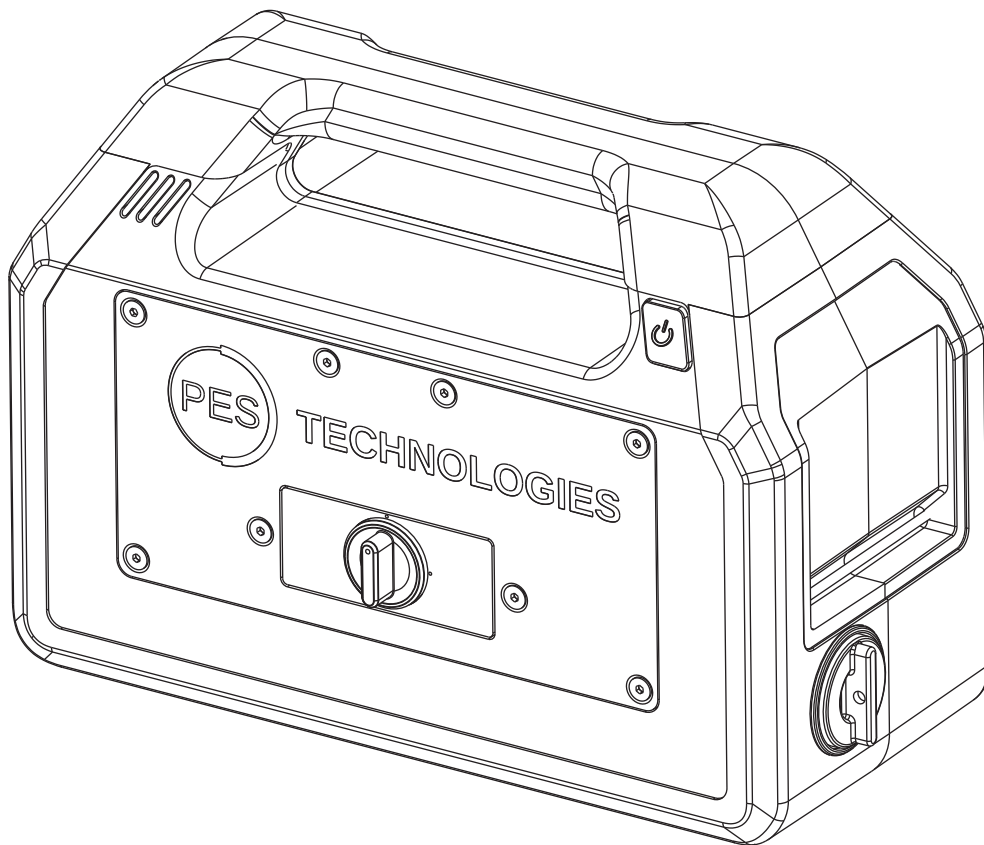




SOIL HEALTH MONITORING TOOL USER MANUAL

www.pestechнологies.com

Important Safety Instructions

READ THIS INSTRUCTION MANUAL CAREFULLY BEFORE USING THE PRODUCT

- The product consists of an Electronic Reader Unit (ERU), a cassette containing a reel of sensors and an App for a mobile device (mobile device not provided)
- Always include this instruction manual when passing the product on to a third party
- Do not use an obviously defective product
- Do not use the product where Bluetooth® wireless transmission is not permitted

SAFETY MESSAGES

 This symbol is displayed to indicate matters and operations that can cause risk. Read the part with this symbol carefully and follow instructions to mitigate risk.

 **WARNING**
This indicates that a failure to follow the instructions can cause serious injury or damage.

 **CAUTION**
This indicates that a failure to follow the instructions can cause minor injury or damage or affect the performance of the unit.

 **WARNING**
This product contains Lithium-ion battery cells.
Follow the warning information provided below to prevent incidents such as fire, explosions, or damage:

- Do not expose the device to excessive physical impact
- Do not pierce the device with sharp objects
- Do not use the product in ambient temperatures greater than 40°C
- Do not store in ambient temperatures greater than 50°C or below -10°C
- Do not expose the device to liquid chemicals
- Do not charge batteries at battery temperatures greater than 45°C

 **WARNING**
This product contains magnesium sulphate crystals:

- Avoid contact with eyes, and if this occurs flush with water
- This product is not intended for use by children



CAUTION

- Do not remove the cassette drawer while the unit is powered on
- If any part of the casing is cracked, do not use and instead call PES Technologies
- Do not expose the device to water moving with force
- Do not immerse the device in water
- If the device gets wet, dry with a cloth
- If the device requires cleaning, use a damp cloth to wipe it
- Do not operate with the base of the ERU at angles greater than 30°
- Do not open the device. If faulty contact, support@pesttechnologies.com for further instructions
- Do not move excessively or shake the ERU during a test. It is permissible to walk with the unit while a test is running
- Do not use the device in close proximity to areas of high emissivity, such as pylons and powerlines, as readings may be affected



INTENDED USE/LIABILITY

- This product is designed for use with mobile devices (e.g. mobile phones, tablets) that support wireless communications via Bluetooth®. This device is intended to work with Bluetooth® 5.0 and above. Performance cannot be guaranteed on devices running lower than Bluetooth® 5.0. There is no compatibility below Bluetooth® 4.1
- It is considered improper use when this product is used for anything other than its intended purpose



CARING FOR THE ENVIRONMENT

- This crossed-out wheeled bin symbol indicates that waste electrical and electronic equipment (WEEE) should be disposed of at specialised recycling centres or returned to your supplier for correct disposal. Do not dispose of the product with household waste
- Your old device may contain reusable parts that could be used to repair other products as well as other valuable materials that can be recycled to conserve limited resources

Please report any issues to support@pesttechnologies.com

Performance Criteria

FUNCTIONAL OPERATION

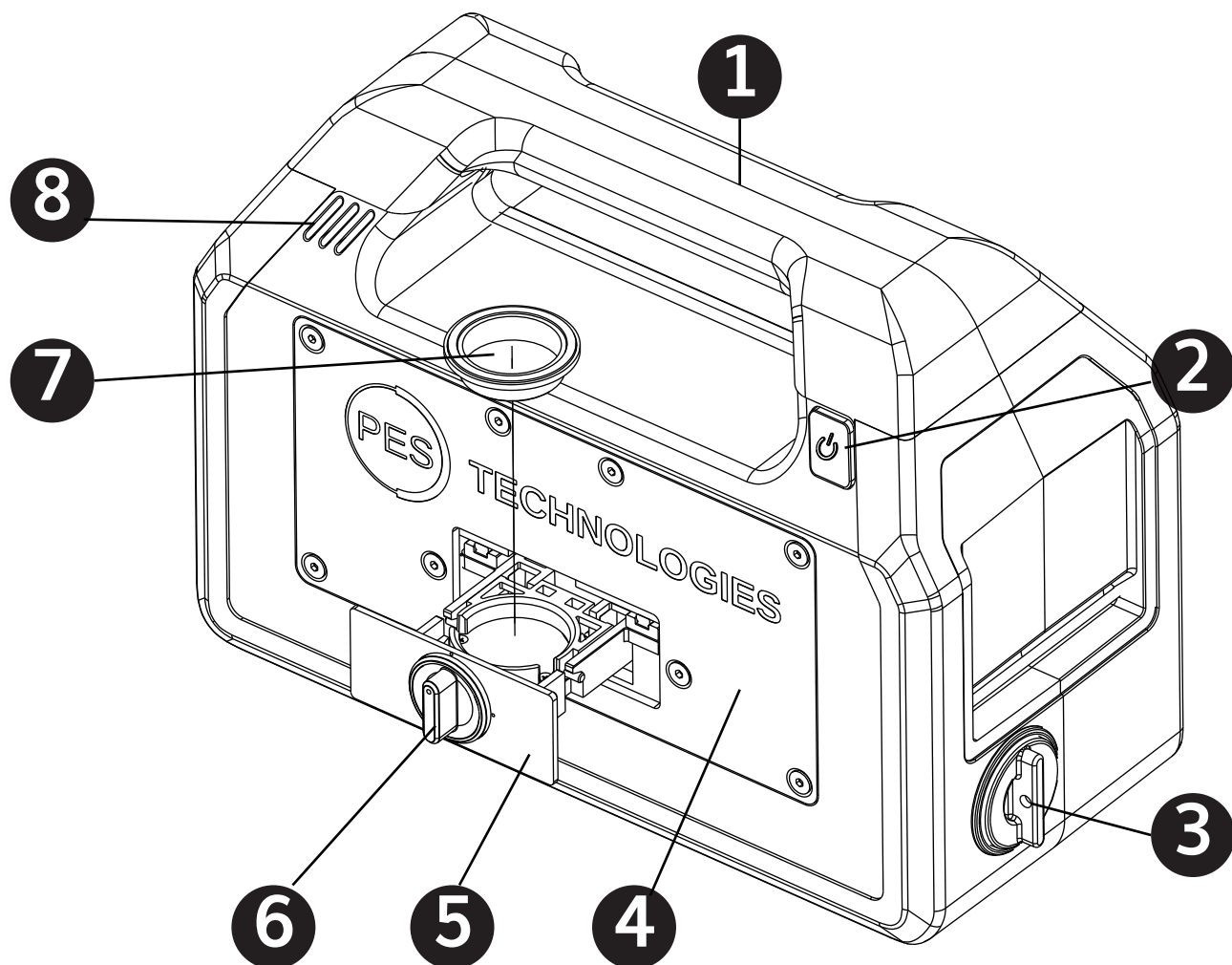
The Soil Health Measurement Tool consists of an Electronic Reader Unit (ERU), a Mobile Application (App) called ScentsCheck™, and a Cloud-based database communicating with a Machine Learning Algorithm (MLA).

- The ERU receives instructions from the App and executes these instructions to deliver a test file back to the App. The instructions sent by the App and the file format received by the App cannot be changed by the User; these are predetermined formats to ensure that the test is carried out consistently.
- The ERU is considered to be functioning normally if it is receiving the instructions, executing these and transferring the test back to the App.
- It is permissible for the ERU to transmit a file containing noise introduced from external sources. The MLA provides immunity to the final result.
- A sensor check must be passed before the test can commence. A small set of data is taken by the ERU and analysed in the App to ensure the sensor is showing all channels and no short circuits.
- The ERU is designed to work with the base horizontal. An angle of 30° (degrees) to the horizontal in either direction is permissible.
- The App initiates a test, receives the test file, formats the data and sends this to the cloud database.
- The Cloud database logs this data and sends this onto the Machine Learning Server, which in turn processes the data through the MLA. The processed data is returned to the Cloud database as a set of results to log against the original data. The results are then sent back to the App to be viewed by the User.
- The Cloud database and the Machine Learning Server are responsible for the quality of the results provided to the user.
- The user is responsible for the interpretation of the results and any actions taken in response to the results.

SPECIFICATIONS

- **Dimensions:** 295mm W x 130mm D x 200mm H
- **Weight:** 3.2kg
- **Operational temperature range:** 5°C to 40°C
- **Operational humidity range:** 20% to 90% non-condensing
- **Storage temperature range:** -10°C to 50°C
- **Storage humidity range:** 0% to 90% non-condensing
- **Battery:** 16.8V lithium-ion
- **Low voltage shut-off:** 14V
- **Charging:** USB Type-C port with Power Delivery Support
- **Charging requirements:** 20W charger minimum
- **Charging Time:** 8 hours from fully discharged
- **Communication to mobile device:** Bluetooth® Low Energy
- **Operational angle:** <30° from horizontal on the base

The Soil Health Measurement Tool



1. Electronic Reader Unit (ERU)

2. Power Button

3. Salt Chamber

4. Cassette Drawer

5. Soil Drawer

6. Drawer Lock

7. Soil Puck

8. LED Indicators 1, 2, 3 (L-R)

Preparing a Test

Preparing Your Soil Sample:

- Using a trowel or auger, clear the top 5cm of soil and discard it
- Collect a soil sample from a depth of 5cm to 15cm. For a more representative sample, PES recommends taking multiple cores from the same area, combining them in a bucket, and thoroughly mixing (homogenizing). This averages out localized variations for a more accurate test result

For a visual guide, visit www.pestechнологies.com.

Important Note: Expect minor variations in results between different samples, even when taken from the same homogenized soil.

Opening the Soil Drawer:

- To Open: Rotate the drawer lock (6) counter-clockwise and pull out the soil drawer (5)
- To Close: Push the drawer in and rotate the drawer lock (6) clockwise

Loading and Unloading Soil Puck:

- Remove the soil puck (7) from the soil drawer
- To Load: Take approximately one teaspoon of soil from the 5cm-15cm depth of your chosen location. Do not overfill; the soil should be level with the top of the puck
- Place the filled soil puck back into the drawer and close it
- You can now start the test via the App on your mobile device
- After testing, discard the soil sample. Do not re-use the same sample, as it has already released volatile organic compounds and will not yield accurate results

Offline Mode

If a phone signal or data connection is unavailable for testing, the ERU can operate offline. Its online/offline status is visible in the bottom-left corner of the App's Home page, above the toolbar. Offline mode requires Bluetooth® to be enabled on your mobile device.

While offline, you can start new tests, but results will only be available after your phone reconnects to data and the test automatically transfers to the cloud database in the background.

To prevent data loss, tests are stored on the ERU until uploaded to the cloud. The ERU can store approximately 15 tests. If more than this are conducted offline, a connection must be re-established to upload the tests and clear the ERU storage.

In offline mode, creating new farms and fields is not possible. Please create these beforehand if poor signal is anticipated.

LED Status

	LED 1	LED 2	LED 3
Unit off	Off	Off	Flashing amber 4s
Unit charging (slow)	Off	Off	Flashing green
Unit charging (fast)	Off	Flashing green	Flashing green
Not charging*	Off	Flashing amber	Flashing green
Unit charged	Off	Solid green	Solid green
50% battery	Off	Solid amber	Solid green
<20% battery	Off	Solid amber	Solid amber
Low battery**	Off	Solid amber	Flashing amber
Testing	Flashing blue	Solid green	Solid green
Unit error	Off	Solid amber	Solid red

*The unit will indicate that it is unable to charge from the connected power source. Please try a different charger.

**At low battery, the unit cannot be used for further tests. Please charge the ERU.

Troubleshooting

Issue	Possible cause	Actions
Sensor failure	Poor sensor	Press "Retry" button in the App
	Soil drawer not closed	Close drawer and ensure it is locked
	Soil drawer connection poor	Re-open and re-close the drawer and press "Retry" button in the App
		Take cassette drawer out and screw back in the following order: 2 long screws either side of soil drawer 2 long screws top of cassette drawer 4 outer short screws
		Contact the PES Support Team
	Poor sensor connection	Remove cassette drawer Remove cassette Ensure plunger is working by twisting black cap Ensure sensor is flat against the cassette board window Re-seat cassette Ensure cassette is screwed down
		Contact the PES Support Team
Test won't start	ERU has low battery	Check ERU battery level in App Charge battery
	Information missing on form in App	Ensure all applicable boxes are filled out in App
App cannot see ERU	ERU has low battery	Charge the battery of the ERU
	Bluetooth® on phone is off	Check phone Bluetooth® is on
	Unit asleep / device not on	Check LEDs are green If not, press power button for 2 seconds and release
	Another user connected	Check no-one else in the proximity has connected to the ERU through their App
	Too far away	Ensure you are within 5m of the ERU
Results not returned	No phone signal	Connect to a 4G/5G network or WiFi
		Contact the PES Support Team

Changing a Cassette



WARNING

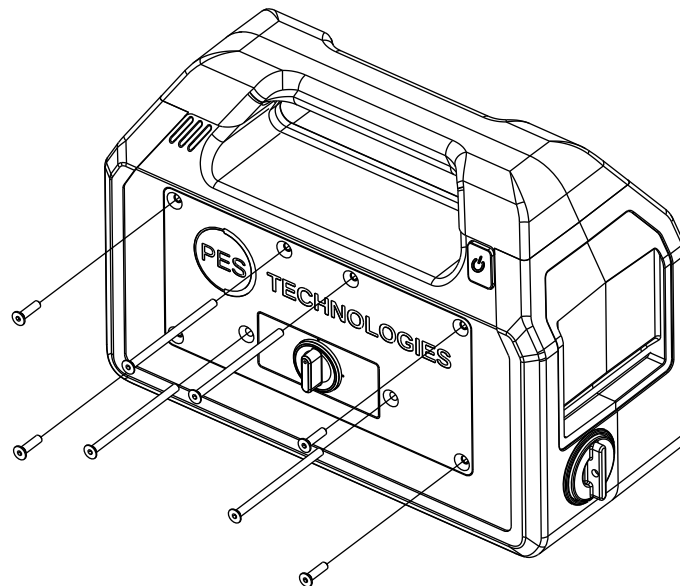
Power off the ERU before proceeding. To prevent damage to sensitive components, avoid touching the pins inside the rear of the drawer cavity.

You will need to change the ERU cassette once all its sensors have been consumed. PES Technologies sells replacement cassettes containing 50 or 100 sensors.

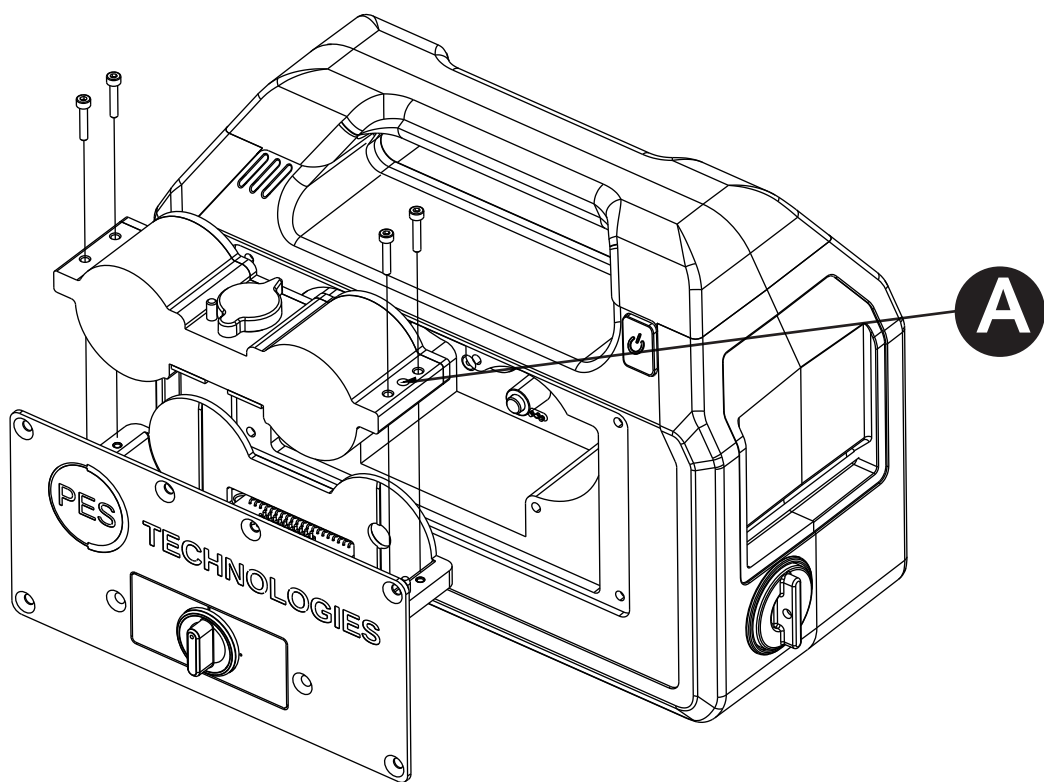
While cassettes are programmed with the purchased number of sensors, they also contain extra to account for potential failures. The system will automatically track the number of successful tests and disregard any sensor failures, guaranteeing you receive the full number of tests purchased.

Replacing the ERU Cassette: Use a **2.5mm Hex / Allen key** (included with your new cassette) to remove the old cassette and install the new one.

- Remove the 8 fastening screws using the 2.5mm Hex / Allen key



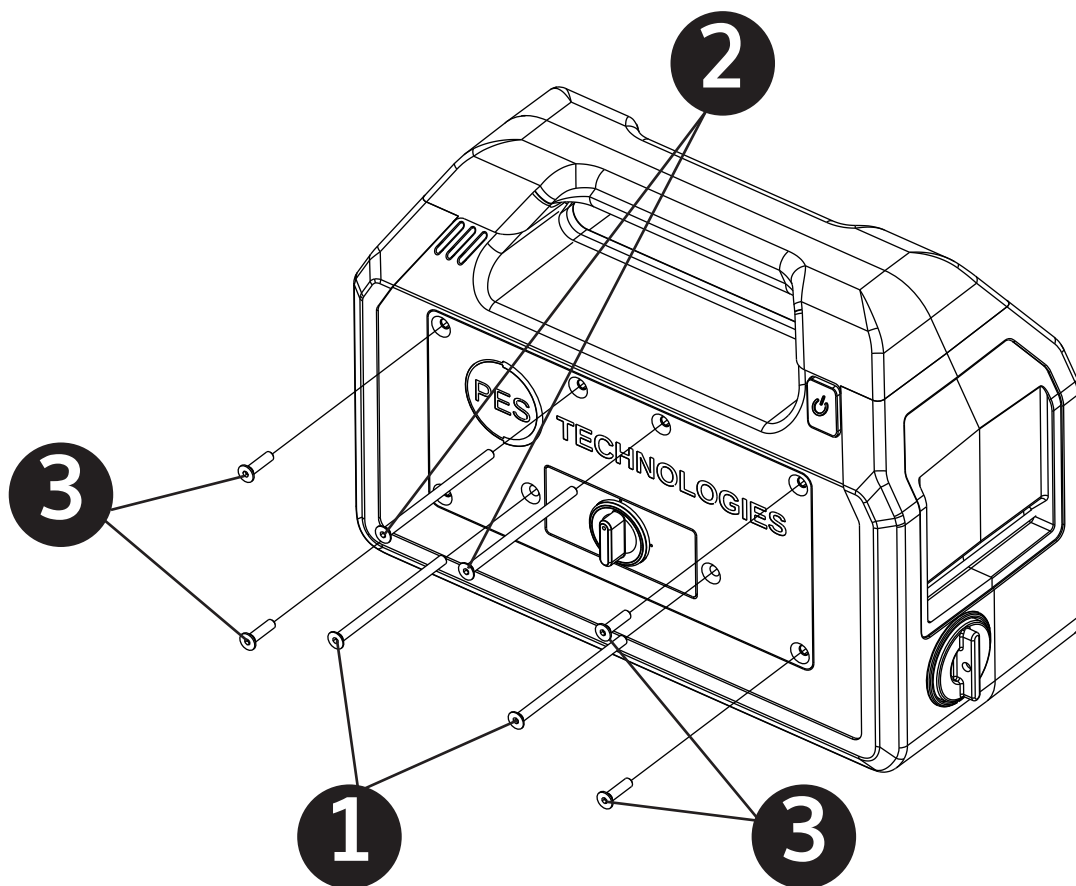
- Remove the cassette drawer
 - Tip – Open the soil drawer and gently pull to pop out the cassette drawer
- Remove the four screws affixing the Cassette to the drawer using the 2.5mm Hex/Allen key (provided with your replacement cassette)
- Lift the cassette out of the drawer
 - Please return this cassette to PES Technologies using the packaging from your replacement cassette and the pre-paid envelope
- To install the cassette, insert the replacement into the drawer, ensuring that the plain face is to the front and the alignment hole (A) is on the right-hand side
- Fasten the cassette to the drawer with the 4 screws, tightening them gently



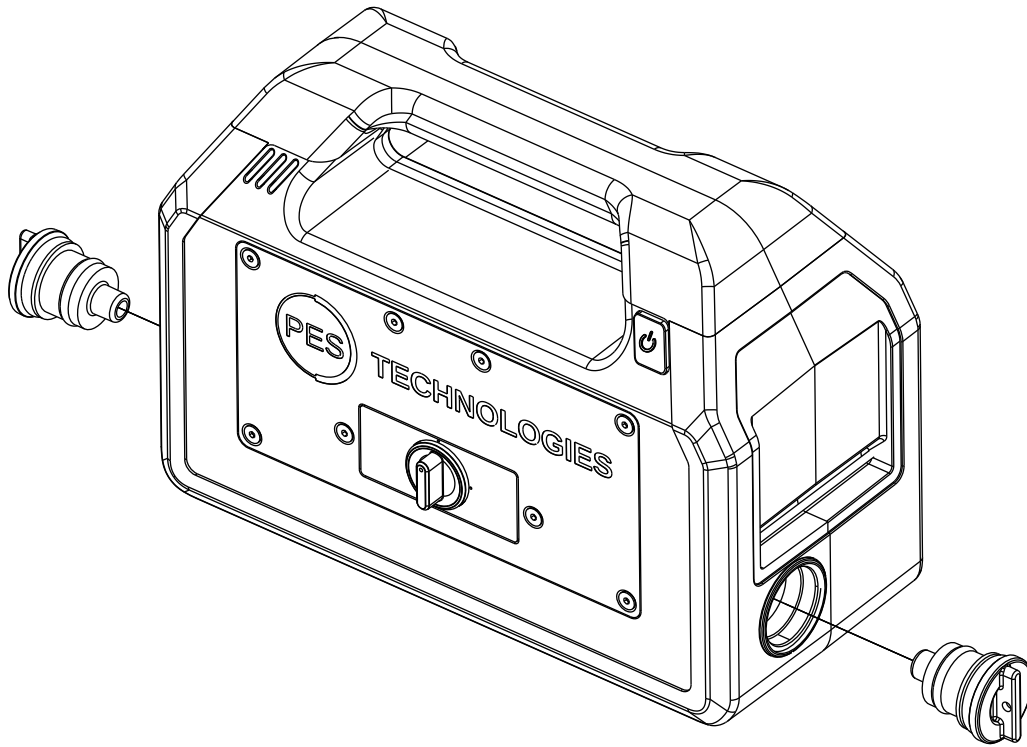
CAUTION

DO NOT OVERTIGHTEN THE SCREWS

- Replace the cassette drawer into the ERU and press firmly to ensure it is properly located
- Replace the 8 screws in the front face of the cassette drawer, starting with the two long screws on either side of the soil drawer (1), then the next two long screws (2), and finally the 4 short screws (3)



Changing Salt



- When a cassette is changed, the salt (Magnesium Sulphate crystals – Epsom salts) is changed as well. Two small packets of Epsom salt will be provided with each cassette PES Technologies sends to you
 - Do not use scented salts – just the pure Epsom salts provided to you
 - Magnesium Sulphate does not absorb Volatile Organic Compounds (VOCs), and so does not affect the results of a test. Other salts or desiccants must not be used, as they will affect the results of any test
- To change the salt, remove the salt tube bungs from either end of the unit. The bungs should pull out with the aid of a tool, such as the hex key provided for the cassette change, may be required if they are too stiff to give extra leverage
- Pour the used salt away by tilting and gently shaking the unit
 - You may need to use an implement to break up any crusted salt
 - It is safe to pour the salt into the general waste
- Check the filter is in the chamber and is visually clear from salt crystals



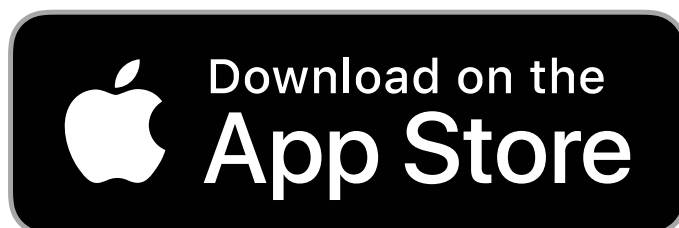
CAUTION

Take care not to damage the chamber or the filters located inside the chamber

- Fill with new salt
- Replace the bung
 - Ensure the bungs are pushed all the way in

Engineering and Operations:
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Download the PES ScentsCheck app here:



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