

# PosiTector<sup>®</sup> PC<sup>✓</sup>

## Powder Checker<sup>®</sup>

### Coating Thickness Gage

INSTRUCTION MANUAL v. 1.1



**DeFelsko<sup>®</sup>**

# Introduction

The **PosiTector® PC Powder Checker®** is a hand-held, non-contact Coating Thickness Gage that uses an airborne high frequency ultrasound to analyze coating powder applied to rigid substrates to calculate and display a predicted cured thickness.

The instrument consists of a base unit and a probe that communicate with each other via Bluetooth wireless technology. They must stay within 10 meters (30 feet) of each other while measuring. A rubber holster with belt loop allows the base unit to stay with the operator while measuring.

**Note:** Do not use compressed air on the probe. Tips for cleaning the screen guard can be found on pg 15.

**Note:** Throughout this manual, the **W** symbol indicates more information about the particular topic or feature is available on our website. Go to: [www.defelsko.com/manuals](http://www.defelsko.com/manuals)

## Power-up / Power-down

**Step 1:** Power-up the probe by pressing the  button.

**Step 2:** Power-up the base unit by pressing any one of the 3 buttons. A beep and a solid probe icon on the base unit indicates both units are ready to measure.

To preserve battery life, both units power-down after approximately 5 minutes of inactivity. All settings are retained.



When a USB cable is connected to the base unit, power is supplied through the USB cable. The batteries are not used and the base unit will not automatically power down. The probe will still automatically power down.

The base unit can be powered down at any time by holding down both (-) and (+) buttons simultaneously for 5 seconds. The probe will also power down.

## Operation Overview

1. **POWER UP** both units.
2. **ZERO** the probe (see pg. 6)
3. **ADJUST** to the specific powder if necessary (see pg. 8)
4. **MEASURE** the applied powder (see below)

### How to Measure

1. Power-up both units. Bring the probe to within 5 cm (2 inches) of the coating powder.
2. Press and hold the  button. Bring the probe closer to the powder. While watching the probe display, align the Distance Paddle with the Distance Target Bar. (see pg. 3)
3. While the probe button is depressed, probe distance and angle should be varied slightly keeping:
  - (a) the Distance Paddle close to the Distance Target Bar, and
  - (b) the Amplitude Indicator at maximum height.
4. Release the  button when you hear a double BEEP or see a thickness measurement on either display.

Both units will power-down automatically after approximately 5 minutes of inactivity.

#### Measurement Notes:

If a thickness result does not appear after 5 seconds, release the measurement button and try again. Wait 1 to 2 seconds between readings.

Small, erratically swinging parts may present measurement challenges. Steady the part whenever possible.

If erroneous readings continually result, change the measurement strategy by rotating the probe, altering its alignment to the part, or by measuring a different location on the part.

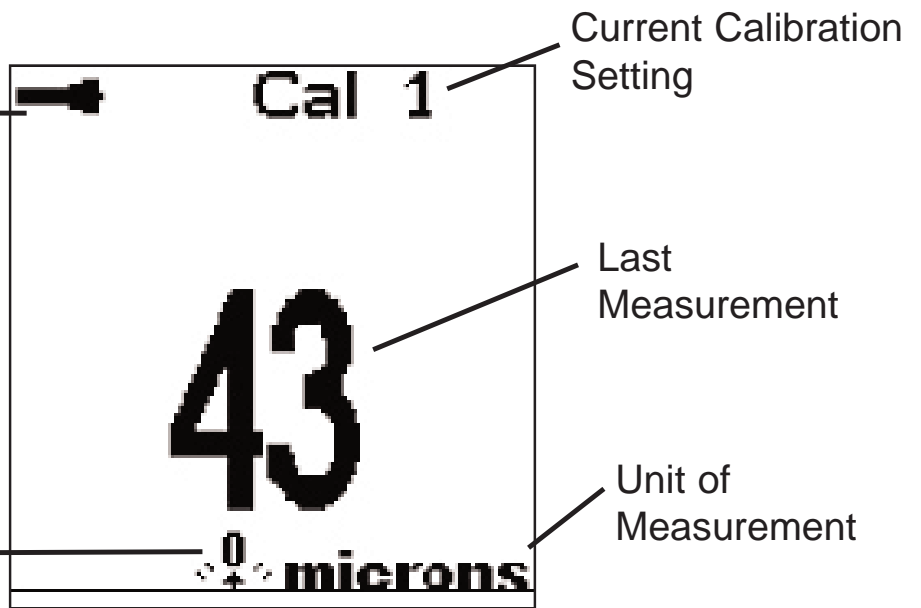
For best results use **Statistics** mode (pg. 12) to generate averages. The average of a series of measurements is often a more meaningful prediction of cured thickness than a single reading.

# Displays

## Base Unit Display:

Solid indicates good wireless connection to probe. Flashing indicates no probe connection.

Factory Calibration Symbol (pg. 8)



## Probe Display (button not pressed):

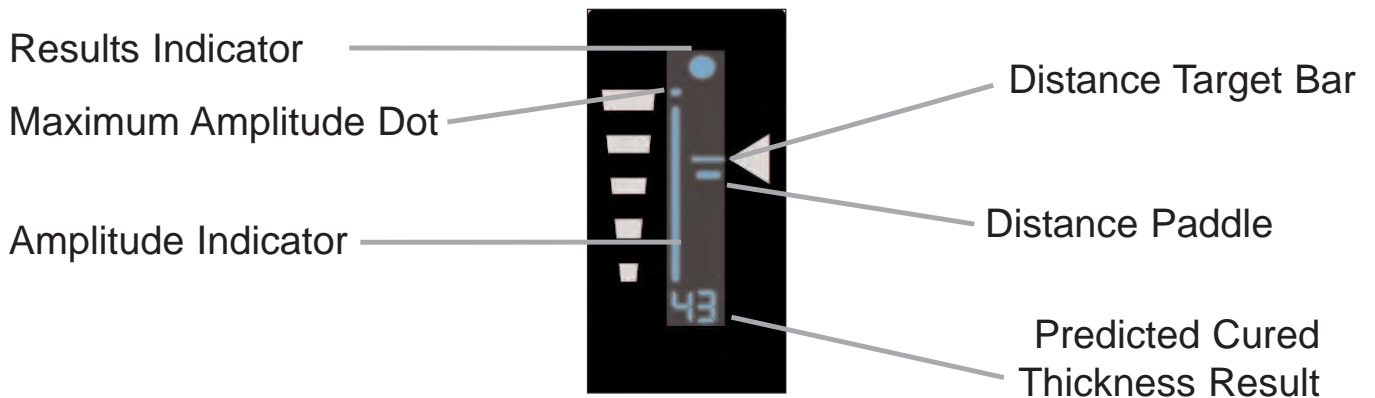


Probe Batteries Status (pg. 15)

Bluetooth Function Indicator

Predicted Cured Thickness Result

## Probe Display (button pressed):



**Bluetooth Function Indicator:** The  symbol indicates the base unit and wireless probe are communicating properly.

**Results Indicator:** When the probe is in the proper position and good samples are being taken, a solid DOT blinks on the probe display, the base unit LED blinks green and emits a high beep. When samples are inconclusive, an "X" blinks on the probe display, the base unit LED blinks red and emits a low beep.

**Distance Paddle:** Graphically represents the distance to the target. It rises and falls to indicate distance from the probe tip to the surface of the powder.

**Distance Target Bar:** The optimum distance for measurement is 18 mm (3/4 inch) between the tip of the probe and the surface of the applied powder. During measurement, keep the Distance Paddle close to the Distance Target Bar.

**Amplitude Indicator:** Strength of the ultrasonic echo. A high position indicates good probe orientation relative to perpendicular. The bar will generally reach higher positions when measuring thin powder and when the probe is at a 90-degree angle to the powder surface.

**Maximum Amplitude Dot:** Marks the highest position the Amplitude Indicator reached during the current measurement attempt.

**Predicted Cured Thickness Result:** When a valid measurement is calculated, the base unit BEEPS twice, the LED blinks green, and the predicted cured measurement result is displayed on both the probe and base unit. Continuing to hold the probe button will result in additional samples being taken.

There are 4 types of displayed measurement results:

**43** — Predicted thickness result.


**0** — The collected samples have resulted in a good reading, but the resultant predicted cured thickness is less than the minimum range.

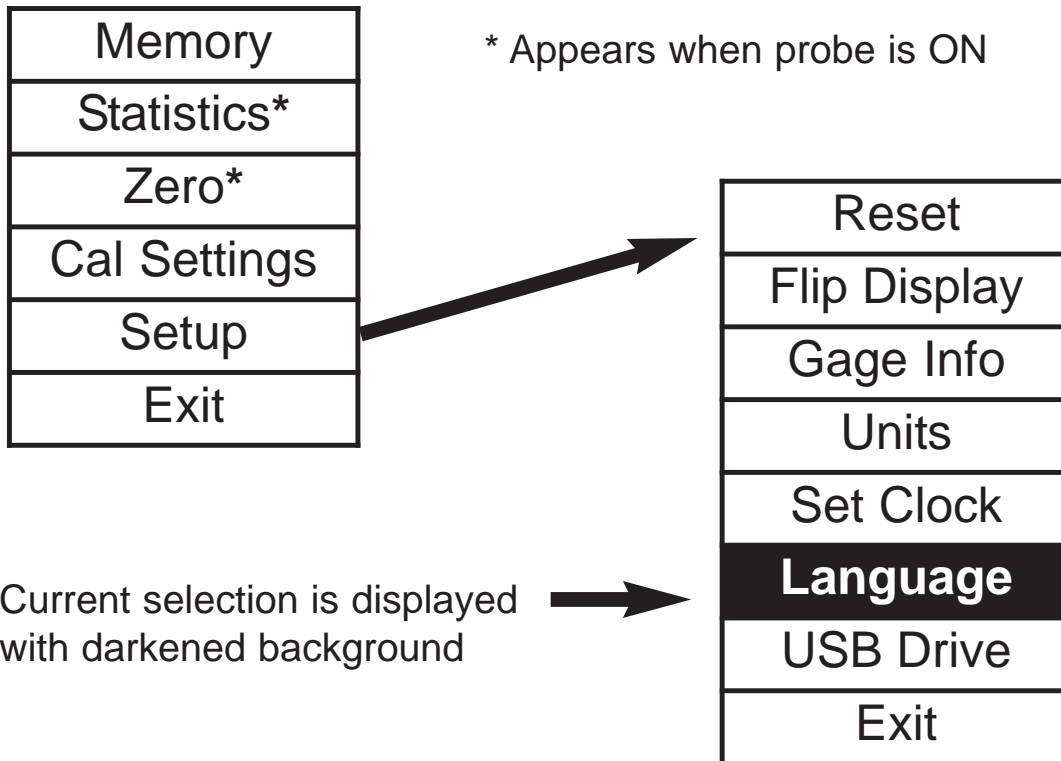
**++** — The collected samples have resulted in a good reading, but the resultant predicted cured thickness is greater than the maximum range.


**--** — An indeterminate or invalid reading.




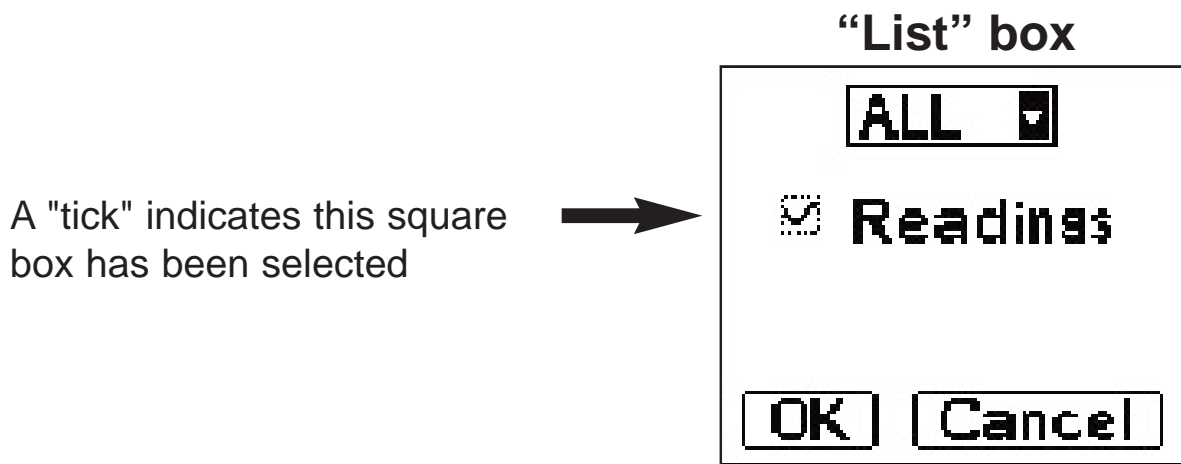
# Menu Operation

Instrument functions on the base unit are menu controlled. To access the full Menu, power-up both the probe and base unit. Then press the  button. If the probe is not powered-up a condensed menu is displayed.



To navigate, press (-) to scroll DOWN, (+) to scroll UP and  to SELECT. To exit any menu, press both (-) and (+) buttons simultaneously or select Exit from the Menu.

List boxes have a down arrow on the right-hand side. Use the (-) or (+) buttons until your desired choice appears, then press  to select this choice and move focus onto the next item.



## Verification of Accuracy

Before first use on a new powder and periodically thereafter, the user should perform an accuracy check. This ensures the gage is working properly by comparing predicted thickness values with actual cured thickness values.

1. Zero the probe (pg. 6).
2. Electrostatically spray powder onto a flat, smooth metal sample.
3. Measure the uncured powder with the **PosiTector PC**.
4. Cure the powder.
5. Measure cured thickness with a magnetic or eddy current coating thickness gage such as the **PosiTector 6000**. Compare results.

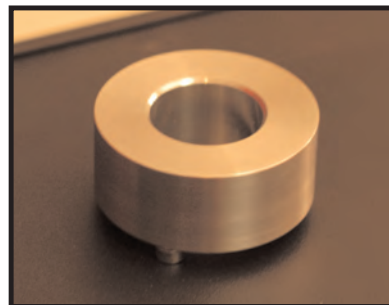
A successful verification requires that the average of a series of measurements by both instruments be within their combined tolerances. If not, adjust the **PosiTector PC** using one of the methods described on page 8.

For best accuracy, perform a Zero at the beginning of every shift to compensate for temperature and humidity changes. It is also required after a Reset (pg. 13).

### Zero Menu Option

Zero

1. Place the included Powder Probe Fixture onto a hard, flat, smooth surface (i.e. glass or metal).
2. Place the measuring end of the probe into the Fixture.
3. Power-up both units.
4. On the base unit select the Zero menu option. The zero process can take up to 30 seconds.



# Calibration and Adjustment

## Cal Settings

The **PosiTector PC** is factory calibrated and performs an automatic self-check each time it calculates a measurement. For many powder measurement applications no further adjustment is necessary. Simply **Zero** at the beginning of each shift, then measure.

Sometimes gage measurement calculations can be influenced by the composition of the coating powder. A calibration adjustment improves accuracy in these circumstances.

Adjustment, or Calibration Adjustment, is the act of aligning the gage's predictions to match those of a known cured sample.

Begin by performing a Verification of Accuracy (pg. 6) to determine if there is a need for an adjustment. If the average of several thickness results is outside the combined tolerances of the two measuring instruments (**PosiTector PC** and dry film thickness instrument) then 3 adjustment techniques are available to correct the variance.


User adjustments are stored in the current Cal setting. It may be desirable to open a new Cal setting first (pg. 10).

\* These menu options appear only when the probe is powered-up.

<b>CAL</b>
Cal Memory
1 Pt Adjust*
2 Pt Adjust*
Powder Comp*
Exit



## Factory Calibration Symbol

 This symbol indicates the instrument is measuring with factory calibration settings. It appears whenever a Reset (pg. 13) is performed or whenever a new calibration setting (pg. 10) is created. It disappears whenever a calibration adjustment is made (pg. 8) or when a user calibration is loaded from cal memory (pg. 10). A probe Zero (pg. 6) does not change the status of the symbol.

## Adjustment Techniques

To ensure the gage is working properly, the user should periodically perform an accuracy check by comparing predicted thickness values with actual cured thickness values (pg. 6).

If the average of a series of measurements by both instruments is not within combined tolerances, the **PosiTector PC** can be adjusted using one of three methods.

- 1) 1-point Adjustment - The first and most common choice.
- 2) 2-point Adjustment - If a 1 Pt Adjust does not improve accuracy.
- 3) Powder Compensation - If adjustments fail to improve accuracy.

### 1 Pt Adjust


1. Zero the probe (pg. 6).
2. Electrostatically spray approximately 75 microns (3 mils) of powder onto a flat, smooth metal sample.
3. Open a New CAL setting (optional - pg. 10).
4. Select New Batch (pg. 11).
5. Take at least 3 uncured powder measurements with the **PosiTector PC**. Results will be stored in the Batch.
6. Cure the powder.
7. Measure cured thickness with a magnetic or eddy current coating thickness gage. Record the results.
8. Select "1 Pt Adjust" then select the batch name from Step 4 into which the previous measurements had been placed.
9. Adjust the displayed batch average lower (-) or higher (+) to match the cured thickness value.

## 2 Pt Adjust

1. Zero the probe (pg. 6).
2. Electrostatically spray powder onto 2 flat, smooth metal samples. Place approximately 40 microns (1.5 mils) on one and 75 microns (3 mils) on the other.
3. Open a New CAL setting (optional - pg. 10).
4. Select New Batch (pg. 11)
5. Take at least 3 uncured powder measurements on the thin powder panel with the **PosiTector PC**. Results will be stored in the Batch.
6. Open a second new Batch.
7. Take at least 3 uncured powder measurements on the thick powder panel with the **PosiTector PC**. Results will be stored in the second Batch.
8. Cure the powder on both panels.
9. Measure cured thickness with a magnetic or eddy current coating thickness gage. Record the results.
10. Select "2 Pt Adjust" then select the appropriate batch names when asked.
11. Adjust the displayed batch averages lower (-) or higher (+) to match the cured thickness values.

## Powder Comp

1. Zero the probe (pg. 6).
2. Electrostatically spray a thick layer of powder (135 microns / 5 mils) onto a flat, smooth metal sample. Lay the panel on a table surface.
3. Place the included Powder Probe Fixture onto the coated panel.
4. Place the measuring end of the probe into the Fixture.
5. On the base unit select the "Powder Comp" menu option. This can take up to 30 seconds.
6. A 1- or 2-point adjustment may be required after this operation.

Note: The  symbol on the display will turn off after the successful completion of an adjustment.

# Calibration Memory

## Cal Memory

When measuring a particular part with a specific powder, it is often convenient to be able to store any unique calibration adjustments made for that application. Then, if you return to that part, the corresponding Cal setting can be conveniently and quickly restored.


A Cal setting is any of the three calibration adjustments (pg. 8). The **PosiTector PC** always displays the current calibration setting (ex. Cal 3) in the upper right corner of the display.

The gage reverts back to its factory default Cal 1 setting after a Reset (pg. 13) or if the user deletes all calibration settings (below).

### New

-Creates a new calibration setting using the next available number (Maximum of 9). By default, these new Cal settings are initially created with the gage's factory settings as indicated with the  $\cdot\frac{0}{\pm}\cdot$  symbol that appears at the bottom of the display.

### Open

-Loads an existing calibration setting. Use the (-) or (+) buttons to scroll the List box until the desired setting appears, then press .

### Delete

-Removes a calibration setting completely from the list. That Cal number can be reused later with the "New" command.

### Print

-Sends a list of all Calibration Settings to the IR printer using the gage's built-in IR port.

## Memory Mode

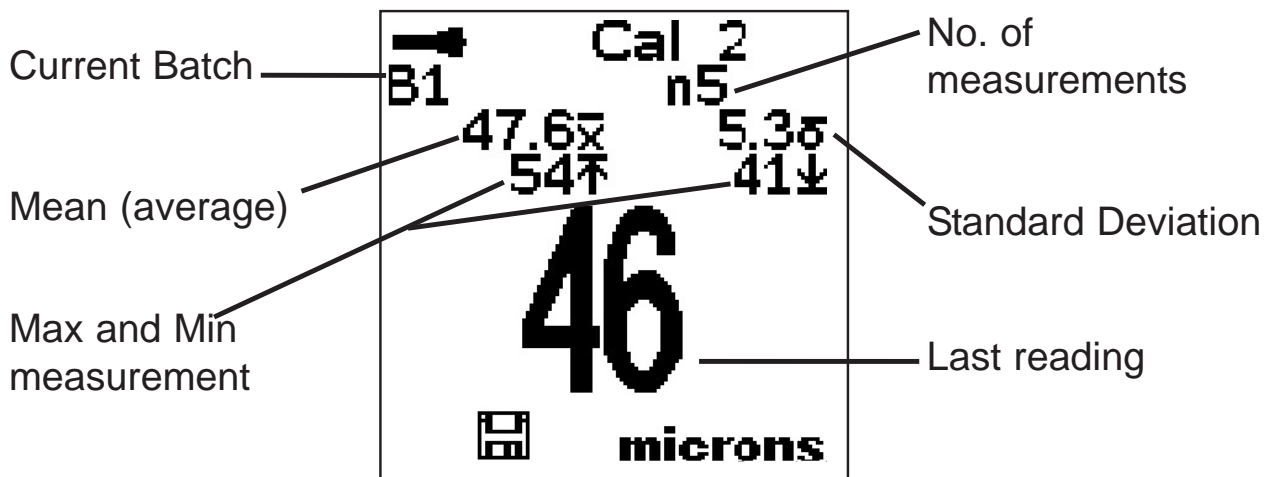
### Memory

The **PosiTector PC** can record 1,000 measurements in up to 100 groups (batches) for on-screen statistical purposes, for printing to an optional IR printer, or for downloading to a computer using the included USB cable. Readings are time-stamped as they are taken.

### New Batch

(This menu option appears only when the probe is powered-up)  
-Closes any currently opened batch and creates a new batch name using the next higher number. For example, if only **Batch 1** and **Batch 3** exist, then **Batch 4** would be created and made the current batch. Statistics are displayed and each measurement will now be simultaneously shown on the display and stored into this new batch. On-screen statistics are immediately updated with each measurement. New batch names are date stamped at the time they are created. Opening a New Batch will turn Statistics mode OFF.

**Shortcuts:** When a batch is open, create a new batch by pressing (+). Remove the last reading from the current open batch by pressing (-).



### Open

-Selects a previously created batch to open and makes current. If it contains measurements, on-screen statistics will immediately reflect values calculated from this batch. Opening an existing Batch will turn Statistics mode OFF.

## Close

-Stops the recording process, closes the current batch, and removes the statistics from the display.

## Delete

-Removes the selected batch completely from memory. The name is deleted and all measurements are erased.

## View

-Lists all readings on the display from the currently selected batch. The last batch is viewed if no batch is currently open. Upon selection, the last 10 measurement values are initially shown. Scroll using the (-) or (+) buttons. Hold for 1 second to scroll a page at a time.

## Print

-Prints all stored measurements from the selected batch, or all batches, to the optional IR printer. Press both (-) and (+) buttons simultaneously to cancel printing.

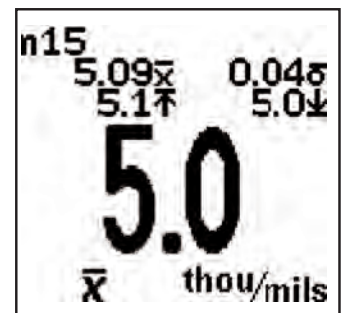
### Downloading Measurements

A computer can view and download measurements stored in memory using the included USB cable. Measurements are not erased from memory after downloading. See "USB Drive" on pg. 14.

## Statistics Mode

### Statistics

The **PosiTector PC** can display basic statistical information as measurements are taken. Individual measurement results are not stored into memory. When Statistics is selected, a  $\bar{x}$  symbol and a statistical summary appear on the display.



#### Notes:

Remove the last measurement by pressing the (-) button.

Clear statistics by pressing the (+) button.

Turning Statistics mode ON will close a currently open batch.

Turning Statistics mode OFF will clear all current statistical information.

## Setup Menu

### Setup

#### Reset

**Reset** restores factory settings and returns the gage to a known, out-of-the-box condition. It is handy when you want to "start all over".


The following occurs:

- All batches are closed and stored measurements are erased.
- Calibration adjustments are cleared and the instrument is returned to the gage's factory calibration settings as CAL 1.
- Menu settings are returned to the following:

**Memory** = OFF

**Statistics** = OFF

**USB Drive** = ON

A more thorough **Reset** can be performed by holding the (+) button when the gage is powered down until the Reset symbol  appears. It performs the same function as a menu Reset with the addition of **Units** = microns, **Language** = English, and **Flip Display** = Normal.

A probe **Zero** (pg. 6) must be performed after any Reset.

#### Flip Display

This option causes the base unit display to read upside down. Ideal for viewing while the base unit is attached to a waist belt so that the display is conveniently pointed toward the operator.

#### Units

This menu button converts the display and all stored readings from microns to mils or vice versa.

#### Set Clock

All batches are date-stamped when created and all measurements are time-stamped (24 hour format) when stored into these batches. It is therefore important to keep both the date and time current using this menu option.

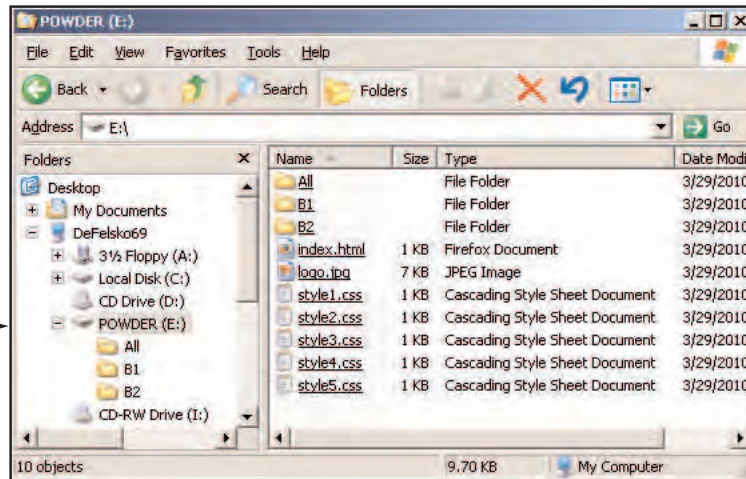
# USB Drive

## USB Drive - Selected

The **PosiTector PC** uses a USB mass storage device class which provides a simple interface to retrieve data in a manner similar to USB flash drives, cameras, or digital audio players.

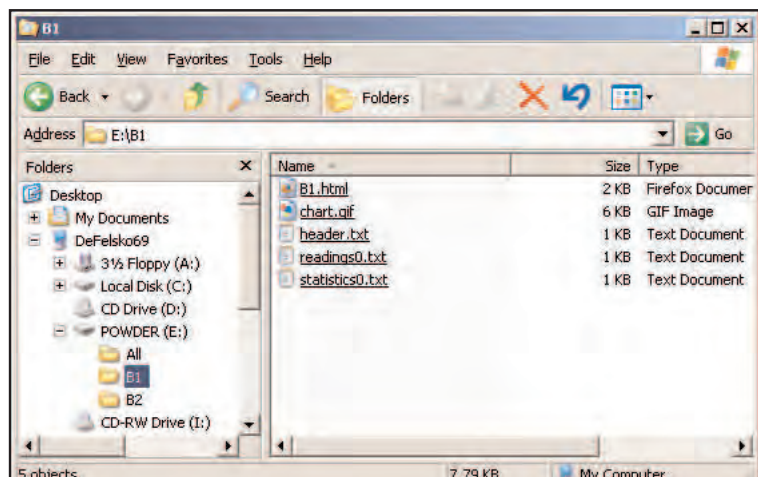
When the "USB Drive" option is selected with a tick mark , any computer can view and download measurements stored in memory (in batches) by navigating a virtual drive labeled POWDER using the included USB cable.

New drive



A formatted HTML report is viewed by selecting the "index.html" file found in the root directory. Optionally, "readings0.txt" files located in each batch folder (i.e. B1) provide access to measurement values.

Measurement values, reports, graphs, or the entire POWDER virtual drive can be copied onto your computer or imported into a document or spreadsheet for permanent storage. The "logo.jpg" file can be replaced with a corporate logo. **W**



While the USB cable is connected to a computer, new measurements will not be included in reports and text files until the USB cable is unplugged and re-connected.

## **USB Drive - Un-Selected**

When this option is not selected with a tick mark , measurement values can be downloaded, as they are taken, to a computer, data collector, or powder controller using a serial gadget driver. (W)

**Note:** When the USB Drive option is changed (selected or de-selected), the instrument must be powered-down, then powered-up to undertake the change.



**Note:** When a USB cable is connected to the base unit, power is supplied through the USB cable. The batteries are not used and the base unit will not automatically power down.

## **Maintenance**

The base unit requires no maintenance except battery replacement. Clean with a soft brush or cloth.

The screen at the measuring end of the probe can be unscrewed for cleaning. Accumulated powder should be carefully removed from the screen by no more than 0.2 MPa (20 - 30 psi) of compressed air. Do not direct air directly into the probe. Replacement screens are available.

## **Changing the Batteries**

The battery symbol  displays a full bar with fresh alkaline batteries installed. As the batteries weaken, the bar will be reduced. When the battery symbol is low  the gage can still be used, but the batteries should be changed at the earliest opportunity. Use only "AAA" alkaline batteries (3) in the base unit and "AA" alkaline batteries (3) in the probe. Nickel-cadmium and nickel-metal hydride rechargeable batteries will work but the gage may appear to have weak batteries. The gage will turn off automatically when batteries are very low, preceded by a low battery warning on the display. If batteries are very low the gage may startup but then turn off quickly.



**Note:** To retain all user settings and stored memory readings, only replace the batteries after the gage has automatically powered-down.



## Returning for Service

Before returning the instrument for service...

1. Install new alkaline batteries in the proper alignment shown within battery compartments.
2. Examine the probe screen for dirt or damage.
3. Perform a **Reset** (pg. 13) and a **Zero** (pg. 6)

If you must return the instrument for service, describe the problem fully and include measurement results, if any. Be sure to also include the base unit, probe, your company name, company contact, telephone number and fax number or email address. Return to your point of purchase.

**Website:** [www.defelsko.com/support](http://www.defelsko.com/support)

## Technical Data

Conforms to ASTM D7378

Base unit dimensions: 146 x 64 x 31 mm (5.75" x 2.5" x 1.2")

Probe dimensions: 222 x 50mm diameter (8.75" x 2" diameter)

Alkaline Batteries: Base unit 3 "AAA" batteries. Probe 3 "AA" batteries

Temperature Range: 0 to 40°C (+32° to +104°F)

Measuring Range: 20 - 110 microns (0.8 - 4.3 mils)

Measuring Resolution: 1 micron (0.05 mil)

Measuring Distance: approximately 18 mm (3/4 inch)

Measurement Area: 2 mm (0.08 inch)

Measuring Time: approximately 2 to 5 seconds

Accuracy:  $\pm 5$  microns ( $\pm 0.2$  mils)

The probe uses ultrasound frequencies above 100KHz with sound pressure levels well below 110 dB (relative to 20uPa).

## Available Options

A variety of accessories are available to help you get the most from your **PosiTector PC Powder Checker**. 



**Warning:** The **PosiTector PC Powder Checker** contains a very powerful magnetic mount for attaching the protective rubber holster to nearby steel structures. As with all magnets, avoid contact with electronic instruments or devices sensitive to magnetic fields such as pace makers and coating thickness gages. Care should also be given to the storing and shipping of any strong magnet to prevent contact with sensitive devices.



## **Limited Warranty, Sole Remedy and Limited Liability**

DeFelsko's sole warranty, remedy, and liability are the express limited warranty, remedy, and limited liability that are set forth on its website:

[www.defelsko.com/terms](http://www.defelsko.com/terms)





# DeFelsko®

Simple. Durable. Accurate.

[www.defelsko.com](http://www.defelsko.com)

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