



SonicFinder1000

Acoustic Pipe Locator User Guide

(English Edition)

Version 1.0

January 2025

P/N: SF1000/SF1001



www.solinastechnologies.com

111, 2966 Main Street SE
Airdrie, Alberta, Canada
T4B 3G4

Phone: +1 (587) 885-7832

Contents

1.	Introduction	1
1.1	Overview of the SonicFinder1000.....	1
1.2	Main Component Features	2
1.3	Device Registration.....	2
2.	Safety Information	3
2.1	General Safety Warnings	3
2.2	Rechargeable Battery Information.....	3
2.3	Regulatory and Compliance Information	5
3.	System Overview.....	6
3.1	SF1000 Acoustic Actuator Unit	6
3.2	SF1001 Acoustic Sensor Unit.....	7
3.3	Other Parts Included.....	8
3.3.1	RF Antenna	8
3.3.2	Small Screw-in Spike	8
3.3.3	Large Screw-in Spike.....	9
3.3.4	XL Screw-in Spike	9
3.3.5	18V Lithium-ion Battery.....	10
3.3.6	18V Lithium-ion Battery Charger	10
3.3.7	SF1001 12V Charger.....	11
3.3.8	Carrying Case.....	12
4.	Device Controls	12
4.1	Top Bar Icons.....	12
4.2	SF1000 Keypad and LEDs.....	13
4.3	SF1001 Keypad and LEDs.....	14
4.4	Pairing the SF1000 and SF1001	15
4.5	Attaching SF1000 Ground Spikes	16
4.6	Setting the Time Zone	18
4.7	Setting the IR Threshold	19

4.8	Setting Gain	20
4.9	Setting Frequency.....	21
4.10	Viewing the Firmware Version	22
5.	Operating Instructions	23
5.1	Setting up the SF1001	23
5.2	Taking Measurements	24
5.3	Pipe Location Process.....	25
5.4	Frequency Scan.....	26
6.	Troubleshooting	28
7.	Maintenance and Storage.....	28
8.	Product Support.....	28

1. Introduction

1.1 Overview of the SonicFinder1000

Untraceable plastic pipe presents a difficult and potentially dangerous challenge for utilities and their service providers. Historic solutions often relied on intrusive methodologies, access to the interior of pipeline assets, or private premises. Many previously available products simply do not work reliably, or if they do work, they are prohibitively costly or labor intensive.

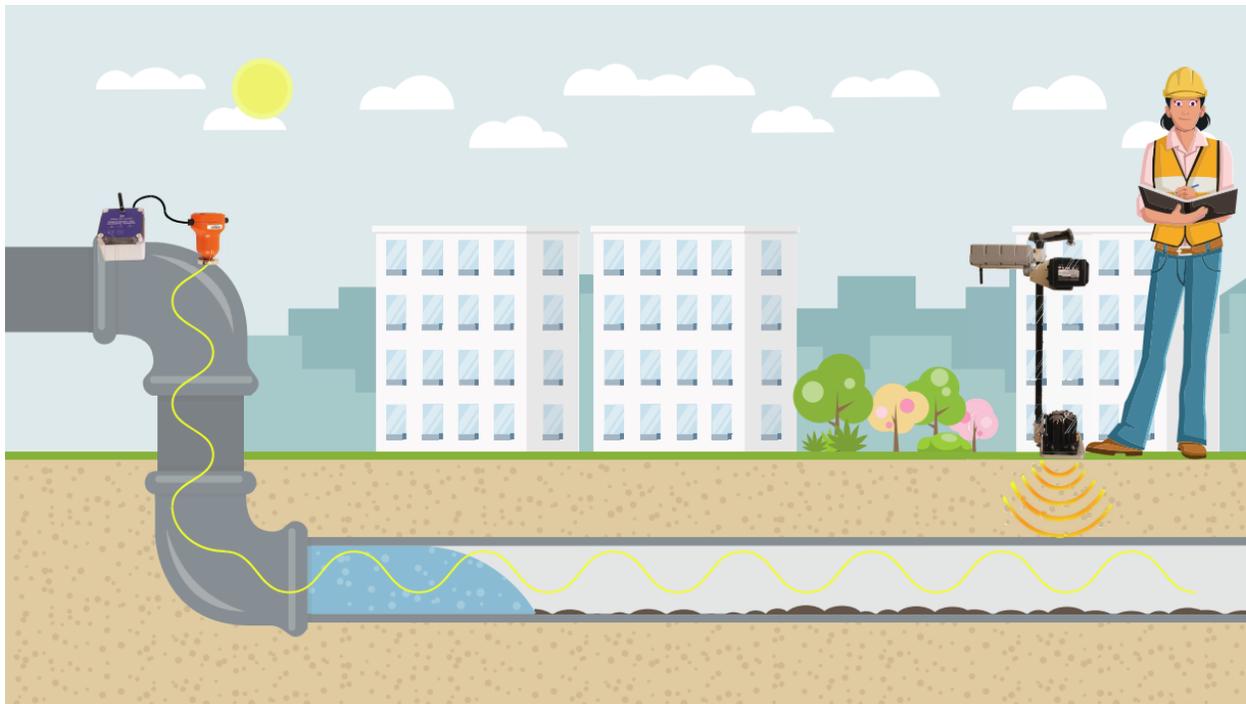


Figure 1. Diagram of the SonicFinder1000 system in use

Solinas Technologies has developed a new approach to this problem that can dramatically improve the management of plastic pipes. The SonicFinder1000 locates hard-to-find underground infrastructure rapidly and reliably.

The handheld SonicFinder1000 plastic pipe locator utilizes advanced patented acoustic sensing to locate buried plastic services rapidly. A large LCD display and a bright LED bar gauge provide immediate feedback to the operator when scanning the terrain. Power is provided through removable standard equipment batteries, allowing for quick field

changes and extended workdays. All of this is realized without accessing the pipe asset's interior.

1.2 Main Component Features

SF1000 Acoustic Actuator: Emits sound waves for the SF1001 Acoustic Sensor to detect

USB Port - Allows for field-upgradable firmware

GPS - High sensitivity receiver provides accurate time and location data (Not currently enabled for geolocation)

Low Power Radio Transceiver - Allows for communication between the SF1000 Actuator and SF1001 Sensor modules

LCD - Backlight 128*64-pixel graphical screen; displays details for pipeline location

Li-ion Batteries - 18V dual batteries allow the unit to last throughout an entire day 4-5 hours of locating per battery set of locating; easy to swap out in the field

Keypad - Simple interface for users to interact with the device

Proximity Sensor - Detects a finger in front of the sensor; used to control acoustic output; Cancel button is an alternative method for engaging actuator

Construction - Easily carried in the field at 13.2lbs

SF1001 Acoustic Sensor: Detects the acoustic output emitted from the SF1000 Acoustic Actuator

Construction - Lightweight construction, weighing in at just 2.4lbs

USB Port - Allows for field upgradable firmware

Radio - Allows for communication between the SF1000 Actuator and SF1001 Sensor modules

Charging Port - 12V barrel connector

Li-ion internal battery; charge lasts multiple days

Keypad - Simple interface for users to interact with the device

1.3 Device Registration

Visit <https://solinastechnologies.com/product-registration/> to register your device. Once registered, firmware updates and additional documentation will be available.

2. Safety Information

2.1 General Safety Warnings

- Always wear appropriate personal protective equipment (PPE) such as gloves, safety boots, and a hard hat.
- Keep the device away from live electrical wires to prevent electric shocks.
- Do not use the device near flammable materials or in environments with explosive gases.
- Follow all local safety regulations and standards when working near underground utilities.
- Use your company's or other applicable safety codes and rules when using this equipment.
- Unless you have the required authorization, license, and appropriate training, do not connect to any pipe, cable, or conductor.
- The equipment should not come in contact with corrosive or hazardous chemicals, gases, or dust.
- Do not open the enclosures (housings) of the SF1000 or SF1001.
- Only use the equipment following the instructions provided.

2.2 Rechargeable Battery Information

The Lithium-Ion batteries used in Solinas Technologies' products meet the required safety standards and include the designated protection circuitry.

Recent regulation changes require that Lithium-Ion batteries be transported in packaging with specified warning labels. For more details, please contact Solinas Technologies Customer Service (+1 (587) 885-7832).

Regulations have also changed regarding the shipping of spare battery packs (battery packs that are not inside a product). The package's weight is limited, and the packaging must be marked with the appropriate warning labels. Please contact Solinas Technologies Customer Service (+1 (587) 885-7832) for more details.

Solinas Technologies' products using Lithium-Ion batteries are classified as "not restricted" and can be shipped by road, rail, sea, and air (passenger and freight aircraft) without restrictions.

IMPORTANT

Batteries contain dangerous chemicals. They can be affected by many things, such as water ingress or heat. In some circumstances, they can explode. They also can cause electric shocks.

2.3 Regulatory and Compliance Information

FCC / IC NOTICES

This product contains FCC ID: OJM-HUMA-900 / IC: 5840A-HUMA900.

This device complies with Part 15 of the FCC rules and Industry Canada license-exempt RSS standards. Operation of this device is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. this device must accept any interference received, including interference that may cause undesired operation.

This equipment is designed to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Any modifications, including the use of antennas other than those provided by Solinas, could void the user's authority to operate the equipment.

3. System Overview

The SonicFinder1000 system consists of a portable acoustic actuator and a separate acoustic sensor. These primary components are linked via RF technology at the factory, and additional supporting parts are shipped in the hard carrying case with them.

3.1 SF1000 Acoustic Actuator Unit

The acoustic actuator unit is the handheld component of the SonicFinder1000 plastic pipe locator system. It emits acoustic output to locate the pipe and displays the acoustic results returned from the remote receiver.



Figure 2. Side view of the SF1000



Figure 3. Top view of the SF1000

3.2 SF1001 Acoustic Sensor Unit

The acoustic sensor component of the SonicFinder1000 plastic pipe locator system is mounted on an exposed portion of the plastic service line, attached water meter, or hydrant. This component contains a geophone designed to pick up the acoustic output from the SF1000 handheld unit. Reading results are transmitted via radio to the hand-held unit's display screen. The SF1001 is powered by an internal rechargeable battery, which can be charged using the 12V charger.



Figure 4. SF1001 unit

3.3 Other Parts Included

3.3.1 RF Antenna

Two antennas are included in the package to attach to the SF1000 and SF1001 for radio communication.



Figure 5. RF antenna

3.3.2 Small Screw-in Spike

Small spikes are provided to attach to the bottom of the SF1000. These ensure better ground contact on hard surfaces such as concrete or asphalt. There are three included in the package.



Figure 6. Three small spikes for the base of the SF1000

3.3.3 Large Screw-in Spike

The package includes one larger spike to attach to the bottom of the SF1000. It ensures better ground contact when deployed in soft soils and surfaces.



Figure 7. Large spike for the base of the SF1000

3.3.4 XL Screw-in Spike

An extra-large spike is included to attach to the bottom of the SF1000 for use in soft soils when the contact provided by the large spike is insufficient.



Figure 8 Extra-large spike

3.3.5 18V Lithium-ion Battery

Batteries for the SF1000 hand-held unit are provided. There are two included in the package.



Figure 9. 18V batteries to power the SF1000

3.3.6 18V Lithium-ion Battery Charger

The provided battery charger recharges the hand-held SF1000 batteries (2 x 18V).



Figure 10. Charger for the SF1000 batteries

3.3.7 SF1001 12V Charger

A wall converter is provided to charge the SF1001 unit.



Figure 11. Charger for the SF1001

3.3.8 Carrying Case

The provided hard case is designed to safely store and transport the SonicFinder1000 system.



Figure 12. Carrying case containing the SonicFinder1000 system

4. Device Controls

This section covers the basic controls, displays, and configuration of the SonicFinder1000 plastic pipe locator system. It includes pairing the SF1000 and SF1001 for communication, attaching SF1000 ground spike configurations, setting a time zone, and setting the IR threshold for triggering the acoustic output.

4.1 Top Bar Icons

Across the top of the SF1000 display screen, there are a variety of status icons. These icons are related to the GPS signal being received, the radio connection with the SF1001, and the battery charge levels for the SF1000 and the SF1001.

See *Table 1* below for the icons and corresponding meanings, moving from left to right on the top bar of the screen.



Figure 13. An example of the top bar configuration on the SF1000

Icon	Meaning
G / 	When the G is white on a black background, SF1000 has a GPS lock
	Strength of the GPS signal
R / 	When the R is white on a black background, SF1000 has a radio connection with the SF1001
	Strength of the radio signal
S 	Battery level of the SF1001
D 	Battery level of the SF1000

Table 1. SF1000 display icons

4.2 SF1000 Keypad and LEDs

The SF1000 has an 8-button keypad and 11 LEDs, as shown in *Figure 14*. The ON/OFF button turns the device on and off. When viewing the main screen, the UP and DOWN arrows change the gain, the LEFT and RIGHT arrows change the frequency, and MENU brings up a menu to select functions such as radio pairing. Once on the menu screen, the UP and DOWN arrows scroll up and down the menu, the ENTER button allows the user to select a menu option, and the CANCEL button exits the menu and returns to the main screen. On the main screen, the LEDs display a bar graph of the value shown in large font.



Figure 14. SF1000 display and keypad

4.3 SF1001 Keypad and LEDs

The SF1001 has a 2-button keypad and 3 LEDs, as shown in *Figure 15*. The ON/OFF button turns the device on and off. The PAIR button pairs the radio with the SF1000 radio, as described in [Section 4.4](#). The POWER LED is green when the device is powered on. The RF LINK LED is yellow when the SF1001 is paired with the SF1000. While pairing, the LED blinks. The CHARGE LED is red while charging and blinks if the device is in fault mode.



Figure 15. SF1001 display and keypad

4.4 Pairing the SF1000 and SF1001

The SF1000 and SF1001 units are paired at the factory before shipping. If the pairing is lost, the unit radios must be paired to communicate properly. After they have been paired once, they can communicate from power up.

If the devices have already been paired, once powered on the SF1001 will illuminate the RF Link LED, and the SF1000 will display a white **R** icon on a black square (**R**) on the top bar.

If this icon is not displayed, pair the devices using the following procedure:

1. Turn both devices on using the ON/OFF buttons.
2. On the SF1000, navigate to the menu. Select the 'Pair devices' option. At the same time, press the PAIR button on the SF1001.

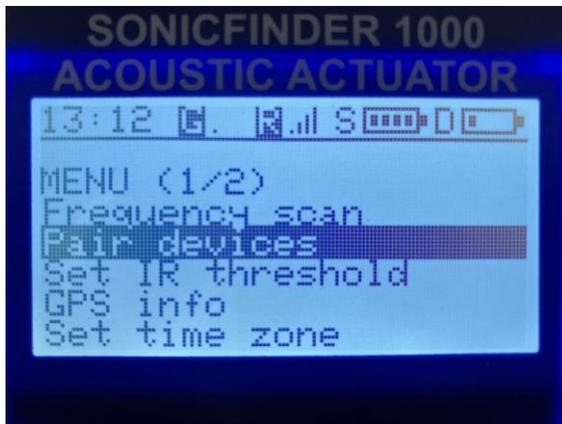


Figure 16. Selecting pair devices from the menu of the SF1000



Figure 17. The pair button on the SF1001

3. Wait for an indication that the device pairing was successful. This may take up to 30 seconds. On the SF1000, 'Successfully paired' will be displayed. On the SF1001, the RF Link LED will light up.

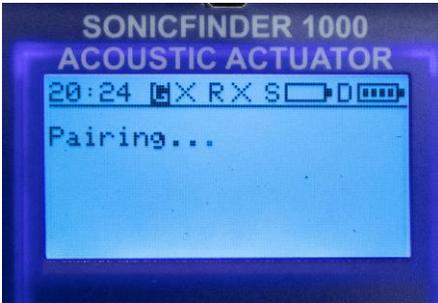


Figure 18. Waiting for pairing the SF1000 to the SF1001

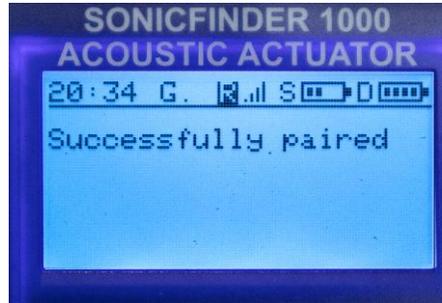


Figure 19. Pairing was completed on the SF1000



Figure 20. Pairing was completed on the SF1001, indicated by the illuminated RF LINK LED

If the pairing has failed, power cycle both devices and attempt the pairing again.

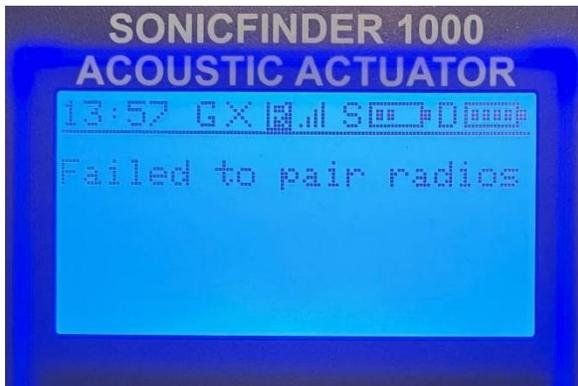


Figure 21. Pairing failed

4.5 Attaching SF1000 Ground Spikes

To ensure better ground contact, the SonicFinder1000 device has one large and three small screw-in spikes. The single large or XL spike gets better actuator transmission when used in soft soil conditions. The three smaller spikes are used when the actuator is used on a hard surface such as concrete or asphalt. On the bottom of the SF1000, there are four holes to screw the spikes into. There are two possible configurations for the spikes: one central spike (Figure 22) or a triangle along the outside edges (Figure 23).



Figure 22. SF1000 single spike configuration



Figure 23. SF1000 triple spike configuration

4.6 Setting the Time Zone

On the SF1000, the default time zone is UTC.

To change the time zone:

1. Navigate to the menu. Select the 'Set time zone' option.
2. Press the UP and DOWN arrow keys to toggle the offset from UTC until the desired offset has been reached.

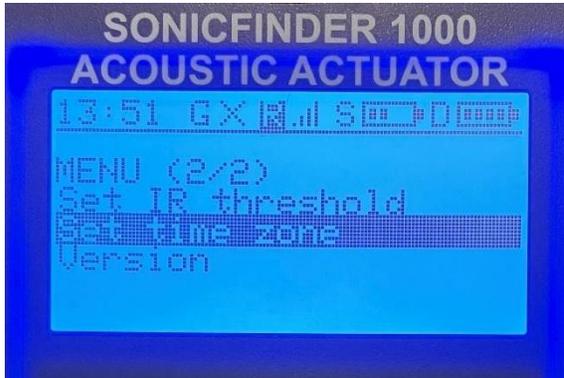


Figure 24. Selecting the time zone setting from the SF1000 menu



Figure 25. A time zone can be set by changing the offset from UTC time in 30-minute increments

4.7 Setting the IR Threshold

On the SF1000, a proximity detector (*Figure 26*) triggers the acoustic output. The acoustic output is enabled when an object is in front of the detector (*Figure 27*). This allows the device operator to block the detector with a finger to trigger the acoustic output while taking measurements.



Figure 26. The SF1000 with the proximity detector circled in red



Figure 27. Triggering the acoustic output of the SF1000 by covering the proximity detector

Depending on the ambient light levels in the environment where the device is being used, the proximity detector may need a different threshold set to function properly.

To set a new IR threshold:

1. On the SF1000, navigate to the menu. Select the 'Set IR threshold' option.
2. On the left, there is an option to set a new threshold using the UP and DOWN arrow keys.
 - a. If the acoustic output is enabled when the proximity detector is unblocked, set the threshold value to be higher than the current reading on the screen's right side.
 - b. If the acoustic output is not enabled when the proximity detector is blocked, set the threshold value to be lower than the reading shown on the right side of the screen while the proximity detector is blocked.
3. Once the new threshold value is set, ensure the acoustic output is triggered by blocking the sensor, and that it is not triggered when nothing is blocking the sensor.



Figure 28. Selecting the IR threshold setting from the SF1000 menu

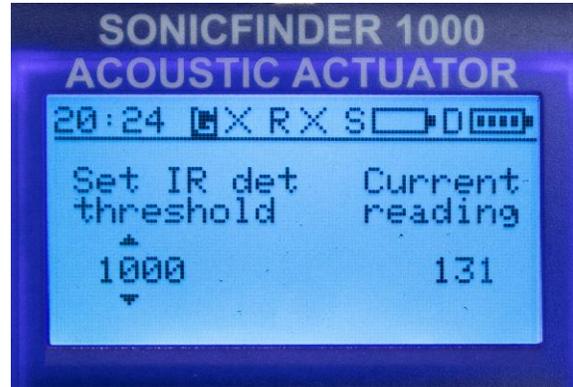


Figure 29. The IR threshold can be changed in increments of 100. The current reading is displayed to the right for reference

4.8 Setting Gain

As the distance from the pipe increases, the gain may need to be changed for better sensitivity. This also may be necessary if the pipe is deeper underground.

The gain value can range from 1 to 7, with 1 being the least sensitive and 7 being the most. Use the UP and DOWN arrow keys on the main screen to change the gain. Note that the gain cannot be changed while the acoustic output is on.



Figure 30. The current gain is shown on the bottom left corner of the screen and can be changed using the UP and DOWN arrows on the keypad

4.9 Setting Frequency

The SF1000's frequency output can range from 50 to 180 Hz in 5 Hz increments, excluding 60 Hz. To change the frequency, use the main screen's LEFT and RIGHT arrow keys. Note that the frequency cannot be changed while the acoustic output is on.

To select the optimal frequency, scroll through all frequency options once the pipe has been located to see where the value peaks the highest. The frequency scan can also do this (see [Section 5.4](#)).



Figure 31. The current frequency is shown on the bottom right corner of the screen and can be changed using the LEFT and RIGHT arrows on the keypad

4.10 Viewing the Firmware Version

The current firmware versions of the SF1000 and SF1001 can be viewed from the **Version** menu.

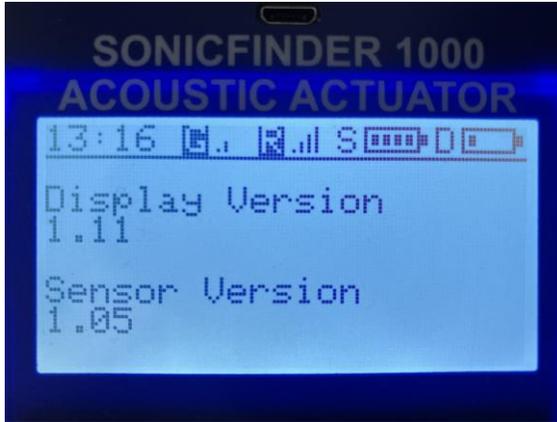


Figure 32. Firmware versions for the SF1000 and SF1001

5. Operating Instructions

This section covers the plastic pipe locator's basic functionality. It includes setting up the SF1001 sensor for measuring, how to measure, and setting gain and frequency on the SF1000.

5.1 Setting up the SF1001

To correctly set up the SF1001 sensor, the geophone (the orange portion of the SF1001) must be vertical, with the magnet facing downwards. This may require attaching a metal clamp to the exposed portion of the plastic service and attaching the sensor via the magnet on the bottom of the geophone (see *Figure 33* below).



Figure 33. SF1001 mounted on a plastic service

5.2 Taking Measurements

Before taking measurements, ensure that the SF1001 has been correctly mounted on the plastic service according to [Section 5.1](#). Also, ensure that the SF1000 and SF1001 are powered on and paired. This will be indicated by the white “[R](#)” icon on a black square at the top of the SF1000 and by the RF Link LED on the SF1001.

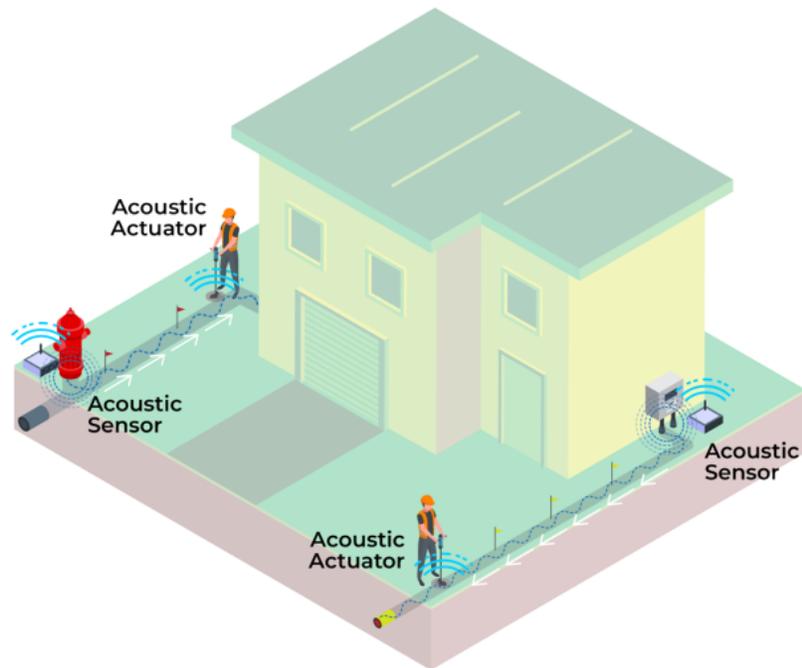


Figure 34. Diagram of the setup for the SonicFinder1000 system

Once the initial setup is complete, follow these steps for each measurement:

1. In soft soils, attach the single large or XL spike to the SF1000 and press it into the ground firmly so that the base of the actuator plate is slightly above the surface. Alternatively, attach the three smaller spikes for hard surfaces and rest the actuator on the surface. You may need to lightly rest your foot on the top of the SF1000 to reduce bouncing.
2. Block the proximity detector to trigger the acoustic output. A black square will appear on the bottom of the main screen to indicate that the proximity detector has been triggered.
3. Wait until the progress bar disappears and a reading appears on the screen. Additionally, a readout of the current sensor value is available on the right side of the screen while the measurement is in progress.



Figure 35. Main LCD display of the SF1000 while operating Figure 36. Completed measurement display

5.3 Pipe Location Process

To locate a plastic service line, measurements should be transverse (perpendicular) to the service's direction, as shown in *Figure 37*. To locate the service, the user should look for a signal peak at a given gain and frequency. Note that results are subject to user interpretation.

Disclaimer: Though it is useful for locating underground services, it is not 100% accurate. The only way to ensure a service line's location is to excavate the site.

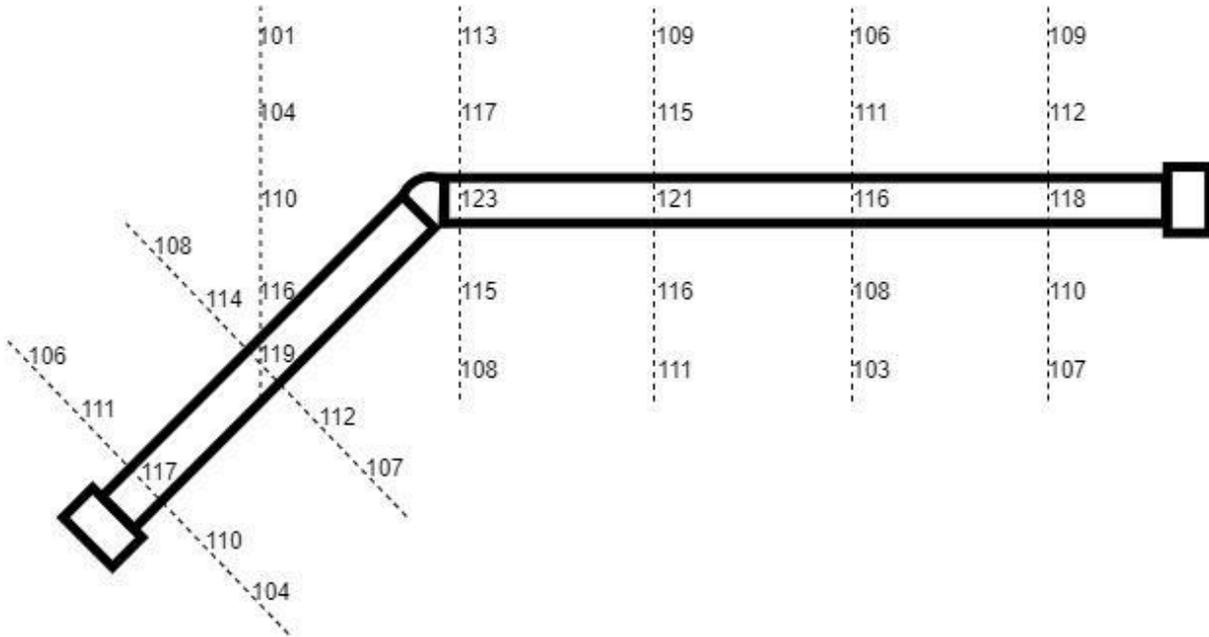


Figure 37. Take measurements transverse to the direction of the plastic service. Note that the measurements provided are only an example of the data's appearance.

5.4 Frequency Scan

The frequency scan option in the menu measures each frequency available on the device, both while the acoustic output is on and off to factor in background noise. The scan takes approximately 5 minutes to run. Once complete, a graph and a printout of the frequency producing the highest readings relative to the background noise will be displayed.

Before running the scan, ensure that the SF1000 and SF1001 are powered on and set up according to the guidelines in [Section 5.1](#). Keep the SF1000 pressed firmly into the ground for the duration of the frequency scan.



Figure 38. Selecting the frequency scan from the SF1000 menu

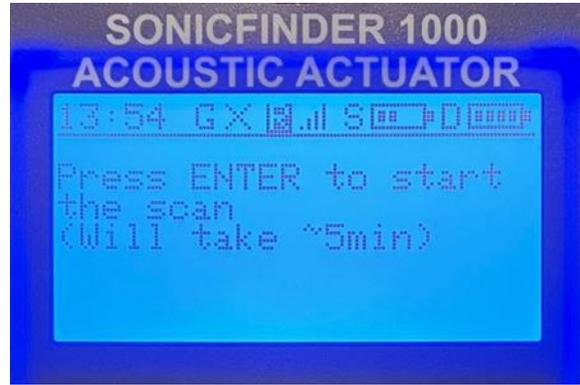


Figure 39. The start screen for the frequency scan

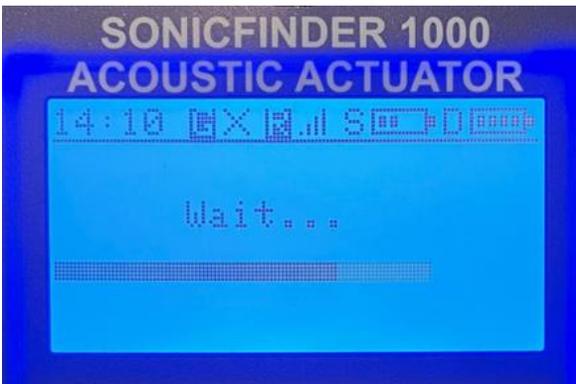


Figure 40. The SF1000 displays a progress bar while the frequency scan is being conducted

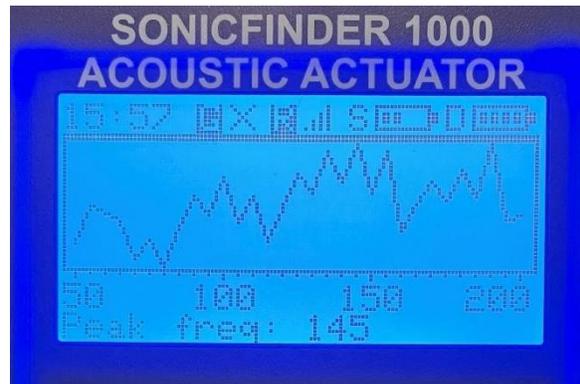


Figure 41. Once complete, a graph is displayed, along with the frequency with the highest reading

6. Troubleshooting

- **Common Issues:**
 - Weak signals, interference, and device errors.
- **Solutions:**
 - Steps to resolve common issues.
- **Error Codes:**
 - Description of error messages and recommended actions.
 - *SF1001 error: please power cycle* – the SF1001 has encountered an issue and requires a restart. Turn off the SF1001, then turn it back on.
 - *SF1001 overflow* – the geophone sensor on the SF1001 has encountered excitation at a level greater than it is capable of measuring. Move the SF1000 further away or decrease the gain, then attempt a new measurement.
 - *WARNING: device at risk of overheating* – the SF1000 has been running for too long, which could cause the electronics to overheat. Turn off the SF1000 for approximately 5 minutes to allow it to cool down.
 - *ERROR: please retry* – if any issues are encountered during a frequency scan, this error will occur. Restart the frequency scan.

7. Maintenance and Storage

Use the equipment only as directed in this User Guide.

- Do not immerse any part of this equipment in water.
- Store in a dry place.
- Keep equipment in the case provided when not in use.
- If left for a prolonged period – remove the lithium-ion batteries from the SF1000.
- Keep the unit clean and free of dust and dirt.
- Protect against excessive heat.

8. Product Support

Support for the SonicFinder1000 product is available by contacting Solinas Technologies.

111, 2966 Main Street
Airdrie, Alberta, Canada
T4B 3G4
+1 (587) 885-7832

<https://solinastechnologies.com/contact-us/>

Have the Serial Number(s) of the unit on hand when contacting support:

For reference, note the product Serial Number(s) here as displayed on your equipment