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Introduction

The *PosiTector Replica Tape Reader (RTR)* is a hand-held electronic instrument that measures burnished Testex Press-O-Film™ replica tape to produce peak-to-valley surface profile height measurements. It consists of a PosiTector body (*Standard or Advanced*) and probe (*RTR-H or RTR-P*)

PosiTector *RTR-P* models also measure peak density (P_d). *Advanced RTR-P* models generate 2D/3D images and SDF Surface Data Files.

Measurement	RTR H	RTR P
Peak Height H	●	●
Linearized Peak Height H_L	●	●
Peak Density P_d		●
2D/3D images (pg. 19)		*Advanced only*
Save SDF surface data file (pg. 20)		*Advanced only*

A surface cleaned by abrasive blast is best described using two measured parameters: *peak height* and *peak density*.

Peak Height
H – the average of the maximum peak-to-valley distances obtained by measuring the thickness of the replica tape

H_L – a more accurate peak-to-valley height measurement adjusted for tape non-linearity without the need to average 2 or more replicas. This method has the additional benefit of being able to extend the range of each grade of replica tape. See *Linearize* pg. 16.

Peak Density *(RTR P only)*
P_d – the number of peaks per square millimeter or square inch. See *Peak Density* pg. 18.

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Quick Start

The **PosiTector *RTR*** powers-up when the center navigation button $\boxed{\text{····}}$ is pressed. To preserve battery life, the Gage powers down after approximately 5 minutes of no activity. All settings are retained.

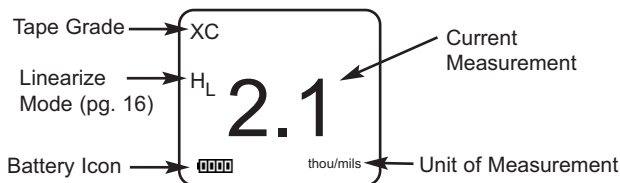NOTE: To ensure best accuracy, the user will be prompted to **zero** the probe every time the Gage is powered-up. It is therefore good practice to clean the probe regularly with the included cleaning card. Cleaning is best performed when the Gage is powered down.

With the Gage powered down...
1. Clean the probe with the included cleaning card. (pg. 12)
2. Power-up Gage by pressing the center navigation $\boxed{\text{····}}$ button.
3. Zero the probe. (pg. 15)
4. Verify Gage accuracy. (pg. 13)
5. Measure the burnished replica tape. (pg. 10)

Typical Display

Tape Grade → XC

Linearize Mode (pg. 16) → H_L

Current Measurement

2.1

Battery Icon → 🔲🔲🔲🔲

thou/mils — Unit of Measurement

Menu Operation

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

Navigation Button

Up →
Center → $\boxed{\text{····}}$
Down →

To navigate, use the **Up** and **Down** buttons to scroll and $\boxed{\text{····}}$ to **SELECT**.

Select **Exit** to exit from any menu.
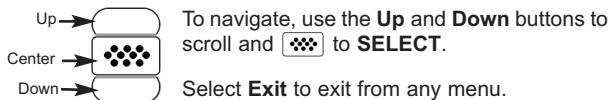
NOTE: The center $\boxed{\text{····}}$ button is purposely recessed to help eliminate unintentional powering-up of the Gage.

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PosiTector body

PosiTector bodies accept all interchangeable probes including surface profile (*RTR/SPG*), coating thickness (*6000/200*), environmental (*DPM*) and ultrasonic wall thickness (*UTG*) probes.

USB Port

connected probe type is displayed during power-up

Display

probe connector

Updates: Keep your *PosiTector* current with software updates containing the latest features, functionality and probe compatibility (see *Updates* pg. 37).

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. 38).

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 Gage can still be used, but the batteries should be changed or recharged at the earliest opportunity (pg. 38).

Wrist Strap
We recommend attaching and wearing the supplied wrist strap.

Protective Lens Shield
The PosiTector display is covered with a thin plastic film for protection against fingerprints and other marks during shipment. This film, while usually removed before using the Gage, can be left in place to protect against paint overspray or debris. Replacements can be purchased.

Probes

When powered-up, the *PosiTector* automatically determines which probe is attached and does a self-check.

To disconnect a probe from a body, slide the plastic probe connector horizontally (in the direction of the arrow) away from the body. Reverse these steps to attach a new probe.

NOTE: It is not necessary to power-down the gage when interchanging probes.

PosiTector *RTR probe* *(RTR-P shown)*

Probe Connector

Measurement Opening (Anvils)

Button Operated Spring Micrometer applies constant anvil pressure

Camera *(RTR-P only)*

Additionally, the *PosiTector* accepts a number of probe types including magnetic and eddy current coating thickness, surface profile, environmental and ultrasonic wall thickness probes.

For the latest information on probe interchangeability see www.defelsko.com/probes

PosiTector *SmartLink* Compatible (*RTR-H* probes only)

A smart new way to measure!
-wirelessly connect <u>*RTR-H* probes</u> to your smart device
-turn your cell phone or table into a virtual PosiTector gage
-includes free PosiTector app

NOTE: *RTR-P* probes are not compatible with PosiTector SmartLink

Learn more at: www.defelsko.com/smartlink

Certification
PosiTector *RTR* 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 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.

Why is surface profile measurement important?

Steel surfaces are frequently cleaned by abrasive impact prior to the application of protective coatings. The resultant surface profile must be accurately assessed to ensure compliance with job or contract specifications. In the protective coatings industry, replica tape is widely used for quantifying surface profile.

Peak height and peak density are important factors in the performance of applied protective coatings. Low values may reduce coating bond strength (adhesion). High values may cause peaks to receive insufficient coverage and possibly rust prematurely and for the surface to be insufficiently wetted.

The figure below is a simplified example of why BOTH peak height AND peak density are important to the understanding of coating performance. The two surfaces have different geometries yet their height measurements are the same. Peak density measurements give a clearer picture of the surface available for bonding.

$H = 50\ \mu m$
(2 mils)

2 mm
(80 mils)

$P_d = 1.5\ peaks/mm^2$

2 mm
(80 mils)

$P_d = 3\ peaks/mm^2$ (2x)
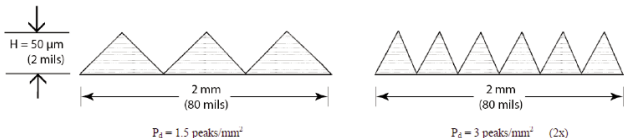
Both surfaces have the same measured peak-to-valley height. A second important measurable parameter, peak density, helps explain why coatings bond differently to each surface.

For these reasons, surface profile should be measured prior to coating application to ensure that it meets contract specifications.

Press-O-Film Replica Tape

Press-O-Film provides a simple way to obtain an impression of a surface for analysis. It consists of a layer of crushable plastic micro foam affixed to a 50.8 µm (2 mil) incompressible polyester film. When compressed against a roughened surface, the foam collapses and acquires an accurate impression, or reverse replica, of the surface. It is available Coarse (C) and X-Coarse (XC) grades to accommodate measurements in different profile ranges.

Placing the compressed tape (replica) into the **PosiTector** *RTR* gives a measure of the average maximum peak-to-valley height of the surface roughness profile. The Gage automatically subtracts the thickness of the polyester substrate from all measurements. Press-O-Film is available in Coarse (C) and X-Coarse (XC) grades to accommodate measurements in different profile ranges.

Optical Grade Press-O-Film Replica Tape
For improved optical resolution and to reduce optical artifacts (see below tape comparison), this special grade of replica tape is available for use with the **PosiTector** *RTR-P*. It provides higher quality SDF surface data files than conventional Press-O-Film replica tape. It is available in both Coarse (C) and X-Coarse (XC).

How to Measure

1. Prepare the test surface
2. Burnish the replica tape
3. Prepare the Gage
4. Measure

Prepare the test surface

Locate a representative site for measurement. Clean the surface to be tested. DeFelsko recommends the use of the included putty to remove dust, debris, or residual blast media from the surface. Firmly press the putty onto the surface using your fingers, and remove.

NOTE: Ensuring a clean surface is especially important when using the **PosiTector *RTR-P*** to measure peak density (P_d) and generate surface images.

Burnish the replica tape (create a replica)

Select the appropriate grade of replica tape based on the target profile. See tape instructions for assistance.

Pull a single adhesive-backed replica tape free of its release paper. A "bull's eye" circle of paper should remain on the release paper (it is not used for measurement).

Apply replica tape to blasted surface. Press the adhesive-backed ends of the tape to hold it firmly in place during the burnishing process.

Firmly compress the foam using the rounded end of the included stainless steel burnishing tool. Apply sufficient pressure in a circular and x-y rubbing motion to produce a replica with a uniform pebble grain appearance. ***Excessively hard rubbing should be avoided because the polyester film could become distorted.*** It normally takes 30 to 60 seconds to fully compress all parts of the foam on most surfaces. After burnishing is complete, remove the replica tape from the surface.

Prepare the Gage

With the Gage powered-down, clean the measurement surfaces using the included cleaning card. Swipe the card through the opening a few times while firmly pressing both probe buttons to remove dust particles and residual tape adhesive.

NOTE: Cleaning the anvils (pg. 12) is especially important when using the **PosiTector *RTR-P*** to measure peak density (P_d) and generate surface images. If the cleaning card is damp, wait for the anvils to dry before measuring.

Power-up the Gage by pressing the center navigation button. An image appears indicating that the probe requires zeroing.

Simultaneously press and hold both probe buttons firmly until the Gage beeps and the arrows point outward. Do not place anything in the measurement opening during this procedure.

Measure the included check shim to verify accuracy (pg. 13).

Ensure the correct grade of replica tape, C or XC, is displayed in the upper left corner of the display (pg. 7).

Measure

Insert the burnished replica tape into the measurement opening. Ensure the tape is properly positioned so that the burnished region is centered within the opening in the probe with the adhesive (sticky) side down.

To position the tape, move the tape to the back of the probe and align the two dots (printed on replica tape) with arrows on both sides of the measurement opening.
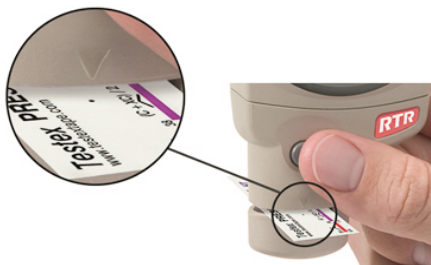
If you are using older tape that does not have the printed dots, simply align by centering the tape within the measurement opening.

During measurement, a constant anvil pressure is applied to the replica tape regardless of how hard the two buttons are pressed. The Gage automatically subtracts the 50.8 μm (2 mil) of incompressible polyester film. No further adjustments are required.

PosiTector RTR-H models
1. Ensure tape is properly positioned.
2. Firmly press both probe buttons simultaneously and hold until the Gage beeps and the surface profile height (H_L) measurement is displayed. The tape can now be safely removed.

PosiTector RTR-P models

It is *important* to clean the anvils before each measurement when obtaining peak density (P_d) and generating surface images.

1. Ensure tape is properly positioned.

2. a) Firmly press both probe buttons simultaneously and hold until the Gage beeps and the arrows point outward.

    b) Remove your fingers from the tape and release both probe buttons (*do not* hold or remove tape from the gage).

    c) Hold the gage steady while the probe measures the compressed foam until the following graphic disappears.

Several images of the foam surface are captured during each measurement. Image blurring will occur if the tape is touched or removed during this time.
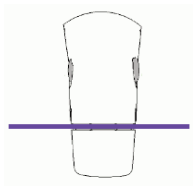
3. The surface profile height (H_L) measurement is immediately displayed. The tape can now be removed. An hour glass ⧖ will display while peak density (P_d) and the associated 2D/3D images are being generated.

NOTE: *Optical Grade Replica Tape* (pg. 7) provides higher quality SDF surface data files than conventional Press-O-Film replica tape. This special grade of tape recommended when taking measurements which will be exported as SDF images.

Cleaning the probe opening (anvils)

The probe contains two measuring surfaces (anvils) that can become contaminated with dust particles and residual tape adhesive. It is therefore recommended to clean the probe regularly with the included cleaning card. Cleaning is essential prior to performing a probe zero (pg. 15) or a verification of accuracy (pg. 13). It is best performed when the Gage is powered down.

With the Gage powered-down, swipe the card through the opening a few times while firmly pressing both probe buttons.

The cleaning card can also be used to clean the surfaces of analog spring micrometers. Replacement cards are available from your dealer.

NOTE: Cleaning the anvils is especially important when using the **PosiTector** *RTR-P* to measure peak density (P_d) and generate surface images.

Example of a 2D surface image taken with a **PosiTector** *RTR-P* Advanced before and after cleaning the anvils with the cleaning card.
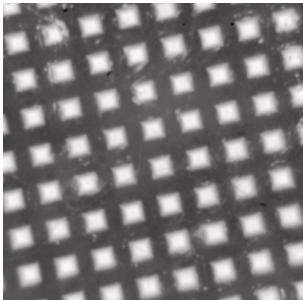
Before Cleaning
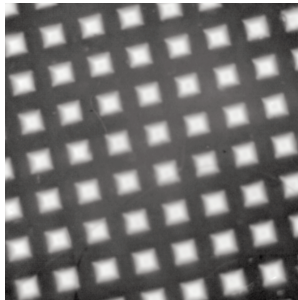
After Cleaning

Calibration & Verification of Accuracy

Calibration

Gage calibration is typically performed by the manufacturer or accredited lab. All probes include a Certificate of Calibration.

Verification of Accuracy

Ensure that the probe has been cleaned with the included cleaning card (pg. 12) and that the probe has been zeroed (pg. 15).

Verify accuracy of the <u>peak height</u> measuring system

Place the *PosiTector RTR Check Shim* into the probe opening. The average of several measurements should be within the combined tolerance of both the Gage and the shim. If not, the Gage may need to be returned to your dealer for service.

The check shim is specifically intended for all **PosiTector *RTR*** probes. The Gage is designed to measure burnished replica tape within a limited measuring range and automatically subtracts 50.8 μm (2 mil) from height measurements to account for the incompressible polyester film. Therefore plastic shims intended for other instruments such as coating thickness gages will not be measured properly.

Verify the <u>peak density</u> measuring system
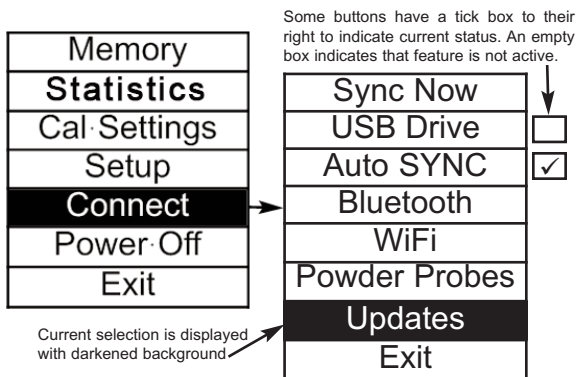
(RTR-P models only)

Place the *Peak Density Check Tape* into the probe opening. The peak density (P_d) result should be within tolerance specified on the tape. *Ignore the peak height (H) result*.

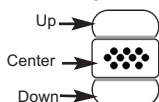If not, the Gage may need to be returned to your dealer for service.

Menu Operation

Gage functions are menu controlled. To access the Menu, power-up the Gage, then press the center navigation button. 𝐖

Below is a sample menu for a **PosiTector *RTR H*** Advanced model:

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

Memory
Statistics
Cal·Settings
Setup
Connect
Power·Off
Exit

Sync Now	
USB Drive	☐
Auto SYNC	☑
Bluetooth	
WiFi	
Powder Probes	
Updates	
Exit	

Current selection is displayed with darkened background

Navigation Button

Up →
Center → 𝐖
Down →

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

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

NOTE: The center 𝐖 button is purposely recessed to help eliminate unintentional powering-up of the Gage.

Cal Settings Menu

Zero

The probe should be zeroed regularly to ensure best accuracy. While the user will be required to zero the probe every time the Gage is powered-up. The **Zero** menu item allows the procedure to be performed at more regular intervals. It is particularly useful during long measurement sessions.

Clean the probe with the included cleaning card (pg. 12) before performing a probe zero.

1. Select **Zero** from the **Cal Settings** menu

2. Simultaneously press and hold both probe buttons firmly until the Gage beeps and the arrows point outward. Do not place anything in the measurement opening during this procedure.

SHORTCUT: Simultaneously press and hold both probe buttons firmly until the Gage beeps and displays "0". This can be performed from the main measurement screen without having to access the menu.

No Tape (*RTR-P* only)

When selected the gage instructs the probe to take a picture and store this image as a reference. This image is used with subsequent measurements to compensate for irregularities in the optical path within the probe. *This operation is only required if the generated images can not be cleaned up by cleaning the anvils with the cleaning card (pg. 12)*

Tape Grade

Selects a replica tape grade. Required when **Linearize** mode (H_L) is ON.   **C** - Coarse   **XC** - X-Coarse (default)

NOTE: Coarse Minus and X-Coarse Plus grades are not supported in **Linearize** mode (pg. 16) since the only function of these two grades is to improve upon the accuracy of C tape at its low end and XC tape at its high end, something the **PosiTector** *RTR* will automatically do when measuring H_L. When **Linearize** mode is OFF, the **PosiTector** *RTR* will measure all four grades of replica tape just like a conventional spring micrometer.

| **Linearize** | ✓ |

This is the default measurement mode. **Linearize** mode is ON when this box is ticked and the "H$_L$" appears on the display.

An undesirable characteristic of replica tape is that measurements made with analog spring micrometers are most accurate near the middle of each grade's range and least accurate at the outer ends of each grade's range. That is why two other grades, Coarse Minus and X-Coarse Plus, are used to check and, if necessary, adjust measurements at the lower and upper ends of the primary range of 20 - 115 μm (0.8 - 4.5 mils).

Inside the primary range, the upper end of Coarse grade's range and the lower end of X-Coarse grade's range share a 38 - 64 μm (1.5 - 2.5 mil) "overlap" region. Current Testex instructions describe a relatively complicated and time consuming procedure (the average of one reading using Coarse grade and one reading using X-Coarse grade) that is used to knit the Coarse and X-Coarse sub-ranges together to achieve reasonably accurate readings over the primary range. This method is a compromise between accuracy and ease of use.

■ When the Linearize box is NOT ticked, the **PosiTector** *RTR* displays a height value of H comparable to the value an analog spring micrometer would display after the 50.8 μm (2 mil) of incompressible polyester substrate has been subtracted. In other words, it is the average of the maximum peak-to-valley distances obtained by measuring the thickness of the replica tape without any correction.

■ When the Linearize box IS ticked, the **PosiTector RTR** displays a more accurate peak-to-valley height measurement H$_L$ that has been adjusted for the non-linearity of replica tape. There is no need to average 2 or more replicas from different grades of tape AND there is no need to subtract the 50.8 μm (2 mil) of incompressible polyester substrate. Ensure the proper tape grade, C or XC, has been selected (pg. 7) and appears in the upper left corner of the display.

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During measurement, if the linearized measurement falls outside of the selected tape grade's range, the Gage will suggest a more suitable tape grade to perform the measurement.

Setup Menu

| Reset |

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

- All batches, stored measurements, images, SDF surface data files, batch names and screen captures are erased.
- Menu settings are returned to the following:

Memory = OFF	**Bluetooth** = OFF	**Tape Grade** = XC
Statistics = OFF	**WiFi** = OFF	**Linearize** = ON
Peak Density* = On	**2D*** = OFF	**3D*** = OFF
Memory Display = None		

*PosiTector RTR-P models only

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

- Bluetooth Pairing info is cleared.
- Menu settings are returned to the following:

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

NOTE: Date, Time and WiFi are not affected by either **Reset**.

Displays gage body/probe details including serial numbers, PosiSoft.net registration key, remaining memory capacity for storage of readings, date and time and software packages.

For security purposes, the serial number and registration key are required to add the Gage to your PosiSoft.net account.
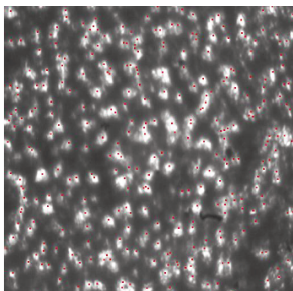
Peak Density ✓ (*RTR-P* only)

When selected, the Gage will measure and display peak density (P_d), the number of peaks per unit area.

The PosiTector *RTR-P* projects light through the replica tape and captures a two-dimensional black and white image.

Peak density be determined by simply counting the bright spots on the image. The intensity of light that passes through the replica tape is inversely proportional to the thickness of the compressed foam. The below photograph of a back-lit piece of replica tape reveals light areas of higher compression (peaks) and dark areas of lower compression (valleys).
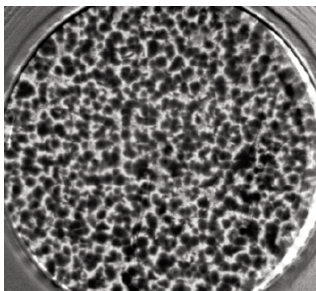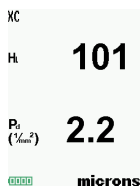
2D image derived from replica tape

Digitally counting bright spots or peaks

NOTE: Cleaning the anvils is especially important when using the **PosiTector *RTR-P*** to measure peak density (P_d) and generate surface images.

| **2D** | ✓ | (*RTR-P Advanced models only*) |

Displays a two-dimensional (2D) black and white image of the replicated surface. When **Memory** is on, this thumbnail image is stored with each reading for inclusion into inspection reports.
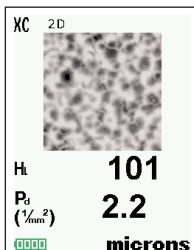
| **3D** | ✓ | (*RTR-P Advanced models only*) |

Displays a low-resolution color three-dimensional (3D) image of the replicated surface. When **Memory** is on, this thumbnail image is stored with each reading for inclusion into inspection reports.

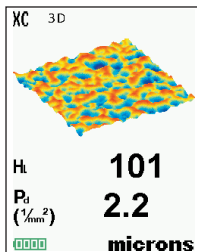NOTE: Press the Up navigation button to scroll between 2D and 3D images if the image does not automatically appear on the display.

Save SDF (*RTR-P Advanced models only*)

Stores a Surface Data File (SDF) to the *USB Drive*. This provides a means to perform a more detailed analysis of the surface using third party image rendering/analysis software such as *Gwyddion* or *MountainsMap*.

Select **Save SDF** within the **Memory** menu. A progress bar will appear while the SDF is saved *(approximately 2 minutes)*.
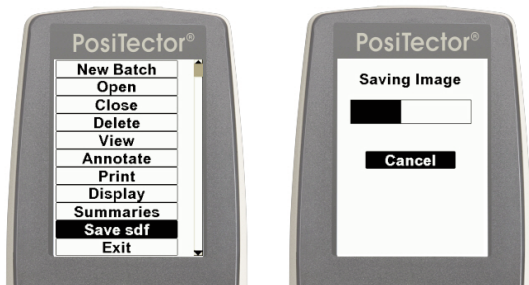

Only a single SDF can be stored at a time. Each saved image overwrites the previous one.

The SDF can be accessed when connected to a computer (see *USB Drive* pg. 31). The SDF is stored in the root directory named with the format: rtr_{datetime}.sdf

NOTE: Cleaning the anvils (pg. 12) prior to measurement is especially important when using the **PosiTector** *RTR-P* to generate surface images.

Optical Grade Replica Tape (pg. 7) provides higher quality SDF surface data files than conventional Press-O-Film replica tape. This special grade of tape is recommended when taking measurements which will be exported as SDF images.

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Below is an example of a PosiTector generated SDF opened in *Gwyddion* - a free and open source software image rendering software. www.gwyddion.net
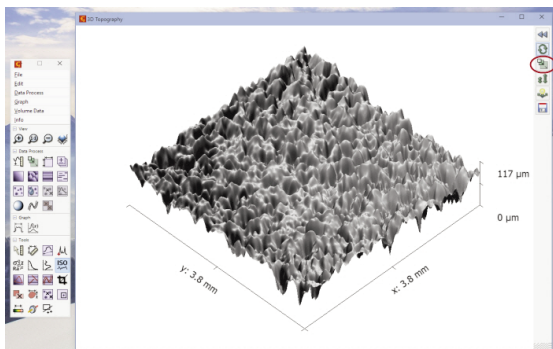
Garnet 30/60 Grit blast cleaned surface

More examples are available at:
    www.defelsko.com/rtr/rtr_surface_data_file.htm

SDF Specifications
  Range: 125 um
  Field of view: 4x4 mm
  Image size: 1024x1024x12bit
  Lateral sampling interval: 3.8 um

Flip Display

This option causes the display to rotate 180°. Ideal for right-side-up viewing when the sensors are pointed away from the user.

White on Black (Advanced models only)

Inverts 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.

Sound

When checked (default), the gage will emit various sounds for activities such as successful measurement and for button presses. Untick to turn sound off.

Set Clock

All measurements are date and 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 Gage's date and time can also be viewed in **Gage Info** (pg. 18).

Units

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

Switching units will turn off Statistics view and closes Memory.

Battery Type

Selects the type of batteries used in the Gage from a choice of "Alkaline", "Lithium" or "NiMH" (Nickel-metal hydride rechargeable). If NiMH is selected, the Gage 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.

Language

Converts displayed and printed words to the selected language.

Statistics

Statistics	✓

A statistical summary will appear on the display. Remove the last measurement by pressing the **(-)** button. Press **(+)** to clear statistics.

$\bar{x}$ Average	σ Standard Deviation
$\bar{\uparrow}$ Maximum Value	$\downarrow$ Minimum Value

Memory Management

The **PosiTector *RTR*** has internal memory storage for recording measurement data. Stored measurements can be reviewed on-screen or accessed via computers, tablets and smart phones. Measurements are date and time-stamped.

Button functions with **Memory** ON:

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 **Memory** Menu includes the following options...

*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.

Standard Model display with **Memory** ON shows measurement statistics:

Mean (average)

# of readings in memory

Standard Deviation
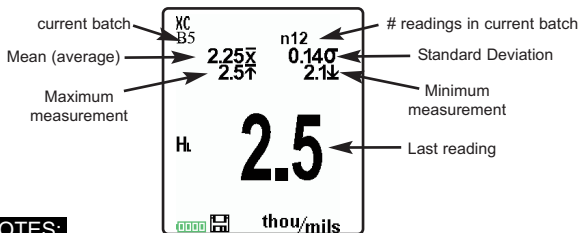
Maximum measurement

Minimum measurement

Last reading
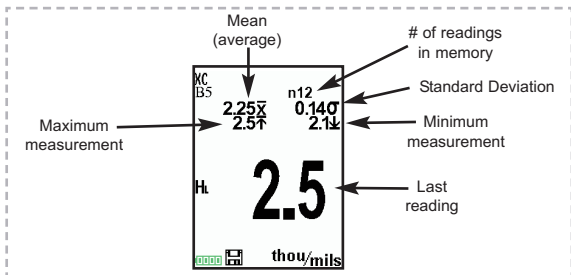
Advanced models store 100,000 readings in up to 1,000 batches. 2D/3D images are stored if checked within the *Setup* menu. The **Memory** Menu includes the following options...

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 batches are date stamped when they are created. Each reading is also data/time stamped.

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

current batch → XC / B5
readings in current batch → n12
Mean (average) → 2.25x̄
Standard Deviation → 0.14σ
Maximum measurement → 2.5↑
Minimum measurement → 2.1↓
Hᴸ
Last reading → 2.5
thou/mils

NOTES:

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

- If memory is ON, continuous measurements can be taken and stored in memory.

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

Open

Selects a previously created batch name to open and make current. If it contains measurements, onscreen statistics will immediately reflect values calculated from this batch.

Close

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

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Delete

Removes a batch completely from memory. The name is deleted and all measurements are erased.

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

Create meaningful batch names and enter notes directly on the Gage using a familiar onscreen *QWERTY* keyboard.

Use the Gage's navigation and **(-)(+)** buttons to enter annotations.

Annotations can be synchronized with PosiSoft.net and are included in all PosiSoft reports (see **Accessing Stored Measurement Data**, pg. 28).

NOTE: Annotations can also be created using PosiSoft.net (pg. 29) or PosiSoft Mobile (pg. 30).

Print

Sends a statistical summary and individual measurements to the optional Bluetooth wireless printer (see pg. 34).
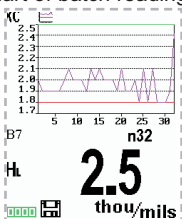
NOTE: To cancel printing, press and hold the **(-)** and **(+)** buttons simultaneously.

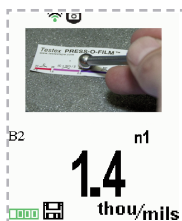**Display** *(appears only if a batch is currently open)*

The following user selectable display options are available:
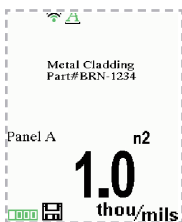
📈 *Chart:* A real-time chart of batch readings

x-y Chart

📷 *Image:* Batch image

A *Notes:* Instructions, descriptions or notes (see **Annotate**, pg.16)

None: Default screen shows statistics

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

PosiSoft.net (pg. 29) and PosiSoft Mobile (pg. 30) are used to insert an *Image* and *Notes* into a batch on the gage.

Summaries (Advanced models only)

Displays a summary of all stored batches including the name, probe type, number of readings and type.

In the following example, Batch 3 (**B3**) indicates an "**F**" *6000* coating thickness probe was used to record a total of "**6**" readings in "**PA2**" mode.
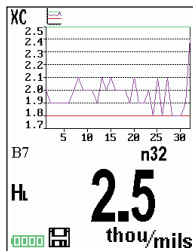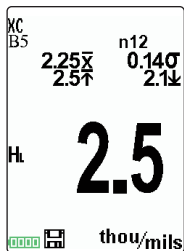
Batch Summaries
Page 1/1

Batch Name	Probe Type	#	Type
B4	SPG	20	
B3	F	6	PA2
B2	F	10	
B1	UTG-C	5	

OK

S c r e e n   C a p t u r e

Press both **(-)(+)** buttons at any time to capture and save an image of the current display. The last 10 screen captures are stored in memory and can be accessed when connected to a computer (see *PosiSoft USB Drive* pg. 31).

Sample Screen Captures

XC
B5   n12
        2.25x̄   0.14σ
        2.5↑   2.1↓

Hʟ
        2.5

thou/mils

XC
2.5
2.4
2.3
2.2
2.1
2.0
1.9
1.8
1.7
        5 10 15 20 25 30
B7   n32

Hʟ
        2.5

thou/mils

Accessing Stored Measurement Data

PosiSoft solutions for viewing, analyzing and reporting data:

PosiSoft USB Drive - connect the **PosiTector** to a PC/Mac using the supplied USB cable to access and print stored readings, graphs, photos, notes and screen captures. No software or internet connection required. **USB Drive** must be selected (See pg. 31).

PosiSoft.net - a free web-based application offering secure centralized storage of **PosiTector** readings. Access your data from any web connected device. Go to: www.PosiSoft.net

PosiSoft 3.0 - Desktop Software for downloading, viewing and printing your measurement data.

PosiSoft Mobile *(Advanced models only)* - access readings, graphs, capture photos and update annotations through WiFi enabled devices, such as tablets, smart phones and computers.

PosiSoft Desktop Manager (PDM):

A small Windows based application which allows automatic two-way communication (synchronization) between the Gage and *PosiSoft.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 PosiSoft.net account or at www.defelsko.com/downloads

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

NOTE: PDM is not required for **WiFi** enabled gages (pg. 34).

PosiSoft.net:

To enhance the operation of your Gage, all **PosiTector** users have access to the features provided by *PosiSoft.net*. It is a 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 *PosiSoft Desktop Manager* is downloaded and installed onto a Windows PC (not required for WiFi connected gages), synchronization of measurement data can be performed either manually or automatically whenever the **PosiTector** is connected to a web enabled PC (USB cable or Bluetooth wireless technology) or WiFi network (Advanded gages only). Gage measurements stored in memory are uploaded; images and batch notes are synchronized.

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.

 NOTE: A *PosiSoft.net* account is not required to **Update** (pg. 37) your **PosiTector**. Simply download and install *PosiSoft Desktop Manager* at www.defelsko.com/downloads

PosiSoft 3.0:

Desktop Software that can be installed onto your Windows PC and allows the user to download, view, print and analyze their measurement data.

Reports and graphs with annotations and corporate logo can be generated. Data can be exported to XML or CSV (comma delimited) text files.

 NOTE: *PosiSoft Software* is available for use with DeFelsko's complete line of electronic instruments and is available for download at www.defelsko.com/posisoft

PosiSoft Mobile:

Is a Gage-based software application featured in all **PosiTector** Advanced instruments (serial numbers 730,000+).

PosiSoft Mobile allows users to:

- browse stored measurement data including notes, images, statistics and charts
- update batch names/notes using your mobile device's keyboard
- insert images directly into Gage batches using your mobile device's camera or image library
- remotely view the live display of a working **PosiTector** & more

PosiSoft Mobile can be accessed from any WiFi enabled device using a standard web browser. Ideal for use with devices such as Windows Phone/Mobile, Blackberry (RIM), Android, Apple iOS and more.

In addition to browser based access, PosiSoft Mobile Managers are available for Apple iOS and Android users.

See *Accessing your PosiTector Mobile* pg. 36.

Connect Menu

Synchronizing (Sync) is the process whereby **PosiTector** stored measurement data uploads to *PosiSoft.net* (from both Standard and Advanced models) while images and batch notes are downloaded to the Gage (*Advanced model only*). This transfer occurs when the Gage is connected via USB, Bluetooth or directly through your WiFi router/hotspot via WiFi. It can be triggered either manually (USB, Bluetooth or WiFi) or automatically (USB only).

Sync Now

When selected, the Gage immediately synchronizes stored measurement data via USB, Bluetooth or WiFi to *PosiSoft.net (PosiSoft Desktop Manager (pg. 28) and an internet connection are required when using USB or Bluetooth.)*

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

Auto SYNC ✓

Allows the Gage to automatically synchronize stored measurements with *PosiSoft.net* when initially connected to the internet via a PC running *PosiSoft Desktop Manager* (pg. 28) or a local WiFi network.

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

USB Drive ✓

Universal Serial Bus (USB) is a specification for 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.

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When checked, any computer can view readings 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" file found in the root directory. Optionally, text ".txt" files located in each batch folder provide access to measurement values. Stored readings and graphs can be viewed or copied using universal PC/Mac web browsers or file explorers.
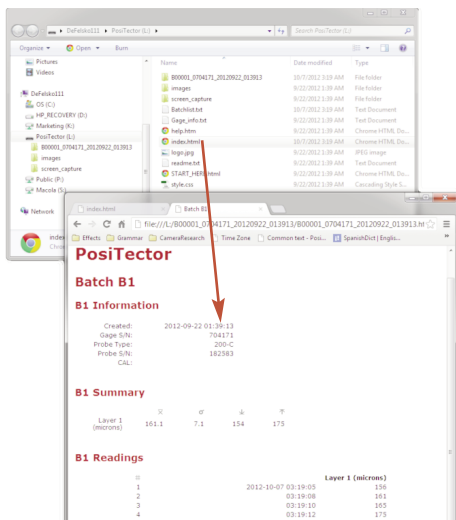

When your **PosiTector** is first connected to your Windows PC via a USB cable, an enumeration process is started that installs device drivers without re-booting your computer. You may see several pop-up windows in the taskbar at the bottom right of your screen. Wait for the entire process to be completed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

NOTE: When connected, 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 Gage will trickle charge the batteries.

Retrieving stored screen captures

The last 10 screen captures (pg. 27) stored in memory can be accessed by navigating to the "screen_capture" directory within the "PosiTector" virtual drive.
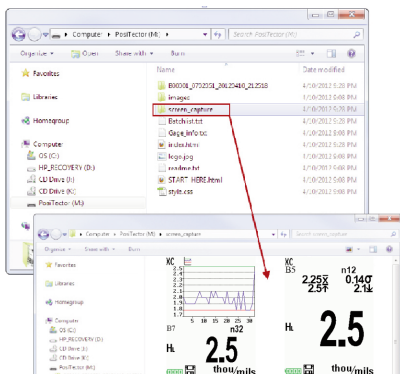
| **Bluetooth** | (*Advanced models only*) |

❖ Bluetooth®

PosiTector Advanced models have Bluetooth functionality to:

- **Communicate** with the *PosiSoft Desktop Manager (PDM)* in lieu of a USB cable.
- **Stream** individual readings 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 Gage and receiving device must be paired before stored or streamed readings 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 Gage will stream readings to the paired Bluetooth Device as they are taken. Readings can be streamed as they are taken to the optional Bluetooth wireless printer (pg. 34) or third-party computer software.

Bluetooth Wireless Printer

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

- Stream individual readings as they are taken.

- Print stored batch readings and summaries.

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

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

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

| **WiFi** | *(Advanced models only)* |

Allows wireless communication with devices such as tablets, smart phones and computers connected to your local wireless network or portable mobile hot spot. See www.defelsko.com/WiFi

On/Off ☑ : Turns WiFi functionality **On**. When selected, the 📶 icon will appear on the display. To deactivate WiFi, select **Off**.

Access Point ☑ : Connect your smart device/computer to a PosiTector Advanced body wirelessly without the need for a separate network. Wirelessly import readings into *PosiSoft 3.0 Desktop Software* (pg. 29) or access *PosiSoft Mobile* (pg. 30) in the field or whenever a WiFi network is not available or out-of-range.

To enable, select **Access Point** from the **Connect > WiFi** menu. The Access Point icon ⁽ᵢ₎ will display in the upper left of the PosiTector display.

Securing your Access Point

To ensure the PosiTector is only accessible to authorized devices, it is important that you enter a passphrase (password) for the Access Point. The default Passphrase is **password**.

In the **Connect > WiFi > Setup** menu, select **AP Passphrase**. Press 🎲 button to display on-screen keyboard. Enter a Passphrase for the Access Point. The Passphrase will be required for all devices connecting to the PosiTector's Access Point.

The PosiTector is now visible to all WiFi enabled devices. Simply connect your devices WiFi to the new PosiTector Access point. All PosiTectors are uniquely identified by their respective gage body serial numbers.

AP Channel

Default Channel: 6
For most users the default channel will not have to be altered. If you are experiencing poor connection or are unable to connect, try another channel.

In the **Connect > WiFi > Setup** menu, select **AP Channel**. Press the **UP** center navigation button to highlight the channel. Use the (**-**) or (**+**) buttons to change the channel. Press the **DOWN** navigation button and select **OK**. Press the 🎲 button.

Import readings into PosiSoft 3.0 Desktop Software (pg. 29)
From the PosiSoft 3.0 menu, select **Import > From Gage**. All connected gages will display their unique serial number. Measurement data will be displayed upon completion of the import.

The time it takes for import will depend on the number of Batches and measurements present within the gage. Imports generally take no longer than a few seconds.

Batches are not erased from the gages memory during import. They remain on the gage until they have been deleted by the user. For more information regarding PosiSoft 3.0:
http://www.defelsko.com/posisoft/posisoft_software.htm

For use on Apple iOS and Android devices:

PosiSoft Mobile Manager apps exist for Apple iOS and Android users. Simply download the App from the Apple App Store or Google Play.

Once your smart device/computer has been connected to the PosiTector Access Point, open the *PosiSoft Mobile Manager* app. Select your PosiTector from the list to open PosiSoft Mobile.

For use with all WiFi enabled devices:

Any WiFi enable device connected to the PosiTector Access Point can view the instrument's built-in PosiSoft Mobile web interface. Using your device's web browser, enter the IP address of your PosiTector to access the features of PosiSoft Mobile.

In the **Connect > WiFi** menu, select **Information** to view the IP address associated with your PosiTector.

Enter the displayed IP address into your devices web browser exactly as it appears. Example: 192.168.0.1:8080

For more information regarding PosiSoft Mobile:
http://www.defelsko.com/posisoft/posisoft_mobile.htm

Networks: The Gage will allow the user to add a new network and will automatically check for available local networks. Available networks detected by the Gage are listed on the screen along with any networks that the Gage has previously been connected to that are not currently within connection range.

Information: Gage displays information about the local WiFi network connection including...
•   SSID: the network's name
•   State: displays if the Gage is connected to the network or not
•   IP Address: the network's IP Address. Users can enter this number into a web-browser of any WiFi enabled device that is connected to the same network in order to view the Gage's synced batches through **PosiSoft Mobile** (See pg. 30).

**Setup:** Allows user to setup a WiFi connection
- IP Settings: enter the IP information as follows... IP Type (DHCP or Static), IP Address, Gateway, Netmask, DNS1, DNS2.
- Server Enable: enables a connection between the network and the Gage.
- Gage Name: enter a name for the Gage (up to 14 Characters).
- WiFi Reset: erases all WiFi settings.

Updates

Determines if a software update is available for your Gage or probe. If an update is available, a prompt will appear allowing the user to choose to perform the update at this time or not.

To perform an update the Gage must be connected to an internet connected PC with *PosiSoft Desktop Manager* (pg. 28), or **WiFi** network (pg. 34).

Important: Ensure that stored measurements are backed up to a PC or *PosiSoft.net*. The Gage may perform a **Hard Reset** (pg. 17) after completion of the update and ALL readings in memory will be erased.

Updates - Sample Screen

Currently installing update 2 of 3 total → **2 / 3**

Progress bar ←
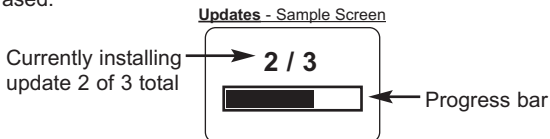
⚠ **DO NOT** unplug the Gage during the update operation.

NOTE: *RTR-P* probes can also be updated via this method. Ensure the probe is connected when checking for available updates.

Current gage and probe software revision information is available within the **Gage Info** menu option (pg. 18).

Technical Data

Conforms to:
ASTM D4417, ISO 8503-5, NACE RP0287, SSPC-PA 17, SP6, SP10, SP11-87T and others

Measuring Range:
20 – 115 um (0.8 – 4.5 mils)

Weight: (without batteries)
140 g (4.9 oz)

Accuracy (H):
+/- 5 um (+/- 0.2 mil)

Resolution:
1 um (0.1 mil)

Anvil Pressure:
110 grams-force (1.1 Newtons)

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

Anvil Size:
Ø6.25 mm (Ø0.25 inch)

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. 22).

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 Gage can still be used, but the batteries should be changed or recharged at the earliest opportunity. The Gage 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 Gage has powered-down.

Battery performance decreases at low temperatures.

Returning for Service

Before returning the Gage for service…

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

2. Clean the measurement anvils using the cleaning card (pg. 12).

3. Perform a **Hard Reset** (pg. 17).

4. Verify accuracy and operation (pg. 13).

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

Website: www.defelsko.com/support

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