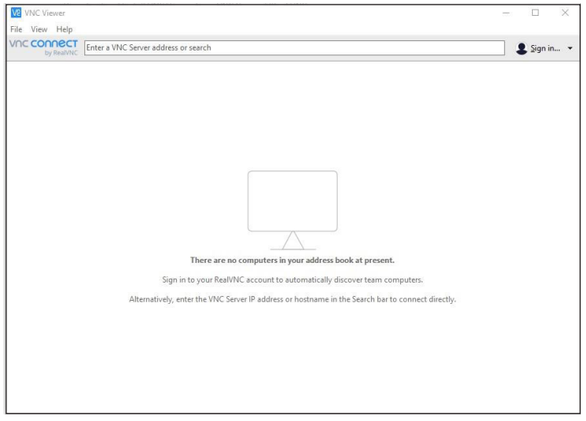

Figure 20. *Open VNC Viewer on computer*

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 21*).

c. Enter the wireless network password in the **Password field** (*Figure 21*).

d. Plug a wireless network adapter into one of the USB ports and restart the shaker.

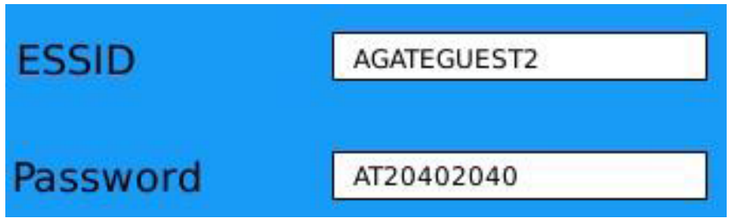

Figure 21. *Enter wireless network configurations*

4. Locate the shaker's IP address ("Wired" or "Wireless", depending on your setup) in the Network submenu (*Figure 22*).

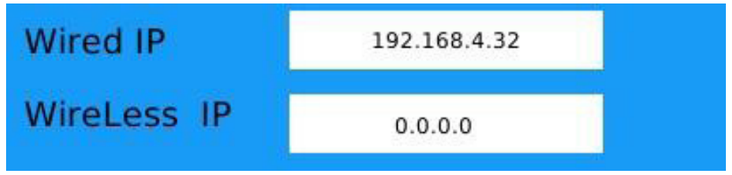

Figure 22. *Locate device IP address*

5. Select **File** > **New Connection** from the VNC Viewer menu.

6. Enter the shaker's IP address in the **VNC Server field** to complete the login setup (*Figure 23*).

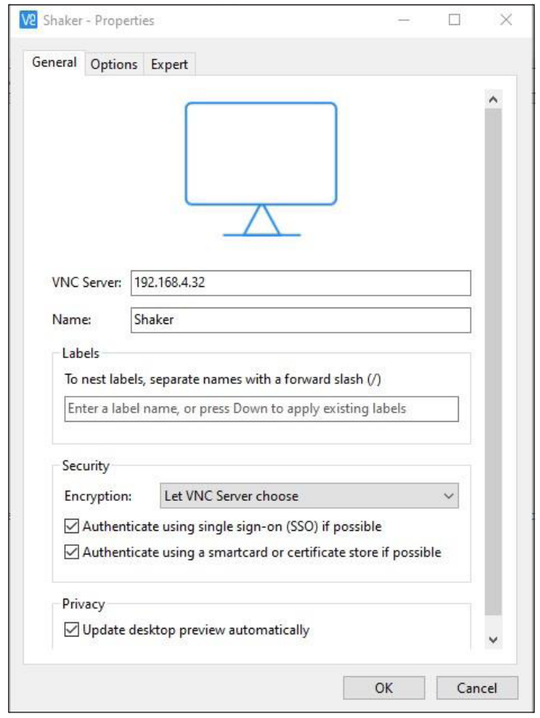

Figure 23. *Enter IP address and name*

7. Enter an identifying name in the **Name field**, such as "AT2030" or "Shaker" (optional).

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

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

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

Product maintenance

Shaker 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: _____

Service Performed: ☐ Recalibration ☐ Battery Replaced Date: _____

Service Performed: ☐ Recalibration ☐ Battery Replaced Date: _____

Service Performed: ☐ Recalibration ☐ Battery Replaced Date: _____

Service Performed: ☐ Recalibration ☐ Battery Replaced Date: _____

Service Performed: ☐ Recalibration ☐ Battery Replaced Date: _____

Operator notes

A2LA accreditation

ilac-MRA A2LA

Accredited Laboratory

A2LA has accredited

AGATE TECHNOLOGY

Temecula, CA

for technical competence in the field of

Calibration

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories*. This laboratory also meets R205 – Specific Requirements: Calibration Laboratory Accreditation Program. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated April 2017*).

American Association for Laboratory Accreditation CORPORATE SEAL 1978 DISTRICT OF COLUMBIA A2LA

Presented this 30th day of July 2021.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 6156.01
Valid to June 30, 2023

For the calibrations to which this accreditation applies, please refer to the laboratory's Calibration Scope of Accreditation.

Figure 24. *AL2A accredited laboratory certification for Agate Technology*

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For the latest product news and insights, visit our website at **agatetechnology.com**.

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

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AT2030
Released 08/16/2024