

SENSOTERRA

Grow more, waste less...



Multi-Depth

Soil moisture
sensor

USER GUIDE



Welcome

Welcome on board and thank you for joining us!
In this guide we will help you get started - from successfully installing your sensor to getting data out of the ground.



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Overview

What is in the box:

Multi-Depth sensor

Antenna

Antenna extension cable

Flag

Cable ties

Drill bit

Magnet

What is not in the box:



Smartphone!



Rubber hammer



Electric drill



Bucket of water

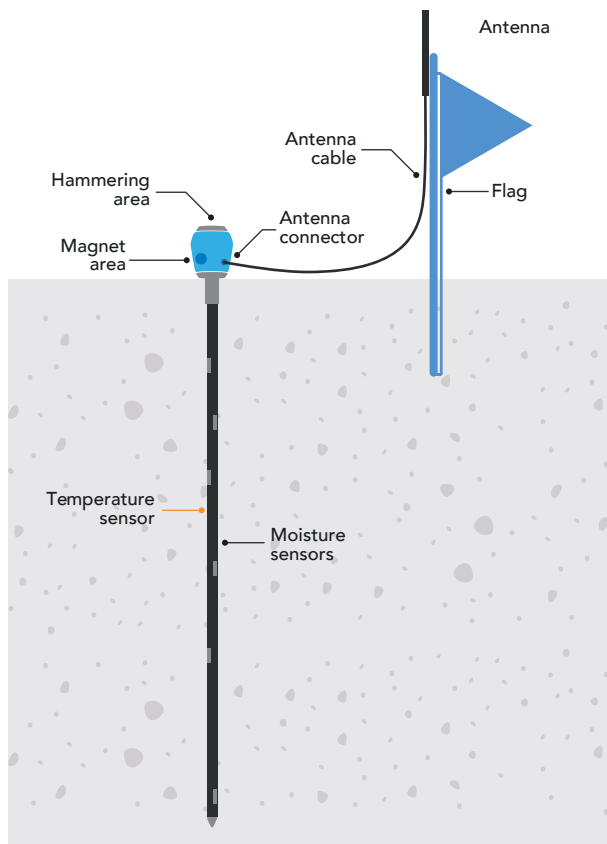


Spade



Wrench size
25mm/1inch

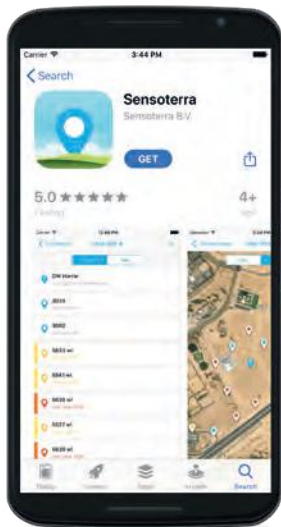
Overview of installation:



1

Preparation

Download the app

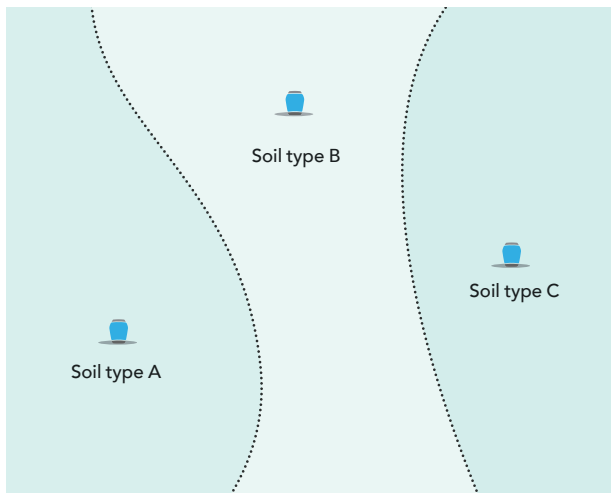


Download the Sensoterra app

Download and install the Sensoterra app from the App Store or Google Play on your smartphone. Create an account or log-in. You will need the app for registering sensors when you install them in the field.



Choosing your location



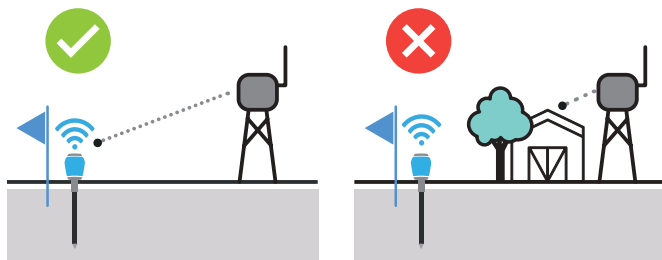
The field you like to monitor can consist of geographic features like slopes and changing soil types. These features might influence the soil moisture levels throughout the field. Consider placing sensors in different places to get a broad overview of the field you monitor.

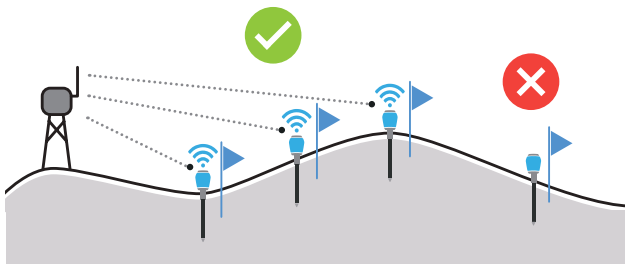
Ensuring good connectivity

Sensoterra sensors communicate over the LoRa network. This means the data is first sent from the sensor to a gateway, which then forwards the data to the cloud via an internet connection.

If you are installing your own gateway, the basic rule is to **find free line of sight** from the sensor antenna to the gateway antenna.

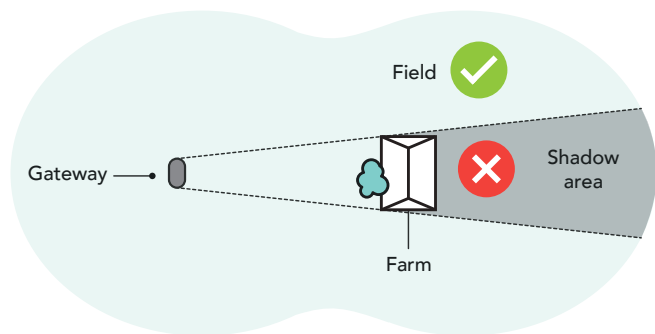
Objects like houses, barns, big trees, big vehicles in the line between sensor and gateway could obstruct the signal. Try to get the gateway antenna up as high as possible to get a look over the fields and think about the location of the objects when choosing the locations of the sensors.





Terrain

Terrain that is hilly creates signal shadows over the field. By placing the gateway at the highest point of the hills could reduce the signal shadows. The sensors should be placed on the side of the hill that is facing the gateway. Avoid placing them in the signal shadow or place your gateway elsewhere.



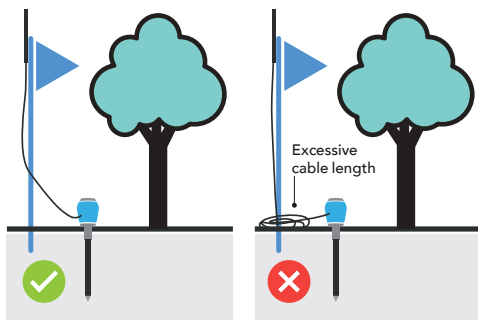
Crops that block the signal

Crops could create a very dense canopy containing a lot of water, which might block the signal. There are multiple antenna extension cable lengths available. **Pick the cable that brings the antenna above the crop canopy to create a free line of sight.**

Cable length counts

Cable length reduces the signal strength. There is a trade off between bringing the antenna high up and using a long cable length. In case of objects/ terrain/crop canopy use the cable length to create a free line of sight to the gateway. If you have a shallow crop and a flat area use a shorter cable.

Always get the most height out of your cable length. Don't take the longest cable and roll up the excessive cable.



Choosing soil type

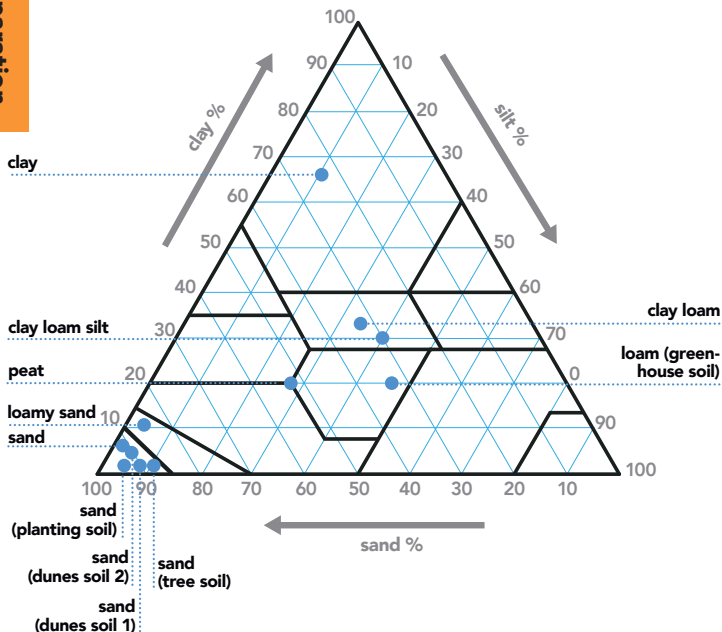
When installing the sensor in the app there is an option to pick soil type. It is important to choose the closest soil type available. This will improve the accuracy of the measurement from the sensor. Sensoterra calibrates the sensor measurements for many different soil types to make the data you view in the app and customer site and the push notifications you set up more useful.



For more information visit the [soil calibration](#) section on www.sensoterra.com



Use the soil triangle to determine which calibration is closest to your soil type:



We continuously add new calibrations, please visit our [soil calibration](http://www.sensoterra.com) section on www.sensoterra.com for the latest information.

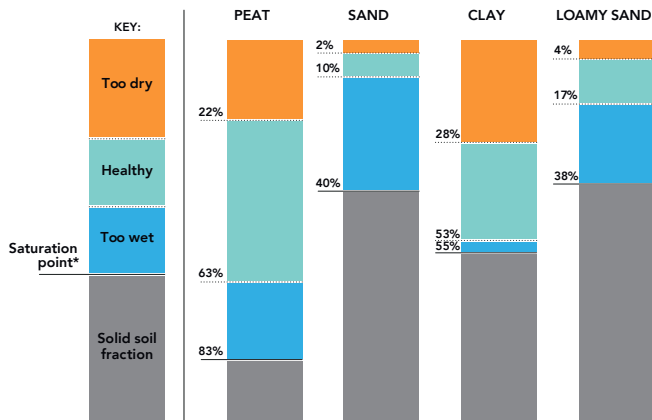
Choosing a unit of measure

The Sensoterra app and monitor can show data in two ways: **Volumetric Moisture Content** and **Sensoterra Index**.

Volumetric Moisture Content

The volumetric soil moisture content of the soil is expressed in the app as Volumetric (%). Volumetric soil moisture data provides a percent value of the soil moisture content of the soil. It is simply the ratio of water volume to soil volume. The volumetric soil moisture percentages allow for careful management of soil moisture levels in your soil.

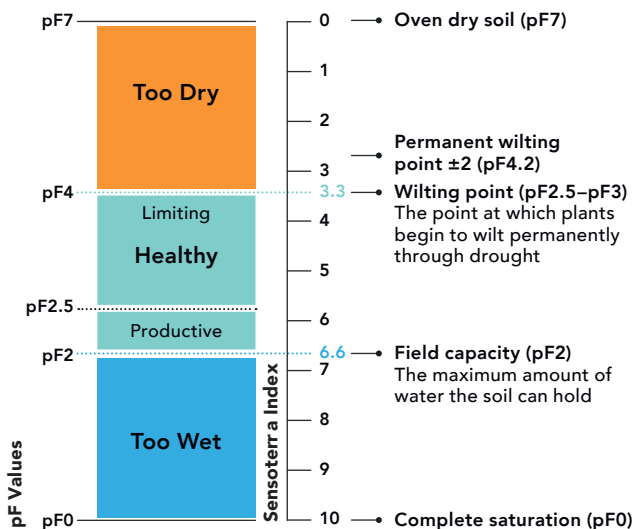
Example:



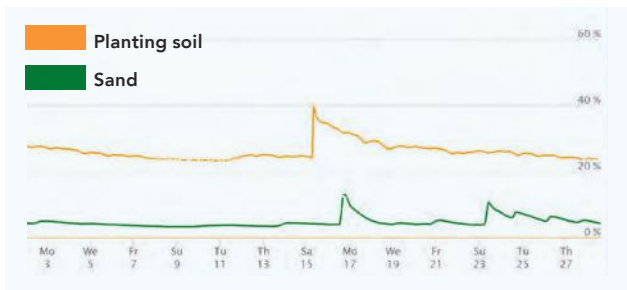
* Saturation point = maximum volume of water that the soil can hold

Sensoterra Index scale (SI)

Sensoterra Index scale is based on pF data and focuses on the 'Too Dry', 'Too Wet', and the 'Plant available water' (or Healthy) zones and spreads the three zones over a 0 to 10 scale. The 0 and 10 values represent oven-dry soil and complete saturation of the soil, respectively. The Sensoterra Index is a simplified soil moisture score that allows you to determine soil health at a glance, as well as making it easy comparing data from sensors in different soils.

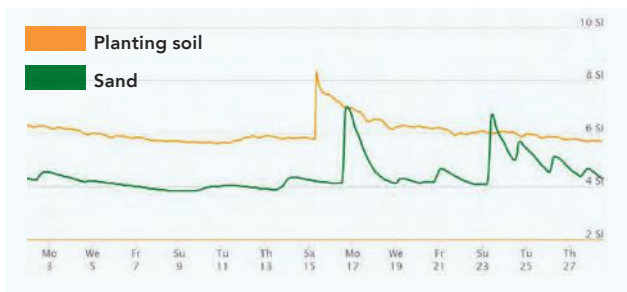


For more on units of measurement:
support.sensoterra.com



Volumetric Moisture Content Example

This example shows two graphs compared by their volumetric moisture content. It looks like the sandy soil is very dry.



Sensoterra Index scale (SI) Example

The same graphs compared by Sensoterra Index. It now becomes clear, that relative to the soil type, both soils are in their healthy zones with SI values above 3.3.



Registering the sensor QR code

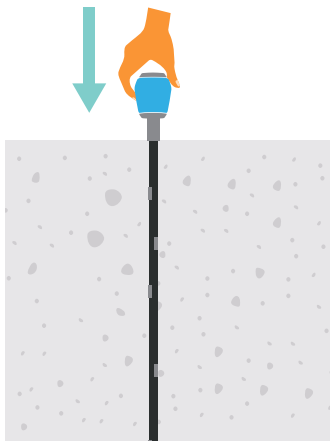
To register your sensor, first select a suitable location in the field where you want to install your sensor. Once you are there, open the app and select **“add a new device”**. The GPS location will be stored so you can easily find the sensor again. Follow the guidelines in the app.

Installing the sensor

Soft soil

The blank metal points on the sensor stem are the measurements points.

These need to be in full contact with the soil for a good measurement. Wetting the sensor before installation could help as a lubricant. Install the sensor in the soil. If the soil is soft, you can **push the sensor fully into the ground**. If the soil is too hard for you to push the sensor all the way, use a rubber hammer until the bottom of the head is flush with the soil.



Scan for video:



If using a hammer



The hammer vibrations may cause the top soil to loosen and create gaps between the soil and the probe. To prevent this from happening:

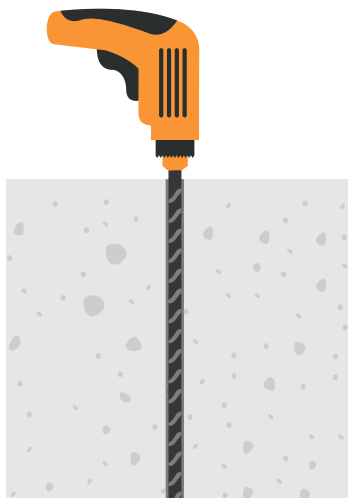
Try to hit the probe as straight on the top as possible.

Hold the probe just below the head to damp the vibrations of the probe.

Installing the sensor

Hard soil

If the soil is hard and you experience so much resistance that the sensor starts vibrating, use a long drill bit to pre-drill a hole for the sensor. After you have pre-drilled the hole, you can push/hammer the sensor into the hole.



Using a drill

Drill a straight hole directly into the soil. Rotate the drill slowly to avoid the wobbly effect of the long thin drill.

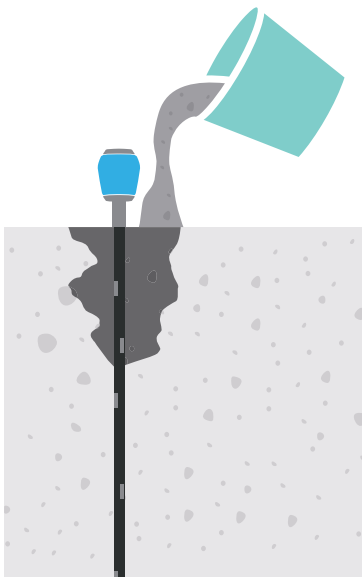
Hammer or push the probe as straight as possible in the created hole. If the probe is accidentally pushed sideways (creating movement or gaps in the soil) remove the probe and drill a new hole.

Ensuring good soil contact

Using soil & water mix

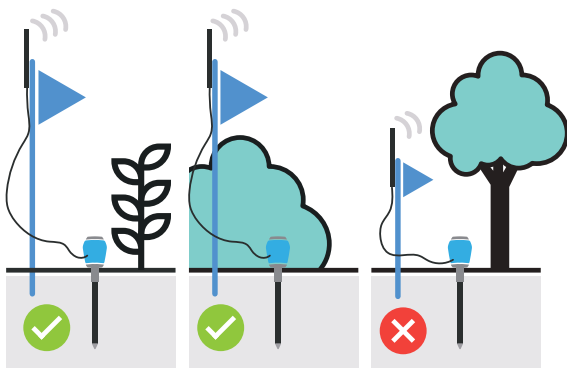


Gently push the sensor sideways to check if there is air around the stem. If there is, the sensor might have poor soil contact. This can be solved by digging out the top 20-30 cm of soil around the sensor. Mix the dug up soil with water and pour it into the hole. This will allow the soil to flow around the sensor and ensure proper contact.



Mounting the antenna

1. Place the flag next to the sensor. This will be used as a pole for the antenna, to keep it well above ground.
2. Attach the **antenna cable** to the **antenna connector** on the sensor, then connect the **antenna** in the opposite end.
3. Mount the antenna securely on the flag with cable ties.
4. If the crops are growing higher than the flag, mount the antenna higher than the expected height of the crop or even in the canopy.





Connecting the antenna

1. Align the connectors of the cable and the sensor.
2. Screw the parts tightly together.
3. Check that the connectors are **properly aligned**. Even though it may feel tight, if the connectors are not fully aligned, they are likely not properly connected.

Wake up the sensor

Magnet trigger

A magnet is attached to the back of this manual. To wake up the sensor hold the **magnet** at the **magnet indicator** on the head for 1 second. The sensor will now begin connecting to the network.



Note

It may take up to 48 hours for the sensor to complete a connection with the network.

To manually trigger a measurement reading

By default, the sensor reads and sends a measurement once every hour. However, the sensor can be triggered to make a measurement by using the magnet.

Hold the magnet at the magnet indicator for:

1 second: to wake the sensor up to do and send a moisture reading.

5 seconds: to reset the sensor, e.g. if have moved a sensor and it fails to connect to the gateway.

Accessing the data

Once the sensor has connected to the network, you can access the data from either:

Sensoterra App on your smartphone

Web Monitor on your desktop or laptop

In your application (as an API)



API's collect the calibrated data and send it to the Sensoterra customer portal and to a third-party ecosystem.



To view your data online visit:
monitor.sensoterra.com

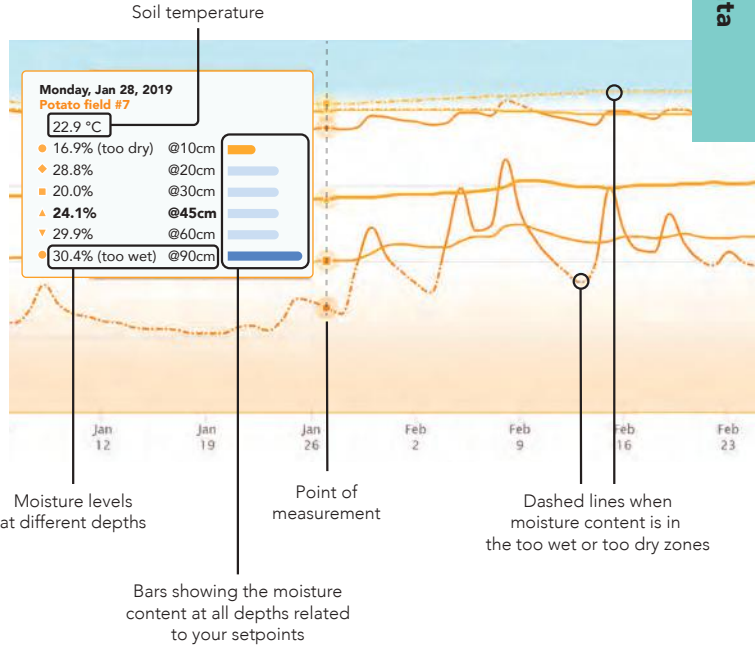
Understanding the data

See data from your field directly in the Sensoterra Monitor. Compare data across e.g. depth or locations.



To view your data online visit:
monitor.sensoterra.com

Data example:



Moving a sensor

Rotate and lift

At the bottom of the sensor head is a flat part designed for getting grip with a wrench. Slowly turn to loosen the sensor from the soil.

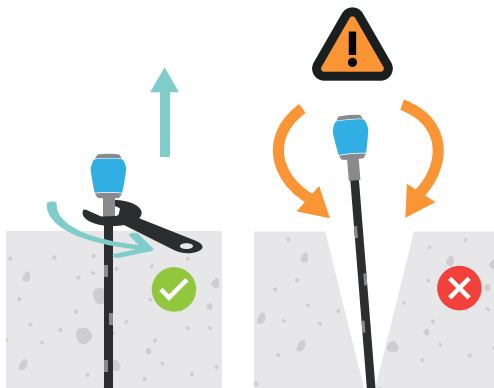
Pull the sensor upwards while you rotate in both directions. Do not wiggle the sensor sideways, as this can damage it.

Installing a sensor in a new location

A sensor can get registered multiple times by the same user account.

Every time you register it you override previous settings like location, soil type, name, etc.

Moisture data is never overwritten and remains visible.



Storage

Cleaning

The sensor can be cleaned with soap for a smooth surface, which would increase the ease of installation. The smoother the surface is, the easier the sensor will slide in the soil.

The measurement surfaces can be cleaned with an alcoholic cleaner.

Storage

Store the sensor in a dry place and don't let the measurement surfaces touch anything conductive. When the sensor doesn't measure anything it will go into a sleep mode saving battery.

Cover the sharp point to avoid any injury.

Place the gateway close to the sensor. Connect the antenna to the sensor. This will avoid the sensor using battery power to attempt to connect to the gateway.

Disposal

Dispose as an electronic product according to local regulations.

Warranty

It comes with a 1 year warranty on the sensor, cable and antenna.

Note

Damage due to wrong installation is not covered by the warranty. Use the drill to make a pilot hole and avoid excessive force on the sensor.

The materials are properly selected for outdoor use. There is always a change UV could change the color and this is not covered by the warranty.

Support



You can find more information on our dedicated support site where you can also reach out to our support team if you should have further questions.



For FAQs and more about using our sensors,
please visit support.sensoterra.com

Safety

Danger: sharp point

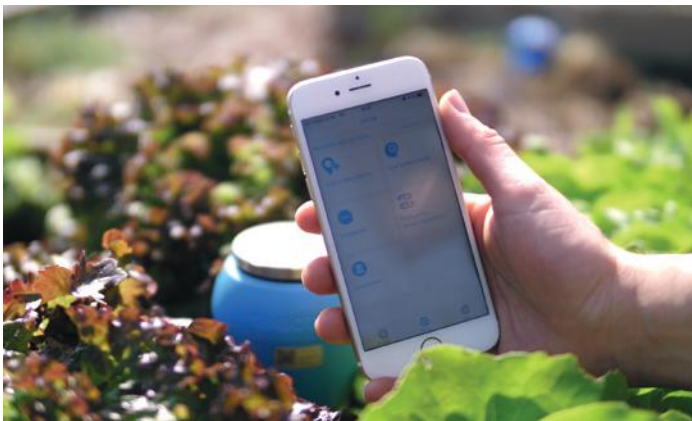
The Sensoterra Multi-Depth sensor contains a sharp point for easy installation. Handle the sensor with care to avoid any kind of injuries.

Keep fingers away from the hammer impact

The metal head is made to hit with a hammer. Hold the head on the bottom side to avoid that fingers come in between the hammer and head.



Hammer the sensor into the ground



Scan the QR code to register and set-up your sensor.

SENSOTERRA

Sensoterra, world leader in wireless soil moisture sensor solutions, provides data-driven solutions for optimizing land and freshwater resources for agriculture, horticulture, landscaping and nature restoration. Empowering better decision making for land management through smart soil moisture measurements. Sensoterra was founded in 2014 and is based in Amsterdam, the Netherlands. Today there are thousands of Sensoterra sensors in the ground, globally.

For further support visit support.sensoterra.com or email: info@sensoterra.com

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Pending patent applications: 中国发明专利申请 201780085708.3 (专利申请, 尚未授权). 中国发明专利申请 PCT/NL2019/050377 (专利申请, 尚未授权). United States Patent Application 16/472,599, European patent application 17832780.5. International patent application PCT/NL2019/050377. Issued patents: Dutch Patent 1042193. Dutch patent 2021169. Sensoterra and its logo are trademarks of Sensoterra B.V.

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