PosiTector® 6000

Coating Thickness Gages

INSTRUCTION MANUAL v. 7.1

DeFelsko®

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Introduction

The **PosiTector** *6000* hand-held, electronic instrument non-destructively measures the thickness of coatings on metals, quickly and accurately. It consists of a body (Standard or Advanced) and probe (Built-in or Separate).

Principles of Operation

F probes use the magnetic principle to measure the thickness of non-magnetic coatings on ferrous metals.

N probes use the eddy current principle to measure the thickness of non-conductive coatings on non-ferrous metals.

FN probes combine the full abilities of both the "*F*" and "*N*" probes.

PosiTector 6000 Kit Contents
- PosiTector 6000 Probe (pg. 6)
- Protective rubber holster with belt clip
- Protective Cap for Probe *(some probes only)* (pg. 3)
- Protective Lens Shield (pg. 3)
- Wrist Strap (pg. 3)
- 3 Alkaline AAA batteries (pg. 27)
- Quick Guide Instructions
- Nylon carrying case with shoulder strap
- USB Cable (pg. 20)
- Certificate of Calibration traceable to NIST (pg. 5)
- Two (2) year warranty on Body and Probe

Protective Cap
Some **PosiTector** *6000* models are shipped with a protective plastic cap over the probe. remove this cap prior to use. Replace it when the instrument is not in use to protect the probe.
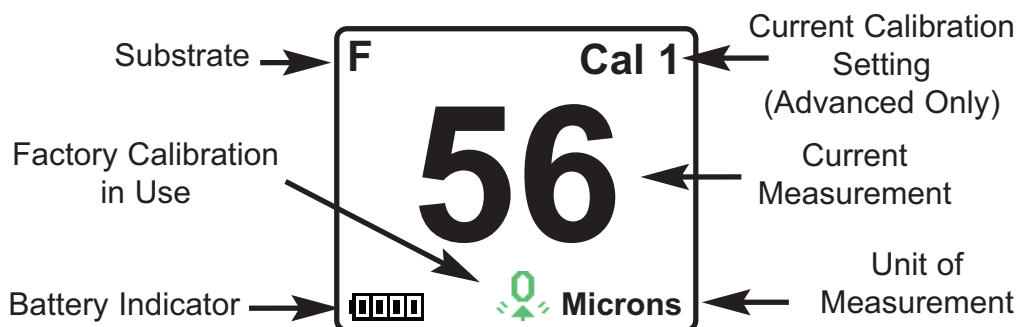
Wrist Strap
We recommend attaching and wearing the supplied wrist strap.
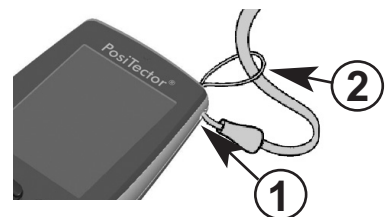
Plastic Lens Shield
The LCD is covered with a thin plastic film for protection against fingerprints and other marks during shipment. This film, while usually removed before using the instrument, can be left in place to protect against paint overspray. Replacements can be purchased.

Typical Screen

Substrate → **F** **Cal 1** ← Current Calibration Setting (Advanced Only)

Factory Calibration in Use

56

Current Measurement

Battery Indicator → 🔋 Q **Microns** ← Unit of Measurement

Operation Overview

The ***PosiTector 6000*** powers-up when the center navigation button is pressed. To preserve battery life, the Gage powers-down after approximately 5 minutes of no activity. All settings are retained.

1. Remove protective plastic cap (if supplied) from probe.

2. Power-up Gage by pressing the center navigation ⬚ button.

3. Place the probe FLAT on the surface to be measured. HOLD STEADY. When a valid measurement is calculated, the Gage BEEPS twice and the measurement is displayed.

4. Lift probe AT LEAST 2 INCHES (5cm) from the surface between measurements - OR - leave probe on the surface in the same location for continuous measurements.

If memory is ON while continuous measurements are being taken, only the last value on the display (when the probe is lifted) is stored into memory. **Scan** (pg.14) stores ALL measurements into memory.

Button Functions- Normal Operation

Adjust Down

Adjust Up

Access the Menu

Restore brightness after dimming *(Advanced only)*
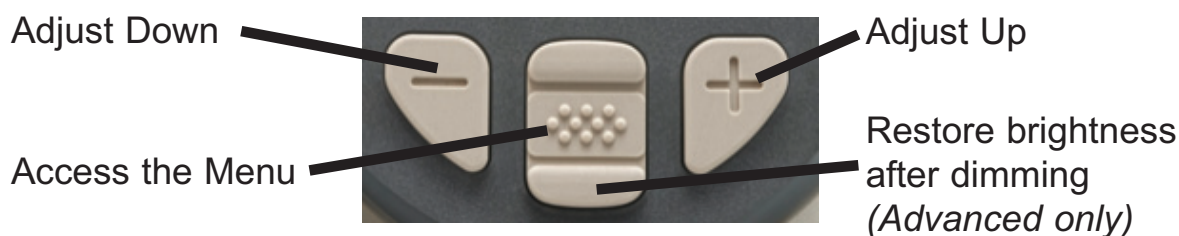
Golden Rule

Measure your uncoated part first! This quick zero-check determines if a *calibration adjustment* is needed for your substrate. (see pg. 9)

Next, lay the included plastic shims onto a bare surface and measure them individually to ensure the Gage measures a known thickness within tolerance.

Certification

All probes include a Certificate of Calibration. For organizations with re-certification requirements, instruments may be returned at regular intervals for calibration. DeFelsko recommends that customers establish gage calibration intervals based upon their own experience and work environment. Based on our product knowledge, data and customer feedback, a one year calibration interval from either the date of calibration, date of purchase, or date of receipt is a typical starting point. Written calibration procedures are available from DeFelsko Corporation at no charge.

Why is Measurement Important?

Dry film thickness (DFT) is arguably the single most important measurement made during the application and inspection of protective coatings. Coatings are designed to perform their intended function when applied within a tight DFT range as specified by the manufacturer. Correct thickness ensures optimum product performance. Even the most basic specification will require DFT to be measured.

Many physical and appearance properties of the finished coating are directly affected by the film thickness including the color, gloss, surface profile, adhesion, flexibility, impact resistance, and hardness of the coating. The fit of pieces assembled after coating can be affected when film thickness isn't within tolerance.

Regular film thickness measurement helps control material costs, manage application efficiency, maintain finish quality and ensure compliance with contract specifications. Paint manufacturers recommend target ranges to achieve optimum performance characteristics and clients expect these parameters to be met.

Precisely measuring finish thickness has other benefits, too. Whether to meet International Organization for Standardization (ISO), quality, or customer requirements for process control, companies need to verify coating quality to avoid wasting money reworking product.

Probes

The **PosiTector *6000*** consists of a <u>body</u> and a <u>probe</u>. A wide selection of interchangeable probes are available. Each retain their own unique calibration information. *All Gage bodies accept all probes.* See info (pg. 14) to find your body and probe type. More probe information is available at www.defelsko.com/p6000. To disconnect, a probe from a body, power-down the instrument and pull the plastic probe connector horizontally (in the direction of the arrow) away from the body. Reverse these steps to attach a new probe.

When powered-up the **PosiTector** automatically determines what type of probe is attached and does a self-check. Coating thickness probes "sense" when they are near metal and immediately attempt a measurement followed by another every 2 seconds. They stop when removed from the vicinity of metal and power-down after 5 minutes of no activity.

This continuous measurement feature is intended to allow careful probe placement on small or odd-shaped surfaces. Ignore all readings taken before the probe is properly placed.

Standard probes

These constant-pressure, stainless steel probes are hermetically sealed to be totally waterproof - **ideal for underwater use**. Hold them at the 2 knurled rings and push the outer spring-loaded sleeve down.

Do this...
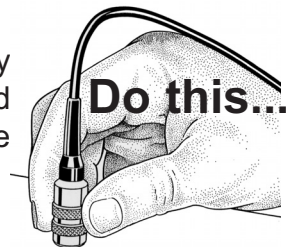
FN Combination Probe

An ***FN*** probe combines the capabilities of both "***F***" and "***N***" probes. Switching between the two is automatic. First, the probe attempts a measurement using the magnetic principle. If the coating is non-magnetic over steel, a reading is displayed with a letter "***F***". If not, the probe *automatically* attempts a measurement using the eddy current principle. If the coating is non-conductive over metal, a reading is displayed with the letter "***N***" (see also **N Lock** pg. 11).

Not this!
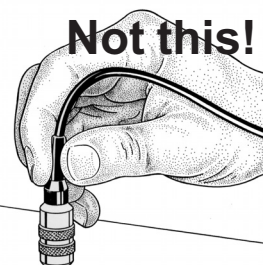
PosiTector® body accepts all PosiTector *SPG*, *DPM*, *6000* and *UTG* probes

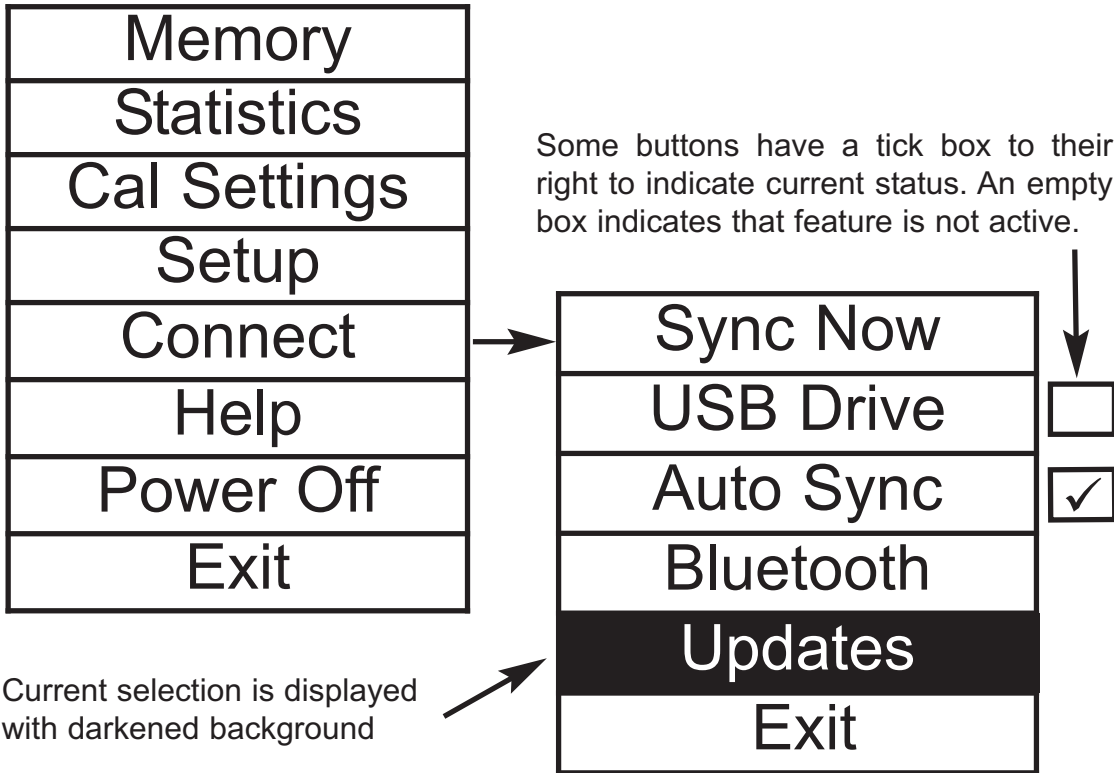Surface Profile

Environmental

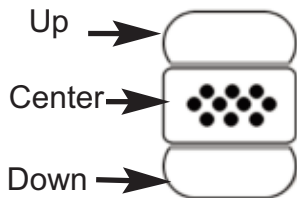Coating Thickness

Ultrasonic Thickness

Menu Operation

Instrument functions are menu controlled. To access the Menu, power-up the instrument, then press the center navigation button ⊞

Below is a sample menu for a **PosiTector** *6000* Advanced Model:

Memory
Statistics
Cal Settings
Setup
Connect
Help
Power Off
Exit

Some buttons have a tick box to their right to indicate current status. An empty box indicates that feature is not active.

Sync Now	
USB Drive	☐
Auto Sync	☑
Bluetooth	
Updates	
Exit	

Current selection is displayed with darkened background

Navigation Button

Up →
Center →
Down →

To navigate, use the **Up** and **Down** buttons to scroll and ⊞ to **SELECT**.

Select **Exit** to exit from any menu.

Screen Capture

Press both **(-)(+)** buttons at any time to capture and save an image copy of the current display. The last 10 screen captures are stored in memory and can be accessed when connected to a computer (see **USB Drive** pg. 22).

Calibration, Verification & Adjustment

The **PosiTector *6000*** non-destructively measures the thickness of coatings on metals. Three steps ensure best accuracy...

Calibration

Calibration is the controlled and documented process of measuring traceable calibration standards and verifying that the results are within the stated accuracy of the Gage. Calibrations are typically performed by the Gage manufacturer or by a certified calibration laboratory in a controlled environment using a documented process.

The standards used in the calibration are such that the combined uncertainties of the resultant measurement are less than the stated accuracy of the Gage. Typically a 4:1 ratio between the accuracy of the standard and the accuracy of the Gage is sufficient.

The **PosiTector *6000*** is shipped with a Certificate of Calibration showing traceability to a national standard. For organizations with re-certification requirements, the **PosiTector *6000*** may be returned at regular intervals for calibration. DeFelsko recommends that our customers establish Gage calibration intervals based upon their own experience and work environment. Based on our product knowledge, data and customer feedback, a one year calibration interval from either the date of calibration, date of purchase, or date of receipt is a typical starting point.

Written Calibration Procedures are available online at no charge.

Verification

Verification is an accuracy check performed by the user using known reference standards. A successful verification requires the Gage to read within the combined accuracy of the Gage and the reference standards.

A reference standard is a sample of a known thickness(es) against which a user may verify the accuracy of the Gage. Reference standards may be coated thickness standards, the included plastic shims, or sample parts whose coating thickness has been determined using other means.

Cal Settings Menu

1-point Calibration Adjustment

Also known as an _offset_ or _correction value_, there are 4 ways to perform this adjustment:

(i) Simple Zero Calibration Adjustment

Measure your uncoated part. If the Gage does not read "0" within the tolerance of the probe being used, lift the probe from the surface and adjust the display down **(-)** or up **(+)** until it reads "0". Measure and adjust until the average of a series of readings on the uncoated surface is within tolerance of "0" .

(ii) Average Zero Calibration Adjustment

To establish "0" on a rough or curved surface a preferred method to **(i)** is to take several readings on the uncoated part and average the result.

(a) Select [**Zero**] from the **Cal Settings** menu.

(b) Press **(+)** to select the number of readings to be used to obtain an average, typically 3 to 10 readings. The greater the variation between readings, the more readings should be taken to obtain an average.

(C) Repeatedly measure the uncoated part. The Gage will wait 2 seconds after placing the probe on the surface to allow the user to correctly position the probe on the surface. After the last measurement the Gage will calculate a Zero which represents the average of all the **Zero** readings taken.

(iii) Simple Adjustment to a Known Thickness

It is sometimes desirable to adjust the Gage to a known thickness, such as a shim, rather than adjusting it to zero.

Measure the object. If the expected reading is not obtained (within tolerance), lift the probe from the surface and adjust the displayed reading down **(-)** or up **(+)** to the expected thickness. Hold the button down to increase the rate of adjustment.

(iv) Average Adjustment to a Known Thickness

On rough or curved surfaces a preferred method to **(iii)** is to take several readings on the known thickness and average the result.

(a) Select $\boxed{\textbf{1 Pt Adjust}}$ from the **Cal Settings** menu.

(b) Press **(+)** to select the number of readings to be used to obtain an average, typically 3 to 10 readings. The greater the variation between readings, the more readings should be taken to obtain an average.

(c) Repeatedly measure the known thickness reference. The Gage will wait 2 seconds between readings to allow the user to correctly position the probe on the surface. After the last measurement the Gage will calculate and display the reading which represents the average of all the measurements taken. If the expected reading is not obtained (within tolerance) lift the probe from the surface and adjust the reading down **(-)** or up **(+)** to the expected thickness and press $\boxed{\text{⁂}}$.

2-point Calibration Adjustment

Preferred method for very unusual substrate materials, shapes or conditions. Provides greater accuracy within a limited, defined range.

1. Select | **2 Pt Adjust** | from the **Cal Settings** menu.

2. Press **(+)** to select the number of readings to be used to obtain an average on the thinner item, typically 3 to 10 readings. The greater the variation between readings, the more readings should be taken to obtain an average.

3. Repeatedly measure the thinner item. The Gage will wait for 2 seconds on the surface to allow the user to correctly position the probe on the surface. After the last measurement the Gage will calculate and display a thickness value which represents the average of all the readings taken using the factory calibration settings.

4. Lift the probe from the surface and adjust the displayed reading down **(-)** or up **(+)** to the known thickness value of the thin item. Press [⦙⦙⦙] to accept this value.

5. Repeat steps 2 - 4 for the thicker item.

| **Cal Lock** | ✓ |

When selected, the 🔒 icon will appear and all calibration settings are "locked" to prevent further user adjustments. Uncheck to make further adjustments.

| **N Lock** | ✓ | *(FN ferrous/non-ferrous combination probes only)*

Select Non-Ferrous Lock (**N Lock**) when operating regularly on non-ferrous substrates. The 🔒 icon will appear and the probe will only use the eddy current principle to shorten measurement time and extend battery life.

N Lock is useful when measuring coatings on plated steel. Normally the probe measures both the coating + plating over the steel using the magnetic principle. N Lock makes the Gage measure the coating over the plating only.

Select N Lock to measure over slightly magnetic substrates; i.e. clear-coat on gold over nickel-plated brass. Although the probe's magnet is used for the magnetic principle, it is also used in N Lock to magnetically saturate a slightly magnetic substrate and allow the eddy current principle to operate unhindered.

CAUTION: With N Lock engaged it is possible to obtain a reading when measuring non-conductive coatings on steel. This is not recommended.

Calibration Memory

Cal Memory	*(Advanced models only)*

It is often convenient to store a particular calibration adjustment before making another. Then, if you return to that part, the corresponding calibration *setting* can be restored.

A "setting" is any calibration adjustment. The **PosiTector** *6000* always displays the current calibration setting (ex. **Cal 3**) in the upper right corner of the display.

The setting called **Cal 1** has unique features. It can be adjusted but never deleted, and is always made active with factory settings after a **Reset** (pg.13).

New

Creates a new calibration setting using the next available number (Maximum of 10). By default, these new Cal settings are initially created with the Gage's factory settings. This is indicated with the ⏚ icon which appears at the bottom of the display. A warning message will prevent the creation of a new **Cal Memory** if a *batch* is open and has readings. Delete the batch first (pg.19).

Open

Loads an existing setting. Use the **Up** or **Down** buttons to scroll until the desired setting appears, then press ⊞. A warning message will prevent the opening of a stored Cal setting if a *batch* is open and has readings. Create a new batch first or open a batch containing no readings (pg.18).

Delete

Removes a setting completely from the list. That Cal number can be reused later with the New command. A setting cannot be deleted if readings have been stored into a *batch* using that calibration setting. Delete all readings in that batch first (pg.19). Although **Cal 1** cannot be deleted, the **Delete** function will return it to factory settings.

View

View stored Calibration Settings.

Setup Menu

Setup

Reset

Reset (soft reset) restores factory settings and returns the instrument to a known condition. The following occurs:

- All batches, stored measurements, images, and batch names are erased.

- All calibration adjustments and Cal Memory are cleared and returned to the gage's factory calibration settings.

- Menu settings are returned to the following:

Memory = OFF   **Cal Lock** = OFF
High Res = OFF   **Bluetooth** = OFF
Statistics Mode = OFF   **Display** = None
Hi Lo Alarm = OFF   **N Lock** = OFF
Scan Mode = OFF

Perform a more thorough **Hard Reset** by powering down the instrument, waiting several seconds, then simultaneously holding both the center [⠿] and **(+)** buttons until the **Reset** symbol appears. This returns the instrument to a known "out-of-the-box" condition. It performs the same function as a menu **Reset** with addition of:

- Bluetooth Pairing info is cleared

- Menu Settings are returned to the following:

Units = microns   **Language** = English
Flip Display = Normal   **Battery Type** = Alkaline
Auto Sync = OFF   **Backlight** = Normal
White on Black = OFF   **Bluetooth Streaming** = OFF
Fast Mode = OFF   **USB Drive** = ON

NOTES:

- Keep the Gage away from metal during a **Reset**.

- Date and Time are not affected by a **Reset**.

Info

Displays the model number & serial number, probe type & serial number, *PosiTector.net* registration key, the amount of remaining memory for storage of readings, date and time, and software packages.

For security purposes, the registration key is required to add the instrument to your free *PosiTector.net* account.

Hi Res ✓

Increases the displayed Gage resolution as follows:

Resolution	Range
0.01 mil	0.00 - 99.00 mils
0.1 mil	100.0 - 999.9 mils
0.1 um	0.0 - 999.9 um
1.0 um	over 1000 um

NOTE: Gage accuracy is not affected.

Fast ✓ ▶▶

Increases measurement speed for most probes. Useful for quick inspection or when measuring large areas with thick coatings where proper probe positioning is not critical. Swift up/down probe movement is required. Reduced accuracy may be noted.

Scan ✓ *(Advanced models only)*

In ordinary operation, the **PosiTector 6000** takes thickness measurements every 2 seconds when placed onto a surface. Normally, the user raises the probe after it has taken a single measurement and relocates it to a second location.

Scan mode modifies this behavior in two ways. First, measurements are taken much faster. Second, all measurements are recorded when memory is on. As the probe slides along the surface in scan mode, the **PosiTector 6000** takes single measurements in quick succession. This may reduce the life of the probe. *Recommended for smooth surfaces only*.

Flip Display

This option causes the display to read upside down. Ideal for use on a worktable (separate cable probes) and overhead (removable built-in probes) with the resultant display conveniently pointed toward the operator.

| White on Black | *(Advanced models only)*

Inverses the LCD display to white on a black background to provide better readability in some surroundings.

| Backlight | *(Advanced models only)*

Selects display brightness (Sun, Normal or Night). All settings will dim slightly after a period of no activity to conserve battery life. Press the **Down** button to brighten the display.

| Set Clock |

All batches are *date*-stamped when created, and all readings are *time*-stamped (24 hour format) when stored into memory. It is therefore important to keep both the date and time current using this menu option. Use the **Up** and **Down** buttons to scroll, and the **(-)** and **(+)** buttons to adjust a value. The instrument's data and time can also be viewed in Info (pg. 14).

| Battery Type |

Selects the type of batteries used in the instrument from a choice of "Alkaline", "Lithium" or "NiMH" (Nickel-metal hydride rechargeable). If NiMH is selected, the instrument will trickle charge the batteries while connected via USB to a PC or optional AC charger. The battery state indicator icon is calibrated for the selected battery type. No damage will occur if the wrong battery type is selected.

NOTE: DeFelsko recommends the use of *eneloop* (NiMH) rechargeable batteries.

| Units |

Converts the display from inch to metric or vice versa. Stored measurements in memory are not converted.

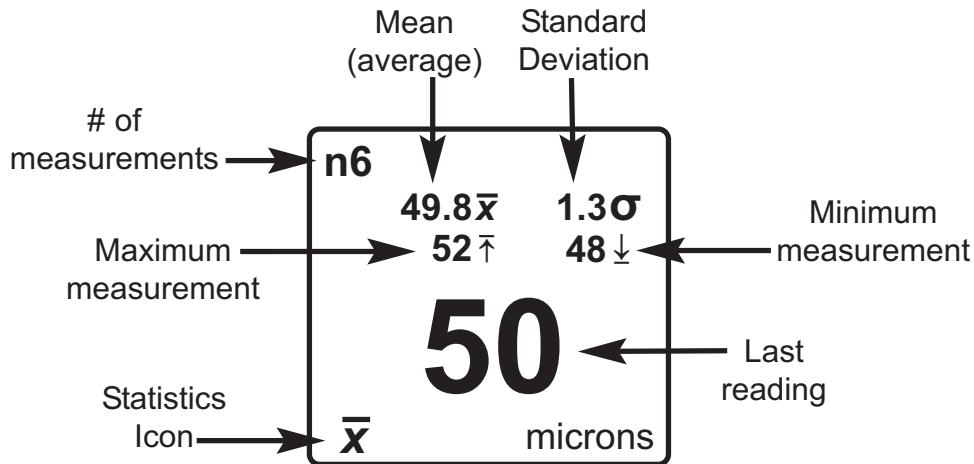**NOTE:** Switching units will turn off **Statistics**, **HiLo Alarm**, and closes **Memory**.

| Language |

Converts displayed and printed words to the selected language.

Statistics Menu

Statistics	✓

When selected, a $\overline{x}$ icon and statistical summary will appear on the display.

Remove the last measurement by pressing the **(-)** button. Press **(+)** to clear statistics.

HiLo Alarm	✓

Allows the Gage to visibly and audibly alert the user when measurements exceed user-specified limits.

When **HiLo Alarm** is selected, the current **Lo** setting is displayed. Adjust down **(-)** or up **(+)**. Alternatively, measure a coating with a thickness close to the required value and make final adjustments with the buttons. Select **NEXT** to accept this value. The current **Hi** setting is now displayed. Follow the same procedure to adjust the **Hi** setting.

The ⚏ icon will appear on the display.

Measurements will be compared to your defined **HiLo** limits. The Gage beeps if results are within those limits. A single low tone will sound if the reading is below the **Lo** limit, and a high tone if it is above the **Hi** limit. Press **(+)** to clear **HiLo** readings.

Clear

Clears all on-screen **Statistics** and **HiLo** tabulations.

Memory Management
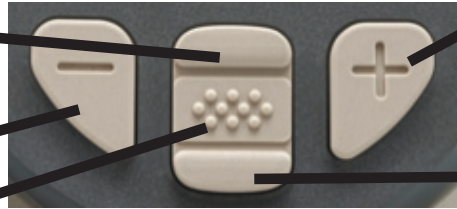
The **PosiTector** *6000* can record readings in memory for printing to the optional Bluetooth wireless printer (pg. 21), transfer to a computer (pg. 21) or synchronizing with *PosiTector.net*. (pg. 21). Readings are time-stamped as they are stored.

Scroll through display modes *(Advanced only)*

Create a new batch *(Advanced only)*

Delete last reading

Access the Menu

Restore brightness after dimming *(Advanced only)*

Standard models store up to 250 readings in one batch. The following appears within the **Memory** menu:

> *On:* turns memory on and begins recording
> *Off:* stops recording (stored readings remain in memory)
> *Clear:* removes all readings from memory
> *View:* lists group statistics and all stored readings on the display. It will begin by showing statistics based on all readings in memory. Use the **Up** and **Down** buttons to scroll through all readings. Press 🔲 to exit.

Advanced models store 100,000 readings in up to 1,000 batches (groups). The following appears within the **Memory** menu:

New Batch

Closes any currently opened batch and creates a new batch name using the lowest available number. For example, if only **Batch 1** and **Batch 3** exist, then **Batch 2** would be created and made the current batch. The 💾 icon appears and basic statistics are displayed. Each measurement will be displayed 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.

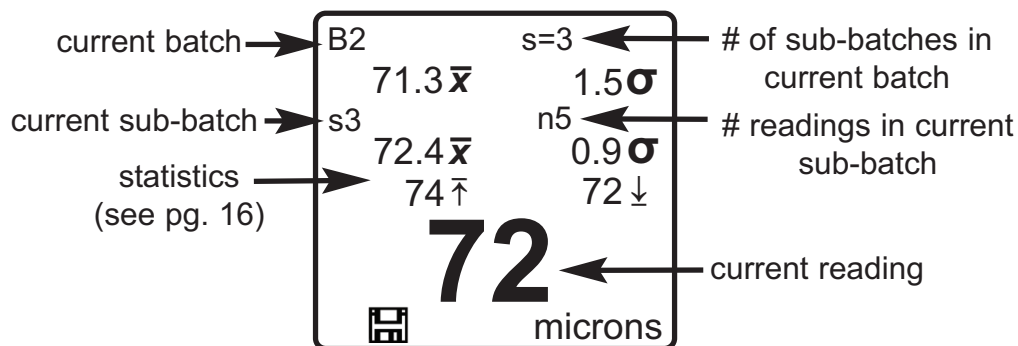Shortcut: When a batch is open, press **(+)** to create a new batch

New Sub-Batch *(appears only if a batch is currently open)*

Creates a new sub-batch within the currently opened batch.

Shortcut: When a sub-batch is open, create a new sub-batch by pressing **(+)**

In the following example, **B2s2** is a sub-batch of **Batch 2**. Sub-batching allows the user to group related batches so that statistics

can be accumulated for them. **Batch 2** contains the statistics for **B2s1** and **B2s2.**

current batch → B2   s=3 ← # of sub-batches in
                                    current batch
          $71.3\,\overline{x}$ $1.5\,\sigma$

current sub-batch → s3   n5 ← # readings in current
                                    sub-batch
          $72.4\,\overline{x}$ $0.9\,\sigma$

statistics → $74\,\overline{\uparrow}$ $72\,\underline{\downarrow}$
(see pg. 16)

          72 ← current reading
          💾   microns

New PA2

Helps determine if film thickness over a large area conforms to user specified min/max levels. See www.defelsko.com/pa2

New 90/10

Determines if a coating system complies with the IMO performance standard for protective coatings. See www.defelsko.com/9010

Open

Selects a previously created batch or sub-batch name to open and make current. If it contains measurements, on-screen statistics will immediately reflect values calculated from this batch. The calibration setting (i.e. Cal 2) associated with this batch is also opened (pg. 12).

NOTE: A solid triangle ▶ is displayed to the right of the batch name when sub-batches are present. Press ⚏ to view sub-batches. This also applies to the *Delete*, *View* and *Print* options.

Close

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

Delete

Removes a batch or sub-batch completely from memory. The name is deleted and all measurements are erased. Sub-batches can be deleted individually. To delete all related sub-batches, simply delete the top-level batch.

View

Scroll using the **Up** or **Down** buttons through information, statistical summary, and a list of each reading in the currently opened batch. Press ⊞ to exit.

Annotate

Use the Gages navigation and (-)(+) buttons to enter meaningful batch names and enter notes directly on the instrument using a familiar onscreen QWERTY keyboard. Annotations can be synchronized with PosiTector.net and are included in USB Mass Storage reports.

Print

Sends a statistical summary and individual measurements to the optional Bluetooth wireless printer.

NOTE: To cancel printing, press and hold the **(-)** and **(+)** buttons simultaneously.

Display	*(appears only if a batch is currently open)*

The following user selectable display options are available:

> _Chart:_ A real-time x-y chart of batch or sub-batch readings.
> _Image:_ An image uploaded (synchronized) from _PosiTector.net_
> _Notes:_ Instructions or notes uploaded from _PosiTector.net_
> _None:_ Default screen showing statistics information when a
> batch is open

Shortcut: When a batch is open, press **Up** to scroll through the above display options.

NOTES: Remove the last reading from the current open batch by pressing **(-)**.

Calibration adjustments cannot be made if any measurements were taken with that setting and stored into a batch.

If memory is ON while continuous measurements are being taken, only the last value on the display (when the probe is lifted) is stored into memory. **Scan Mode** stores ALL measurements into memory (pg. 14).

Each batch can contain a maximum of 10,000 readings.

Connecting to a Computer

The **PosiTector** can be connected to a computer using the included USB cable or Bluetooth wireless technology (pg. 23). The USB connection has the following capabilities:

- Download datasets via USB Mass Storage (pg. 21)
- Download readings and synchronize batch photos and notes via *PosiTector.net* (pg. 20)
- Update the instrument firmware (pg. 24)
- Supply power to the instrument for extended use, or recharge optional rechargeable batteries (pg. 27)

The USB port resides on the top of the instrument, behind a rubber flap.

PosiTector.net

To enhance the operation of their Gage, all **PosiTector** users have access to the features provided by *PosiTector.net*. It is a free web-based application offering secure centralized management of readings.

After (1) a user account has been created, (2) a gage has been registered, and (3) the *PosiTector Desktop Manager* is downloaded and installed onto a Windows PC, synchronization of measurement data can be performed either manually or automatically whenever the **PosiTector** is connected to a web enabled PC by either USB cable or Bluetooth wireless technology. Gage measurements stored in memory are uploaded; images and batch notes are downloaded.

Uploaded data can be manipulated using a standard internet web browser from any location in the world - job site or head office. Reports and graphs with annotations and corporate logo can be generated. Data can be exported to XML or CSV (comma delimited) text files.

Measurement data can be shared with authorized users via a secure login from any computer and most web enabled devices including smart phones.

PosiTector Desktop Manager (PDM) is a small Windows based application which allows automatic two-way communication (synchronization) between the Gage and *PosiTector.net* (internet connection required). When installed, PDM runs as a start-up application and resides in the Windows notification area (system tray) of a PC. PDM is available as a free download within your *PosiTector.net* account.

Register your Gage on PosiTector.net to take full advantage of your gage's capabilities. See www.PosiTector.net

A *PosiTector.net* account is not required to Update (pg. 24) your PosiTector. Simply download and install *PosiTector Desktop Manager* at DeFelsko.com/downloads.

Outputting Stored Datasets

Stored datasets can be accessed using one of the following:

USB mass storage - connect your **PosiTector** to a PC/Mac using the suppled USB cable to access and print stored readings and graphs. No software or internet connection required.

PosiTector.net - a free web-based application offering secure centralized storage of thickness readings. Access your readings from any web connected device. (See www.PosiTector.net and Sync Now pg. 22)

Bluetooth Printer (sold separately) Stream datasets as they are taken or print batch readings and statistics. See pg. 23 for pairing information.

Legacy PosiSoft Support - Existing PosiSoft users can continue using the familiar legacy PosiSoft software to download datasets. Upgrade your PosiSoft version at: www.DeFelsko.com/PosiSoft

Connect Menu

Connect

Synchronizing (Sync) is the process whereby **PosiTector** stored measurement data uploads to *PosiTector.net* (from both Standard and Advanced models) while images and batch notes are down-loaded to the instrument (Advanced model only). This transfer occurs when the instrument is connected via USB or Bluetooth Wireless Technology to a web-enabled PC running the *PosiTector Desktop Manager* (pg. 21). It can be triggered either manually (USB or Bluetooth) or automatically (USB only).

Sync Now

Immediately initiates synchronization with *PosiTector.net* when connected (USB or Bluetooth) to an internet connected PC running *PosiTector Desktop Manager*. (pg. 21)

Multiple gages can be synchronized simultaneously when connected using multiple connections (for example two gages connected via USB and one gage connected via Bluetooth).

Auto SYNC	✓

Allows the instrument to automatically synchronize with *PosiTector.net* when initially connected (USB or Bluetooth) to an internet connected PC running *PosiTector Desktop Manager*. (pg. 21)

Additional measurements added to memory while connected are synchronized only when the USB cable is disconnected, then reconnected or when **Connect**>**Sync Now** is selected.

USB Drive	✓

Universal Serial Bus (USB) is a specification to establish communication between devices and a host controller (usually a personal computer). USB has effectively replaced a variety of interfaces such as serial and parallel ports.

The **PosiTector** 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 checked, any computer can view readings and saved screen captures (pg. 7) stored in memory by navigating a virtual drive labeled "PosiTector" using the included USB cable.

A formatted HTML report is viewed by selecting the "index.html" or "START_HERE.html" found in the root directory. Optionally, text ".txt" files located in each batch folder provide access to measurement values. Stored datasets and graphs can be viewed or copied using universal PC/Mac web browsers or file explorers.

When your **PosiTector** is first connected to your Windows PC via a USB cable, an enumeration process is started that installs device drivers without re-booting your computer. You may see several pop-up windows in the taskbar at the bottom right of your screen. Wait for the entire process to be completed before proceeding.

NOTE: When connected (see photo pg. 20), power is supplied through the USB cable. The batteries are not used and the body will not automatically power down. If rechargeable (NiMH) batteries are installed, the instrument will trickle charge the batteries.

| Bluetooth | *(Advanced models only)* |

PosiTector Advanced models have Bluetooth functionality to:
- **Communicate** with the *PosiTector Desktop Manager (PDM)* in lieu of a USB cable.
- **Stream** individual datasets to a computer or Bluetooth wireless printer as they are taken.
- **Print** to the optional battery powered Bluetooth wireless printer.

On: Turns Bluetooth functionality **On**. When selected, the ✸ icon will appear on the display. To deactivate Bluetooth, select **Off**.

Pairing: The instrument and receiving device must be paired before stored or streamed datasets can be transmitted. For pairing instructions, see www.defelsko.com/bluetooth

Info: Lists information about your current Bluetooth connection, including the currently paired device and MAC address.

Stream: When checked, the instrument will stream datasets to the paired Bluetooth Device as they are taken. Datasets can be streamed as they are taken to the optional Bluetooth printer or third-party computer software.
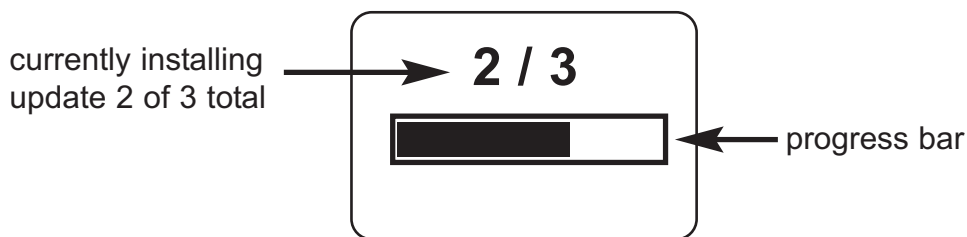
Updates

Determines if a software update is available for your instrument (must be connected to an internet connected PC with *PosiTector Desktop Manager* (pg. 21)). If an update is available, a prompt will appear allowing the user to choose to perform the update at this time or not.

NOTE: Ensure that stored measurements are backed up to a PC or *PosiTector.net*. The instrument may perform a hard **Reset** (pg. 13) after completion of the update and ALL readings in memory would be erased.

Updates - Sample Screen

currently installing
update 2 of 3 total

2 / 3

progress bar

⚠ **DO NOT** unplug the Gage during the update operation.

Available Options

Bluetooth Wireless Printer

PosiTector Advanced models can output to the optional battery powered Bluetooth wireless printer one of two ways:

- Stream individual datasets as they are taken.

- Print stored batch datasets and summaries.

Begin by entering the **Connect>Bluetooth** menu. Turn Bluetooth ON and "Pair" the **PosiTector** to the printer.
See: www.defelsko.com/printer

Streaming: In the **Connect>Bluetooth** menu, select the "Stream" tick box. All datasets will now be simultaneously displayed on the LCD and sent to the printer.

Printing: In the Memory menu, select "Print".

Coating Thickness Standards

Certified Thickness Standards are used to verify the accuracy and operation of coating thickness gages and are an important component in fulfilling both ISO/QS-9000 and in-house quality control requirements. Contracts often specify that coating thickness measurements be taken by gages whose measurement accuracy is traceable to a National Metrology Institute such as NIST or PTB.

Standards are typically purchased as an accessory to coating thickness gages. Many customers find it more practical to verify the accuracy of their own gages in-house, rather than utilize DeFelsko's calibration services. This is particularly true when many gages are in use and/or when accuracy verification is performed often.

There are 5 types of coating thickness standards available:

Certified Coated Metal Plates are the best solution for verifying the calibration, accuracy and operation of most magnetic, eddy current or ultrasonic coating thickness gages including magnetic pull-off gages as well as many competitive models. They fulfill both ISO and in-house quality control requirements. At ±0.43 μm (±0.017 mil) Certified Coated Metal Plates are the most accurate solution.

Certified Polystyrene Blocks are for use with gages that measure over 1500 μm (60 mils).

Certified Plastic Shims (foils) provide an economical alternative to coated metal plates. They have reduced accuracy of ±2 μm (±0.08 mil). A coating thickness gage measures shim thickness when this shim is placed over a smooth metal surface (zero plate).

Non-Certified Plastic Shims (foils) provide a quick operational check of the instrument and they allow the user to perform practice measurements when placed over metal. They protect the

probe from damage or premature wear when placed over hot or abrasive surfaces, and they can be placed on top of soft or tacky coating films to obtain thickness measurements without the gage probe depressing the coating film. A set of 5 shims is included with every **PosiTector *6000***.

Zero Plates are uncoated steel or aluminum disks. A zero plate is included with most coated metal sets. The first gage measurement is on a zero plate to verify that the gage measures zero correctly. Electronic gages can usually be adjusted to "0" if necessary. A zero plate is also a convenient base onto which a plastic shim or polystyrene block can be placed for measurement. Zero plates are also used to provide a substrate where none exists. Large sheets of material such as paper, plastic, fabric and rubber can be measured with a coating thickness gage by placing the material over the zero plate. This is useful when the measured item is too large to access with a micrometer or other device.

For more information, see www.defelsko.com/standards

Temperature

Operating range: +32° to +120°F (0 to +50°C)

The **PosiTector 6000** compensates automatically for temperature. Allow a few minutes for the probe to reach ambient temperature before measuring.

Discard the first measurement taken in a notably different temperature condition. When measuring surfaces much hotter or colder than ambient, lift the probe at least 6 inches (15cm) and allow 1 second off the surface between measurements.

Power Supply / Battery Indicator

Power Source: 3 AAA alkaline, Lithium or optional Nickel-metal hydride (NiMH) rechargeable batteries. For best battery indicator results, ensure the appropriate **Battery Type** is selected in the **Setup**>**Battery Type** menu (pg.15).

The battery indicator ▮▯▯▯▯ displays a full bar with fresh alkaline or fully charged batteries installed. As the batteries weaken, the bar will be reduced. When the battery symbol is low ▮▯▯▯▮ the instrument can still be used, but the batteries should be charged or recharged at the earliest opportunity. The instrument will turn off automatically when batteries are very low, preceded by a Low Battery Warning on the display.

⚠ To retain all user settings and stored memory readings, only replace the batteries after the instrument has powered-down.

Battery performance decreases at low temperatures.

Rechargeable Batteries (available option)
DeFelsko recommends the use of *eneloop* (NiMH) rechargeable batteries. They combine the advantages of rechargeable batteries and disposable (Alkaline) batteries. They discharge very slowly and can be stored for long periods without having self discharge concerns. (See www.eneloop.info)

Returning for Service

The **PosiTector** does not contain any user-serviceable components. Before returning the instrument for service:

1. Install new or newly recharged batteries in the proper alignment as shown within battery compartment.

2. Examine the probe tip for dirt or damage. The probe should move up and down freely.

3. Perform a **Hard Reset** (pg. 13)

4. Place a plastic shim onto bare metal (steel or non-steel, depending upon whether you have an "*F*" or "*N*" probe) and attempt a measurement.

If you must return the instrument for service, please fill out and include the service form located at www.defelsko.com/support with the instrument.

Troubleshooting

Most conditions can be cleared with a **Hard Reset** (see pg. 13). If not, visit our Service & Support page for information on sending your instrument to us for a no charge evaluation.

See: http://www.defelsko.com/service

Probe attempts a measurement even while held in the air:

The probe may have been left near metal, including jewelry, during power up or at rest. Possibly a finger was held over the probe. Try measuring on an uncoated object. Otherwise turn the Gage off, and then on again. Finally try a reset.

Thickness readings are inconsistent:

- Probe tip may be damaged, scratched or worn

- Make sure you lift the probe well clear of the surface between measurements

- Try measuring on a different surface with the included plastic shims

- Hold the probe on the surface and allow it to take several measurements. If the second and subsequent measurements are consistent, you are not putting the probe onto the surface fast enough.

- The substrate and/or coating surface is uneven, in which case inconsistent readings are to be expected. Take several measurements and average them to get a meaningful result.

Gage powers up but will not take any readings:

- Substrate may not be metal. "F" probes measure coatings on ferrous metals such as steel and iron, and "N" probes measure over non-ferrous metals such as aluminum.

- Protective cap must be removed from probe (if outfitted with one).

- An extreme calibration adjustment might have been made.

Gage will not print to the Bluetooth wireless printer:

- Ensure the gage has been paired for use with the printer and the Gage menu option **Connect>Bluetooth>Stream** box is ticked.

- Check printer batteries. Switch it off and then on again.

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:

<u>www.defelsko.com/terms</u>

www.defelsko.com