

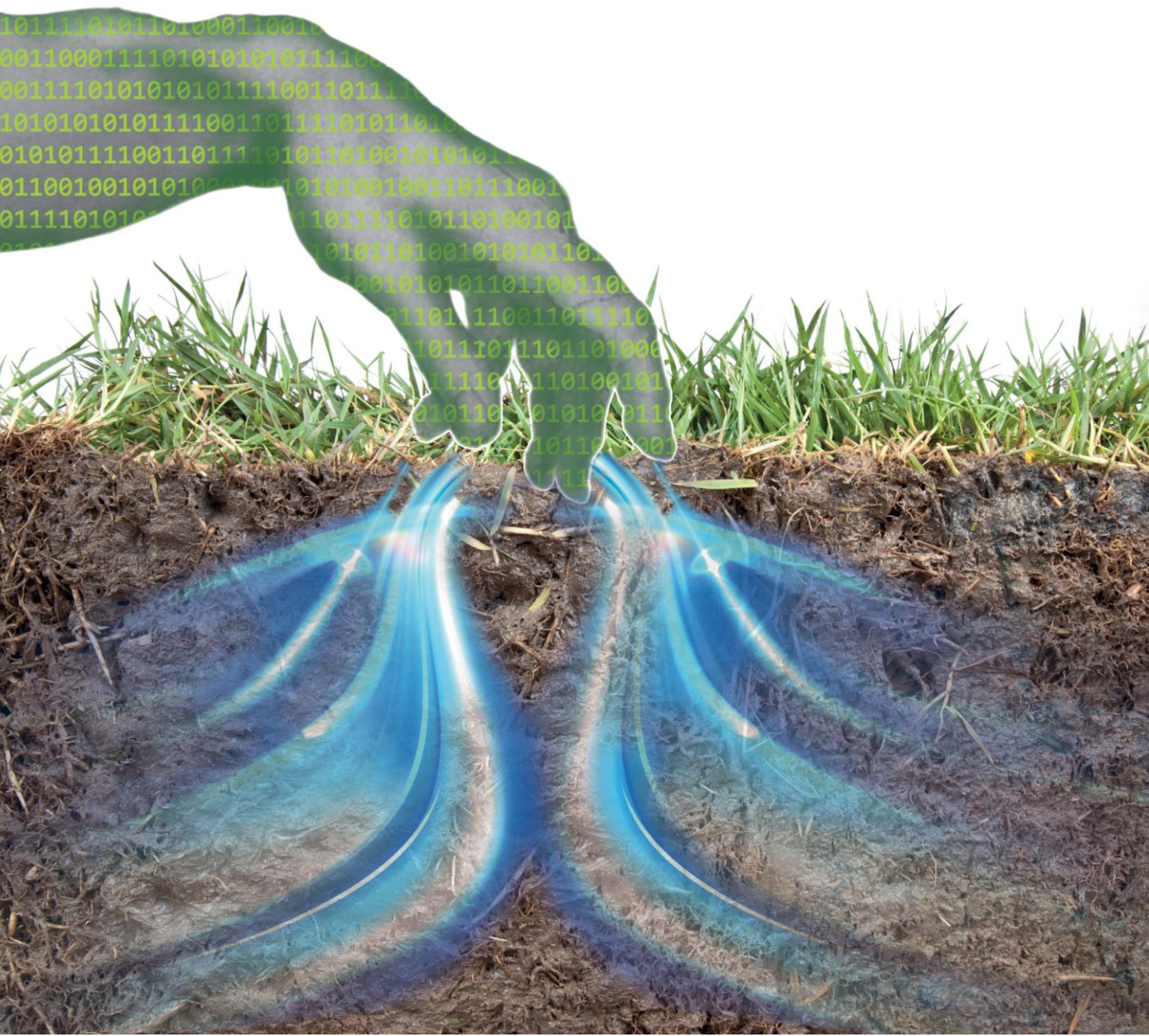


Soil Scout™ Hydra

Soil Scout™ Base station

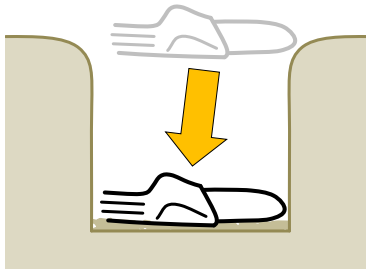
User Manual

January 2019



Soil Scout HYDRA - Quick Installation Guide

These Instructions relate to open-field installations. For other environments such as biomass piles or growing pots, please contact Soil Scout.

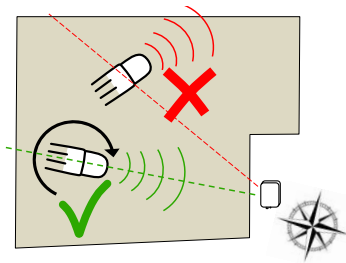


Dig an installation hole to the desired installation depth only. Digging too deep will disturb the bottom soil.

Leave approx. 1 cm (0.4") of loose soil on the bottom of the pit to allow for firm soil contact with the device.

Place the device on the pit bottom. Place **only one** Scout in one pit.

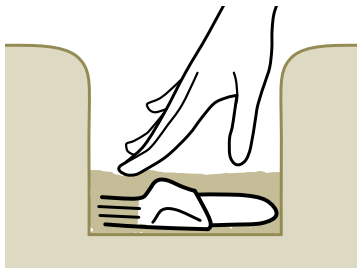
⚠ Note: Before installation write down the **5-digit ID code** on your Soil Scout Hydra for each unit you are burying. During installation record exact depth and precise GPS location coordinates.



Ensure the round end (the antenna) of the Soil Scout HYDRA is pointing **towards your Base Station** receiving antenna.

Installing the Hydra sideways will significantly decrease communication range distance.

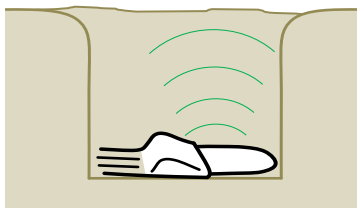
Choose the locations for you devices so that the line of sight from Scout to the Base Station is open and free of obstacles.



Stuff soil firmly all around the Soil Scout™ Hydra **by hand**. If the soil is so hard that it breaks into blocks or clumps, apply some water and knead the soil to make it softer.

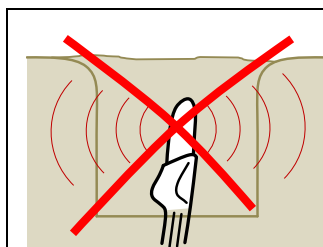
Give the device a tight soil contact and leave **no air pockets**.

Do **not use tools** or hard objects as accidental impact on the device may damage it.

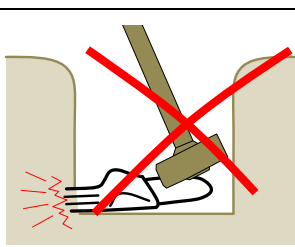


Replace the rest of removed soil back into the installation pit. Restoring the original soil layers, if possible, is recommended.

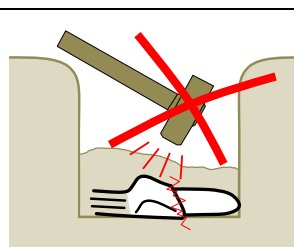
Pile any extra soil into a mound on top of the pit. Do not leave a depression on the surface, as it will collect excessive surface water and may affect moisture measurements.



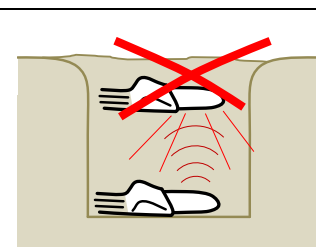
Do not place Soil Scout Hydra in an upright position



Do not use excessive force or tools on the Soil Scout Hydra



Do not use tools to compact the soil

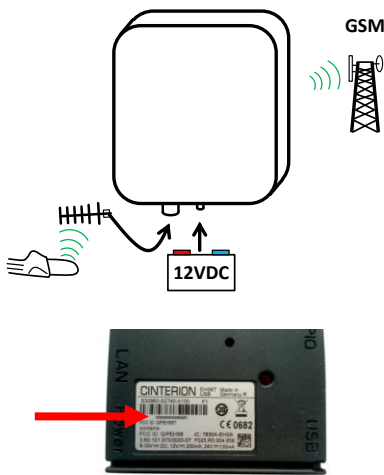


Do not place several Scouts in one pit

SOIL SCOUT

Soil Scout Base Station - Quick Installation Guide

Base Station



The Base Station receives data wirelessly from the underground Scouts, via a Receiving Antenna, and forwards it to the Soil Scout Cloud. The Base Station has a GSM/3G cellular modem inside, which takes a standard-size SIM card (not included), and requires constant electricity.

Make sure that the PIN code for the SIM card is disabled

Remove the front cover using a Phillips / cross-head screw driver

Insert the SIM card. The card will click into place

Replace the front cover. Do not use excess force turning the screws

Using the tabs on the back of the Base Station, attach it firmly to a suitable wall/pole/tower, in a place that is safely accessible for inspection and maintenance. Make sure that the outside connectors are facing downwards.

▲ *Note: For each Base Station make sure you record the **15-digit IMEI Code** located inside the Base Station box. It is printed below the sticker's bar code in very small numbers and is required in setting up Soil Scout Cloud Account.*

Receiving Antenna

The Receiving Antenna receives data from the underground Scouts, and passes it to the Base Station. Mount the antenna firmly on wall/pole/tower. The antenna metal body must be electrically grounded. Check with your local Dealer if you unsure how to do this.

Omni antenna: the Pole-shaped Omni-directional antenna must be mounted vertically / **straight upwards**. It will receive incoming data across 360°.

Yagi antenna: the Directional antenna has a receiving arc of approx. 30°. Install the antenna horizontally, with the tip pointing towards the Scouts, and the ladder-like elements pointing up and down – not left and right.

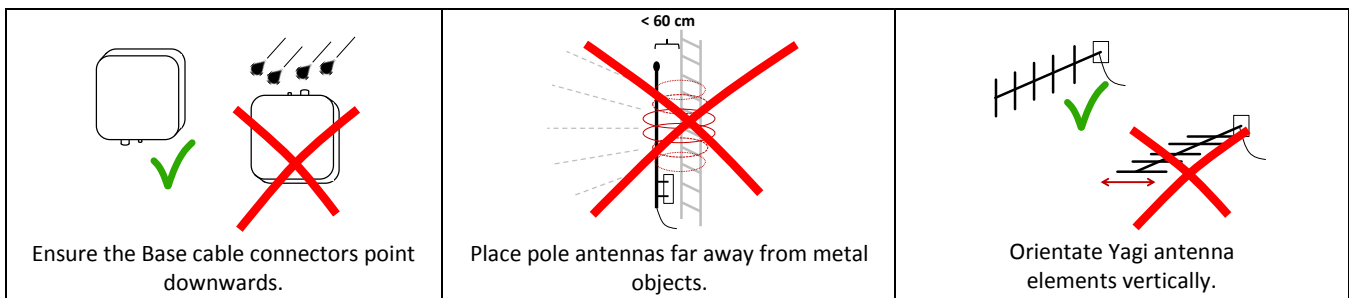
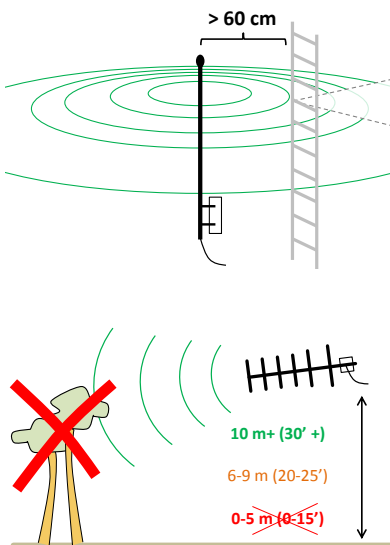
Placement Guidance

Mount the antenna **as high as possible**. Minimum distance to closest Scout should be approx. 6 times the height of the mounting point of the antenna. Height less than 5 m from the ground is often too low. 10 m or more is ideal, depending on distance to Scouts.

Avoid placing the antenna within 60 cm (2') of metal objects such as ladders, utility boxes or tin roof.

Any objects - especially metal - in between the Antenna and the underground Scouts may attenuate signals and cause blind spots.

If purchasing 3rd party antennas, please check with your local Dealer for compatibility and installation details.



Ensure the Base cable connectors point downwards.

Place pole antennas far away from metal objects.

Orientate Yagi antenna elements vertically.



Soil Scout Cloud Account - Quick Installation Guide

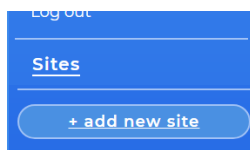


Getting Cloud Login Credentials

In order to be able to access the Soil Scout Cloud, you will need a personal user account with login name and password. Contact your local dealer for credentials.

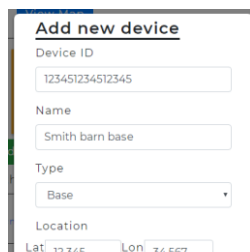
Soil Scout Cloud login page can be found at <http://www.soilscouts.fi>

For the best browsing experience, we recommend using Chrome.



Creating a New Site

A Site is a geographical location that has been equipped with a number of Soil Scout devices. If your dealer has not created a Site for you, this is the first thing to do. Write in a Site name and fill in all relevant text boxes.



Adding a Base Station and Checking it is Online

Now you will see the Site Block in the home page view. This view will present you the most important information on daily basis. In a newly created Site, there are no Devices being monitored.

The first step is to add a Base Station. The most important parameter is the Base Station **IMEI code**, a unique 15-digit identification number inside the Base Station enclosure. It is printed below the sticker's bar code in very small numbers.

You can edit Base Station settings or add Bases to your site at any time.

If you have not restarted your Base Station after creating the Site, the Base Status will be *Not connected* as a red bar. Restart your Base and Status will shift to *OK* as a green bar.

The Base station will report diagnostic information to the Cloud hourly, whether there are actual Soil Scouts at the site or not.



Network Devices					Add new device	
Name	Type	Height	Status	Properties		
Smith barn base	Base	1000.0cm	OK			

Adding New Devices

The final step in setting up your Soil Scout Cloud service is entering the device information for the Soil Scout Hydra sensors. It is highly recommended to add all devices and check that they get connected to the Cloud before going out to the field.

Start the dialogue by clicking *Add new device*. Device type (Scout/Base/Repeater) and **Device ID** are mandatory, while coordinates, depth and grouping are optional. For each Soil Scout Hydra you will find the unique 5-digit hardware identification number underneath the ID Code-text.



Explore the Soil Scout Cloud!

Congratulations, you have now successfully setup your Soil Scout Cloud and are ready to explore the functionalities: measurement graphs, configuring email notifications, etc. You will find more information about the Cloud in the Help & FAQ page accessed from the drop down menu.



ECHO Repeater - Quick Installation Guide

The ECHO Repeater receives data wirelessly from the underground Scouts, via a Receiving Antenna, and seamlessly forwards it to a Base Station (via other ECHO's if necessary). The ECHO is used to extend the range between Scouts and the Base Station and provide a link path around possible obstacles.

Power / Orientation / Mounting

The ECHO Repeater is normally powered by a solar panel and an internal rechargeable battery, and for auxiliary use in dim conditions, it has a DC supply socket of the same kind as in the Base Station. The ECHO is mounted with the supplied metal strap to a 50mm/2" round vertical mast (not included), with the power switch and type label facing down. For optimal solar energy harvesting, the panel on the front should face the sun most of the day – in the northern hemisphere the panel should face directly south and in the southern hemisphere directly north. In the tropics the orientation is not critical. If the unit is partially shaded during the day, the best way to overcome this is to raise the unit higher as this will increase the radio range as well. Another option is to move the mounting mast to a less shaded area.

Reception and Transmission

The reception characteristics of the ECHO are exactly the same as those of the Base Station, including the suggested antennae and their mounting and expected ranges between Scout units and the receiving antenna. The stub antenna supplied with the unit allows for reception from close by, and increased range can be obtained with the use of a larger antenna. Refer to the Range Estimation Table for expected distances.

For transmitting, the ECHO has an internal antenna, and the line-of-sight range between ECHO and another receiving unit, whether Base Station or another ECHO, is multiple kilometres. Having obstacles such as a tree line or a building between the two units will decrease range significantly – having both antennae as high as possible mitigates this risk. Multiple ECHO Repeaters can be used in a daisy-chain setup if required.

Usage

To install, simply mount the unit and switch it on. No additional configuring or setting up is required: all packets received are automatically forwarded onwards. In addition, any duplicate packets caused by a Base Station picking up a Scout packet both directly and through an ECHO are automatically discarded. Adding the unit to the Soil Scout Cloud is recommended to allow monitoring of the device health, as well as battery and solar voltages.

When the device is switched off, the solar panel will not charge the internal battery.

Battery Operation

If the unit is placed in such a place that it cannot harvest the required power from the sun, a DC supply can be connected to the connector on the bottom of the unit. The unit will then charge the internal battery regardless of the power switch state.

The internal battery is a 18650-sized 3,7V Li-Ion battery with a long life span. If for some reason you suspect a failed battery, please consult your local distributor. There are no user serviceable parts inside the unit, and opening the enclosure may void your warranty.

CAUTION: RISK OF EXPLOSION IF BATTERY IS REPLACED BY AN INCORRECT TYPE.
USED BATTERIES MUST BE DISPOSED OF ACCORDING TO LOCAL LAWS AND REGULATIONS.

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1. Introduction

Thank you for becoming a Soil Scout™ user! You now have the most advanced wireless soil monitoring equipment at your disposal. Please read through this manual to get full benefit from the unprecedented opportunities the system can provide.

The system is intended for achieving near real-time wireless monitoring of underground measurement data, such as soil moisture and temperature. Before using the system for any other purposes, contact the manufacturer.

The system is designed for either the ITU Region 1 (comprising of Europe, Africa, the Middle East west of the Persian Gulf including Iraq, the former Soviet Union and Mongolia) or ITU Region 2 (comprising of the Americas, Greenland and some of the eastern Pacific Islands).

Using the system in other region than intended for violates local radio frequency limitations and is illegal. For more detailed information on allowed regions and countries visit <http://life.itu.int/radioclub/rr/art05.htm>.

2. Soil Scout™ System Components

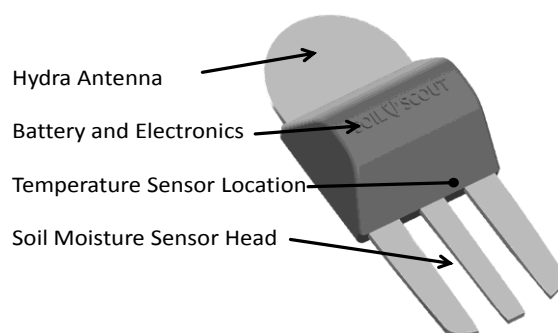
The **Soil Scout™ Hydra** device, depicted below, is intended for underground installation, while the Base station for receiving the data transmitted from underground is intended for installation above-ground and in air.

The Hydra has embedded antenna, battery, electronics and sensors. The antenna is the semi-circular disc, while the soil sensor head is the 3-prong comb in the other end. The battery and electronics are molded inside the center bulb and cannot be replaced or accessed in any way.

The device is permanently sealed in manufacturing and is fully waterproof to allow installation in completely water-filled environments, where no hazardous chemicals such as solvents are present.

The radio on Hydra produces the maximum allowed radio power of 27 dBm (500 mW) according to European radio regulations (Directive 1999/5/EC). Any attempts to enhance the transmission power by self-made means will cause prohibited emissions and are therefore strictly forbidden.

The **Soil Scout™ Base station** is encased in a weather proof plastic enclosure containing one or several receiver boards, a cellular modem and/or storage device, connectors for external antennas and connector for DC power. The box has means for mounting. Deciding the best and most suitable mounting method to a wall/pole/tower is for the user to decide. The 12V AC/DC adapter must be protected from weather.



The underground Soil Scout™ Hydra device

The contents of the Base station varies according to customer application and site requirements. All Bases include a receiver board that will receive and decode wireless data signals coming from underground and a cellular modem for Cloud uplink.

Please note, that three different antennas are discussed in this document:

- | | |
|-----------------------------|--|
| 1) <i>Hydra Antenna</i> | Semi-circular radiative element on the underground device |
| 2) <i>Receiving Antenna</i> | External antenna connected to your Base Station for receiving data from under ground |
| 3) <i>GSM Antenna</i> | Base modem's stub antenna inside the enclosure for communicating with cellular network |

3. Before Installing Devices

All Soil Scout™ devices are ready for use when delivered. The Hydra transmitters have been tested and put into operation in manufacturing and there is no way to adjust their operation. The Base Station will start working autonomously when powered up.

However, it is good practice to perform certain procedures before mounting receiving equipment or burying Hydra transmitters. This way damaged devices or site specific features can be observed with least effort.

If your Base Station has a GSM modem, mount the intended SIM-card in a mobile phone or a tablet and make sure the PIN-code request security feature is turned off. Shut down your handheld device and restart for checking that no PIN-dialogue emerges. Also test that some GPRS data service can be operated, such as opening a web page or similar. A plan for voice calls only will not work, but a plan for data only is sufficient.

Once the SIM card is mounted, power up your Base Station. When ever the Base starts - even after power failure - it will open connection to the Cloud and transmit a wakeup message independently from any incoming data from the Hydra transmitters. Log on to your Cloud account (at <http://www.soilscouts.fi>, note the plural form of the word soilscouts) and observe that the Base wakeup message has been recorded.

Keep the Hydra transmitters in near vicinity to the Base for an hour and check that all scouts report data to the Cloud. Note: the Hydra Antenna is designed to radiate underground and will work poorly in free air. This is why the transmitters should be within 100 meters from the Base while testing the devices in air.

Make a plan of your Soil Scout™ Hydra deployment before going into field. It is easier and more reliable to execute a good plan and write down eventual changes to it, than simultaneously carry out the field work and document it. A good plan covers following:

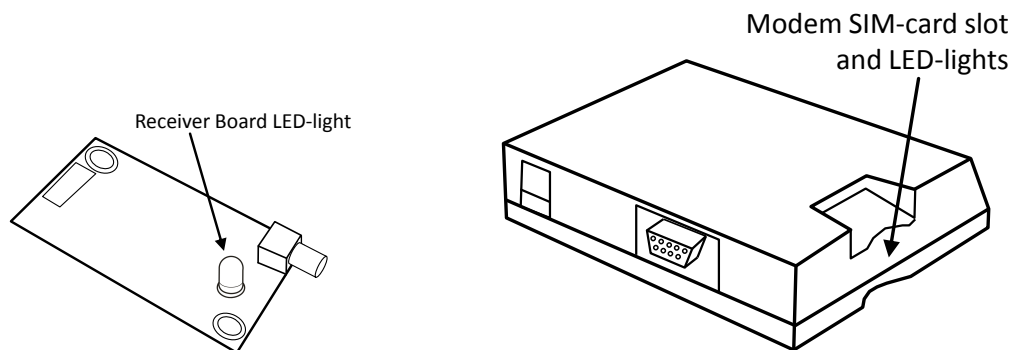
- Map of intended locations where each Hydra goes
- Hydra id-numbers on the map
- Intended depths of each Hydra
- Means to write down soil observations during installation
- Positioning device or other means to exactly record the realized locations within 1 m

Keep a copy of your plan in office and make a backup of a modified plan after the field work. Remember, that after deployment there are no means to resolve an individual Scout Hydra's location. The transmissions are very short, occur seldom and often have powers below noise floor, so feasible technical methods to triangulate devices do not exist to date.

4. Base Station Led-light indicators

Depending on Base Station configuration, there are usually two kinds of devices inside the Base Station enclosure. The Receiver Board(s) have one two-coloured led. There may be several Receivers in one Base.

In Base Station TX models, there is also a cellular modem inside the Base. The modem has two led-lights which are visible through the transparent modem cover.



Receiver Board Status Led

<i>Led blinks GREEN</i>	Base is in normal operation. The green blinking indicates, that new data packages from underground Scouts have been received within 1 hour and forwarded to the modem.
<i>Led alternates RED/ORANGE</i>	No new incoming data packages from underground Scouts have been received for 1 hour or more.

Modem Status Leds

<i>GREEN fully on</i>	The modem has powered up.
<i>YELLOW on/off every second</i>	The modem has limited or no cellular network service.
<i>YELLOW flash every 4 seconds</i>	The modem has registered to a cellular network.
<i>YELLOW 3 second long blink</i>	The modem has succesfully uploaded data to the Cloud.

5. How to Install and Align Receiving Antenna?

When properly oriented and mounted, the *receiving antenna height* is the most important parameter influencing your Soil Scout™ system operation quality. The higher up the antenna is compared to the soil surface, the stronger the received radio signals are. As a rule of thumb, the antenna height should be *at least* 6-8 m (20-25') in all cases, and if distances exceeding 200 m (650') are desired, heights 10-15 m (30-50') are recommended.

The metal body of the antenna must be grounded for lightning protection. If it is not clear to you how grounding should be done, contact an authorized electrician.

The Soil Scout™ system can be extended with a variety of general or specific receiving antennas. Most installations can be assembled by using simple omni-directional pole antennas and directive yagi antennas. In order to achieve the most appropriate configuration, the user should understand the basics of different receiving antennas and their properties.

Refer to the *Range, Antenna and Cable Guide* for more detailed information.

6. How to Choose Installation Locations for Soil Scout™ Hydras?

The Soil Scout™ system can be used for a large variety of purposes from widespread agriculture fields to confined containers. This is why definitive instructions cannot be given, but certain guidelines may help the end user in deciding how to deploy the devices in a most favorable way.

You should always install a single Hydra only in one pit. The Hydra should be left against the undisturbed pit bottom, but leaving in another device half way will not allow you to do so. One Scout on top of another will also intercept a significant part of the radio waves coming from below and thereby decrease range. In addition, would you wish to relocate devices, you will not have access to the deeper ones, if others are installed on top of them.

Which variability is of your highest concern?

There are good reasons, why just one or two Scouts will not deliver a true Soil Scout™ system. The power in applying wireless and long-lived sensors is in the ability of observing near-realtime variability on a whole new level. Build your deployment in a way that will provide data from such points that bring you certainty of the phenomena you want to see and learn.

How far from the Base Station can you go?

Bare in mind, that all well-known issues to wireless radio devices concern Soil Scout™ Hydras as well. Connectivity is more reliable the shorter the communication distance is. You might at times achieve distances far beyond the reported ranges, but it is not uncommon to fail even at modest distances and depths. After all, the outdoors is a non-structured environment, and in the end all relevant circumstances cannot be determined beforehand.

Example 1: A field with adjustable sub-drainage needs monitoring to support the management. 3 Hydras are installed in an area which is known to more likely stay wet. One is installed 15 cm deep on top of a drain pipe, one at the same 15 cm depth inbetween drain pipes, and one between two other pipes but 30 cm deep. Then 3 Hydras are installed in a drier area inbetween drain pipes, one at 15 cm and another at 45 cm depth.

In this example case the user can observe 3 points that all have the same depth 15 cm, which makes it easy to determine how much wetter is the wet area and how well the drainage is operating. Inside the wet area the moisture profile can be seen by comparing the 15 cm and 30 cm depth values. In the drier area, water availability in the deeper root zone can be observed. In the winter time, the user has Hydras at 3 different depths and frost depth profile can be monitored.

Example 2: Piles of organic substrate must stay within a certain moisture and temperature limit. Each pile is instrumented with 3 Hydras. Two are installed 20 cm and 40 cm deep in each pile. The third ones are installed at varying depths at 50..100 cm. Three of the piles are supplemented with a fourth Hydra also at 20 cm depth.

In addition to monitoring and recording pile properties, 3 different kinds of variabilities can now be observed. Comparing one pile to another is easy, since they both have sensors at 20 and 40 cm so that if a pile would behave differently from the others, it will be noticed. The

variability by depth can be seen for each pile, and those that have equal behaviour at 20..40 cm probably are comparable in regards of the third Hydra deeper in. A detailed depth profile can then be combined from these piles. In order to find out how much the choice of sensor location inside a pile causes difference in sensor readings (how uniform one pile is), comparing the two values from 20 cm depth will indicate the effect of in-pile variability.

It is good practise to only push the system's capabilities step by step:

- Install more transmitters close and fewer far away from the Base Station
- Try to place deepest ones close and shallow ones far to balance the depth/distance attenuations
- Install Scouts in several sessions, if possible, so that you can observe the performace as you go
- If range distance is inadequate, resolve whether to elevate antenna or obtain a stronger one

7. Trouble shooting

No incoming data to the Cloud

At least your Base Station receivers should report connectivity to the Cloud on regular basis, typically once every hour, even if no data is received from the underground transmitters. Please inspect that your Base station is powered on and there are led lights blinking inside the enclosure. If not, find out why the Base has no power or is it mechanically damaged.

Some led-lights are blinking, but the Base Station is not reporting to the Cloud

There are two kinds of devices inside the Base Station. Receiver boards are attached through the enclosure wall to receiving antenna cables and should constantly blink green, or alternate red/orange (see *Chapter 4 Base Station Led-light indicators*). The cellular modem is the device having a stub antenna and the SIM-card slot.

Before trying anything else, disconnect power from your Base Station, wait for 10 seconds, turn power back on and identify one of the following cases:

1. Both devices have blinking led lights

Both devices are operating. In this case it is most likely that the modem has no connectivity to the cellular network. Refer to *Chapter 4 Base Station Led-light indicators* and determine what state the modem is in by inspecting led light behavior. Make sure there is a properly inserted SIM card in the modem, the PIN-code request is shut off, your cellular plan allows GRPS data transfer and the operator has not made changes to your service. If there is any uncertainty of the cellular data plan, shut down the Base station and switch the SIM-card over to another device such as a mobile phone and test data connectivity at the same site. If the mobile phone shows very weak network signal strength, use the phone to locate a better location for your Base. From the network signal strength point of view, data communication should be fluent wherever voice calls succeed.

2. Only the receiver board has blinks lights

The modem lights are not blinking. You either have a too low operating voltage (lower than 7 VDC) or the modem is broken. You can try to disconnect power from the Base and gently move all cable connectors inside the box to eliminate the possibility of a loose cable.

3. Only the modem device has blinking led lights

In the very unlikely event that the modem is operating but the receiver board stays dead, the receiver board must have been damaged.

The Base Station reports to the Cloud, but no new data from Soil Scout™ Hydras comes in

The Receiver Board inside your Base Station is operating properly, since it triggers the reporting to the Cloud. If the Receiver Board light alternates red/orange, then it has not received any new data packages from Scouts for 1 hour or more.

Try to confirm that your Soil Scout™ Hydras are inside range. Find out if some new obstacle has emerged inbetween the Receiving Antenna of your Base Station and the installed underground Scouts.

Make sure that your Receiving Antenna is properly connected to the Base (both ends of the cable) and that the cable is not mechanically damaged. Determine if the antenna orientation has been altered. Find out if some other device may have begun emitting strong disturbance in the radio channel.

Make sure that you have not made such changes to the Cloud service that would cancel recording, such as deleted Scouts from the data base.

8. Technical Specifications

Specifications subject to change without notice
For additional information, please contact the Soil Scout team at info@soilscout.com

HYDRA100 Scout

Radio power	27.0 dBm (500 mW). Transmit only. Bandwidth <250kHz.			
Frequency Variants	869.525 MHz (ITU-1) Europe & selected other markets 921.700 MHz (ITU-2) Americas, Australia, NZ & selected other markets Custom Information upon request			
Battery capacity	3000 mAh, encapsulated primary lithium			
Life expectancy	Up to 20 years @ 1 cycle per 20 minutes			
Encapsulation	Black polyurethane molding			
Dimensions (L x W x H)	129 x 59 x 25 mm (5.1" x 2.3" x 1.0")			
Sensors	Temperature 3-prong integrated Capacitive (moisture content) & Resistive (EC / salinity)			
Moisture Accuracy	± 2 % mean error (1 % with correct soil type, 1 % installation repeatability)			
EC Accuracy	± 0.2 dS/m mean error, Typical resolution 0.1 dS/m, Range 0 to 20 dS/m			
Dielectric Accuracy	± 2 % mean error, Resolution 0.5 to 1.5 ε, Range 1 to 135 ε			
Temperature Accuracy	Range -40 to +80 °C / -40 to 176 °F Accuracy: +/- 0.1 °C / 0.18 °F			
Resolution	-40 to -11 °C	1.00 °C	-40 to 12 °F	1.80 °F
	-10 to +10 °C	0.25 °C	-12 to +50 °F	0.45 °F
	+10.5 to +80 °C	0.50 °C	+51 to +176 °F	0.90 °F

Base Station

Receiver RF sensitivity	-100 dBm, BNC connector			
Frequency Variants	Same as HYDRA100 Scout			
Operating Voltage	8-14 VDC, 300 mA			
Dimensions (L x W x H)	180 x 130 x 100 mm (7.1" x 5.1" x 3.9") ²⁾			
Data interface	4G modem / Custom ¹⁾			
Power Supply	100-240VAC with 5m (16'4") lead (included)			

A wide selection of Omni-directional / Directional / Sector antennas are compatible

ECHO Repeater

Receiver RF sensitivity	-100 dBm, BNC connector			
Frequency Variants	Same as HYDRA100 Scout			
Radio transmit power	27 dBm (500 mW)			
Power Supply	Solar panel charging a 2400 mAh 3.7V Li-ion battery. Mains power supply available as accessory (same as used for Base Station) Optional Repeater variant to enable connection to heavy battery			
Range	10km / 6-mile line-of-sight from ECHO to Base Station / another ECHO ³⁾			
Dimensions (W x H x D)	190 x 135 x 95 mm (7.5" x 5.3" x 3.7")			
Mounting	50 mm (2") pole mount / wall mount			

1) 4G modem is a third-party component. Network specific SIM-card not supplied. Not eSIM compatible.

2) Excluding mounting tabs + external interface ports

3) Any obstacles (vegetation, hills, buildings) between the radios will decrease range. Base Stations & Repeaters dynamically mesh.

9. Compliance statements

Soil Scout Ltd. / Soil Scout Oy hereby declares that Soil Scout Hydra transmitter and Base station receiver are in compliance with the following requirements:



RoHS Directive (2002/95/EC)

WEEE Directive (2002/96/EC)

Please dispose this product by taking it to your local collection point or recycling center. This will help to protect the environment in which we all live.

Battery Directive (2006/66/EC)

CE conformity: Soil Scout Ltd. / Soil Scout Oy hereby declares that Soil Scout Hydra transmitter and Base station receiver are in compliance with the essential requirements and other relevant provisions of:



R&TTE Directive (1999/5/EC)

EMC Directive (2004/108/EC)

Low Voltage Directive (2006/95/EC)

ErP Directive (2009/125/EC)

The relevant Declaration of Conformity is available online at <http://soilscout.com/legal>

FCC compliance: This equipment has been tested and found 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.

Changes or modifications not expressly approved by Soil Scout Ltd. could void the user's authority to operate the equipment.

10. Disclaimer

Soil Scout Ltd. / Soil Scout Oy disclaims any and all liabilities related to or arising from third parties' products or services, which use the data generated by a Soil Scout product. Soil Scout Ltd. / Soil Scout Oy disclaims any and all liabilities related to or arising from the functioning / malfunctioning of third party product or service, its interoperability with a Soil Scout product, safety of a third party product or service as well as any other liabilities related to or arising from a third party product or service. Soil Scout Ltd. / Soil Scout Oy shall not be liable for any data transfer fees or any other fees which might be due to or related to the use of Soil Scout products.

The products are protected by patents pending.