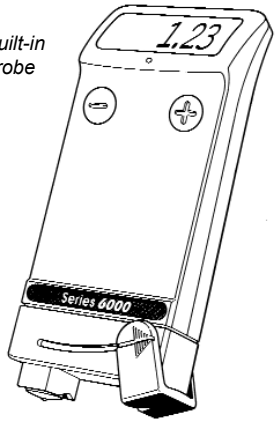
Model *6000* Series

INSTRUCTION MANUAL ver. **5.1**/M
for Memory (3) models

Coating Thickness Gages

Built-in probe



Separate probe

DeFelsko®

Simple. Durable. Accurate.

CONTENTS

Introduction

The ***6000*** hand-held, electronic Gage non-destructively measures the thickness of coatings on metals, quickly and accurately.

While all ***6000*** Gages look the same and behave in a similar fashion, there are several ***models*** each having specific abilities or features as denoted by the model number (ex. ***6000 FNS3***). The model number and serial number(s) can be viewed with the **GAGE INFO** menu option.

Most models are available in a choice of ***style***, ***option*** and ***principle of operation***.

Styles

Built-In Probe Gages have a permanent, built-in probe for easy, one-hand operation.

Separate Probe Gages have a probe at the end of a cable and have an "***S***" in the model number.

Options

(1)-Basic

(2)-Standard - includes on-screen statistics and limited memory to print up to 250 stored measurements to an IR printer.

(3)-Memory - advanced memory management and multiple calibration adjustments. Supplied with ***PosiSoft*** software.

Principles of Operation

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

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

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

NOTE: This instruction manual describes Memory (3) Gages with serial numbers greater than 50,000.

Power-up / Power-down

The ***6000*** powers-up when ⊖ or ⊕ is pressed and displays a 0 measurement value. Built-In probe Gages will also turn on when the probe touches a surface. To preserve battery life, the Gage powers-down after 60 seconds of no activity. Alternatively, hold both buttons down for at least 5 seconds. All settings are retained during power-down.

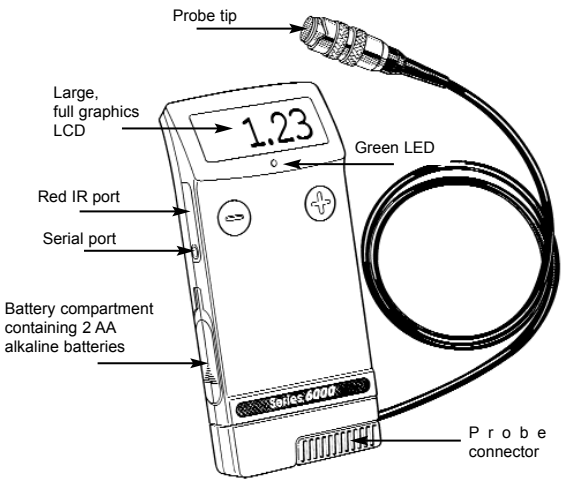
Quick Start

1 -On Built-In probe models, slide the probe cover open FULLY. It acts as a second "foot" to steady the Gage. On separate probe models, remove the black rubber cap.

2 -Turn Gage on with any button.

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

4 -Lift probe AT LEAST 2 INCHES (5cm) from the surface between measurements - OR - leave probe in the same location for continuous measurements every 3 seconds. Do not drag the probe sideways on the surface.



Golden Rule

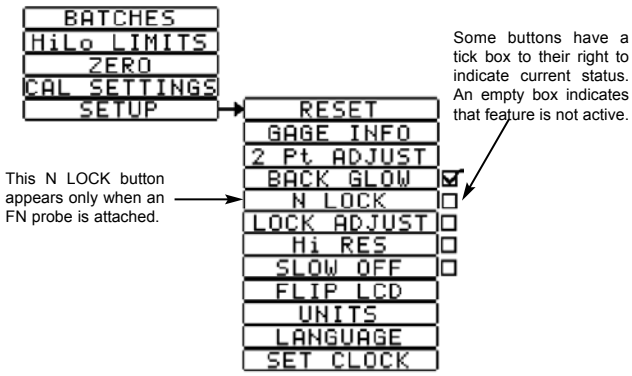
Measure your uncoated part first! This quick zero-check determines if a *calibration adjustment* (see pg.6) is needed for your substrate.

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

Menu Operation

Gage functions are menu controlled. To access the Menu, turn the Gage on and press ⊖ ⊕ simultaneously.

Gage Menu

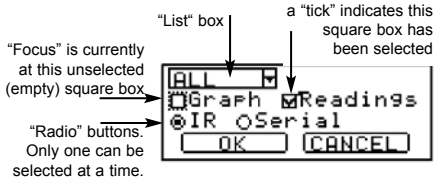


To navigate, press ⊖ for **NEXT**, ⊕ for **SELECT**.
Press both at any time to exit any menu.

When there are more menu buttons than can fit onto one screen, a scroll bar will appear. The dark area indicates what portion of the total menu you are currently viewing.

There are four active elements which may appear on the display: **MENU** buttons, **RADIO** buttons, **SQUARE** boxes and **LIST** boxes. As you navigate using the ⊖ button, each element on the display will receive “focus” as indicated by the item reversing color to black, or by being surrounded by dots. The ⊖⊕ buttons act on the element in focus.

LIST boxes have a down arrow on the right-hand side. Use the ⊖ button until your desired choice appears, then press ⊕ to select this choice and move focus onto the next item.



Calibration and Adjustment

Calibration is the act of measuring known Calibration Standards and verifying that the results are within the tolerance of the Gage. User specific calibration intervals should be established based upon frequency of use, handling practices and measuring environment. *(Written Calibration Procedures are available from DeFelsko at no charge.)*

Adjustment, or Calibration Adjustment, is the act of aligning the Gage's thickness readings to match that of a known sample in order to improve the effectiveness of the Gage on a specific surface or in a specific portion of its measurement range. 1-point or 2-point calibration adjustments are possible and these are stored in calibration *settings* such as **CAL 1** (see pg.9).

The *6000* is factory calibrated and performs an automatic self-check each time it takes a measurement. For many applications no further adjustment is necessary. Just check ZERO on the uncoated substrate, then measure.

But sometimes Gage readings can be influenced by changes in substrate shape, composition, surface roughness or by measuring in a different location on the part. That is why Calibration Adjustments are made possible.

Where a calibration method has not been specified, use a 1-point method first. If measuring the included shims reveals inaccuracies, use the 2-point method.

Factory Calibration settings can be restored at any time by either performing a RESET (see pg.10), creating a NEW calibration setting (see pg.9), or by DELETING the adjustments made to the CAL 1 calibration setting (see pg.9).

A 1- or 2-point Calibration Adjustment may be performed if readings are not falling within the expected range of thickness for the application being measured. It cannot be made if there are readings in memory which used that adjustment.

NOTE: With "***FN***" models, calibration adjustments are made only to the "***F***" or "***N***" side, whichever was measured last.

1-point Calibration Adjustment

Also known as an *offset* or *correction value*, there are 3 ways to perform this most common adjustment:

(1) Simple Zero Calibration Adjustment

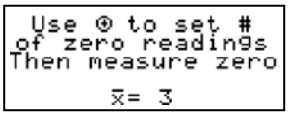
Measure your uncoated part. If the Gage does not read "0" within the tolerance of the probe being used, lift the probe from the surface and adjust the display down ⊖ or up ⊕ until it reads "0". Measure and adjust until the average of a series of readings on the uncoated surface is "0"

Note: Once adjusted, you may "lock" the current calibration adjustment to prevent further user modification. See "Lock Adjust" on page 8 for additional information.

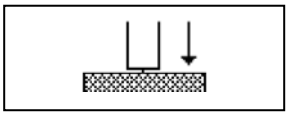
(2) Average Zero Calibration Adjustment

On rough or curved surfaces the Simple Zero Adjustment method must be repeated several times to get a good "0". A preferred method is to let the Gage take several readings on the uncoated part and average the result automatically.

1. Select the **ZERO** menu option.
2. Press ⊕ to select the number of readings to be used to obtain an average, typically 3 to 10 readings, i.e. $\bar{x}$=3. The greater the variation between readings, the more readings should be taken to obtain an average.



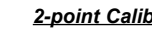
3. Repeatedly measure the uncoated part. The Gage will wait 1 second between readings to allow the user to correctly position the probe on the surface. After the last measurement the Gage will calculate and display "0" which represents the adjusted average of all the ZERO readings taken.



(3) Adjustment to a Known Thickness

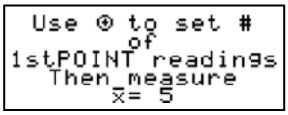
It is sometimes desirable to adjust the Gage to a known thickness, such as a shim, rather than adjusting it to zero.

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

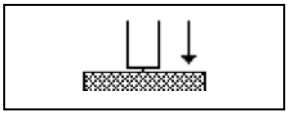
2-point Calibration Adjustment 

This method requires taking two readings at known thickness values: a thin value (often zero) and a thicker value. These values should be on either side of the thickness range to be measured.

1. Select the **2 PT ADJUST** menu option.
2. Press ⊕ to select the number of readings to be used to obtain an average on the thinner item, typically 3 to 10 readings, i.e. $\bar{x}$=3. 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 1 second 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 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 ⊖ ⊕ simultaneously to accept this value.

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

NOTE: If you exit this routine after step 4 by pressing ⊖ ⊕ simultaneously a second time, the Gage will simply perform a 1-point Calibration Adjustment on the average obtained on this first known thickness.

User Mode Calibration

Depending upon the probe attached, 6000 gages normally use factory CAL SETTINGS to measure the thickness of:

-non-magnetic coatings over magnetic substrates (F probes)

-non-conductive coatings over conductive substrates (N probes)

One- and two-point calibration adjustments are possible in order to improve the effectiveness of the Gage on a specific surface or in a specific portion of its measurement range.

There are a number of applications, however, where one- and two-point calibration adjustments will not work satisfactorily on their own, such as when measuring:

-magnetic coatings over magnetic or non-magnetic substrates such as iron loaded polymer paints and nickel coatings (F probes)

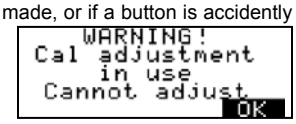
-conductive coatings over non-conductive substrates such as thermally sprayed zinc over concrete (N probes)

For these applications, the included PosiSoft software is required to create a new CAL SETTING inside the gage. PosiSoft allows the operator to define a function using a 9th order standard polynomial which converts standard 6000 readings into user defined outputs. The function acts as a post display routine and will not affect the standard operation of the gage. Please contact your dealer for more information on this feature if your application requires such capability.

Lock Adjust

LOCK ADJUST ☑

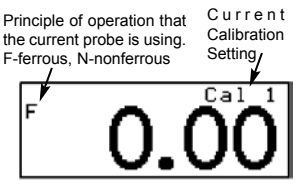
When selected, current calibration adjustments are "locked" to prevent further user adjustments. If a calibration attempt is made, or if a button is accidently pressed, the following message will appear:



Creating Multiple Calibration Settings

CAL SETTINGS

It is often convenient to retain 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 1- or 2- point calibration adjustment. The ***6000*** always displays the current calibration setting (ex. **CAL 3**) in the upper right corner of the LCD.



The setting called **CAL 1** has unique properties. It can be adjusted but never deleted, and is always made active after a **RESET** (see pg.10).

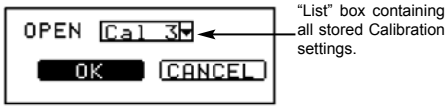
When **CAL SETTINGS** is selected, this screen appears:

NEW

-creates a new calibration setting using the next available number. (Maximum of 10 Calibration Settings) For example, if **CAL 1** and **CAL 3** exist, then **CAL 2** would be created and made the current setting. But in list boxes it would appear last because it is the most recent. *By default, new Cal settings are initially loaded with the Gage's factory settings.* This is indicated with the icon which appears at the bottom of the LCD. A warning message will prevent the creation of a new Cal setting if a *batch* is open and has readings. Close the batch first.

OPEN

-loads an existing setting. Use the ⊖ button to scroll the **LIST** box until the desired setting appears, then press ⊕. A warning message will prevent the opening of a stored setting if a *batch* is open and has readings. Close the batch first.



DELETE

-removes a setting completely from the list. That 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 (see **BATCHES** pg. 11). Although **CAL 1** cannot be deleted, the **DELETE** function will return it to factory settings.

PRINT

-sends a list of all Calibration Settings to either the IR printer using the Gage's built-in IR port, or to a serial printer using the included RS232 cable.

A linear offset value generated by a 1-pt calibration adjustment. The ***6000*** always takes measurements using factory calibration settings, then subtracts this value and displays the result on the LCD. This value is set to 0.0 when a 2-pt calibration adjustment is made.

Separate "F"errous and "N"on-ferrous values may be printed.

Batch names containing measurements using this calibration adjustment.

IR Printer output

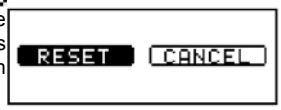
```
6000
S/N 50000
-----------------------
Cal 1

F Zero Offset      0.0  um
F1stPnt Start     52.0  um
F1stPnt Target    50.0  um
F2ndPnt Start      514  um
F2ndPnt Target     500  um

Active Batches
Batch1
Batch3
```

Values generated by a 2-pt calibration adjustment. "Start" values are the user's low and high points measured using factory calibration settings. "Target" values are the user's adjustments using the (-) (+) buttons. "Target" values are returned to a default value equal to the "Start" values if a 1-pt "average zero" calibration adjustment or a "reset" is made. These values are not changed, however, if the (-) (+) buttons are used to make a Zero Offset change.

Reset Menu Option

RESET

RESET restores factory settings and returns the Gage to a known, out-of-the-box condition. It is handy when you want to "start all over". When **RESET** is selected, the following screen appears:



The following changes are made to the Gage:

- all batches and all stored measurements are erased.
- all **CAL** settings are cleared and returned to the Gage's factory calibration settings.
- menu settings are changed to the following:

BATCHES are closed	**HI RES** = OFF
HILO LIMITS mode = OFF	**SLOW OFF** = OFF
BACKGLOW = ON	**FLIP LCD** = Normal
N LOCK = OFF (FN probes only)	**LOCK ADJUST** = OFF

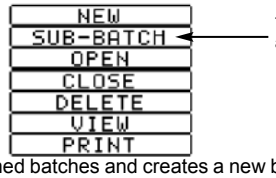
A "hard" **RESET** can be performed when the Gage is powered down. It is handy when the Gage fails to power-up or operate properly. Hold the ⊕ button until the **RESET** symbol appears. It performs the same function as a menu **RESET** with the *addition* of **UNITS** = mils and **LANGUAGE** = English.

NOTE: Keep the probe away from metal during a **RESET**.
Time and Date are not affected by a **RESET**.

Storing Readings into Memory (Batches)

BATCHES

The ***6000*** can record 10,000 measurements in up to 200 groups, or *batches*, for on-screen statistical purposes, for printing to the optional IR printer, for printing to a serial printer using the included RS232 cable, or for downloading to a personal computer using the included ***PosiSoft*** software. Readings are time-stamped as they are taken. When **BATCHES** is selected, the following choices are presented:



This option appears only if a batch is currently open.

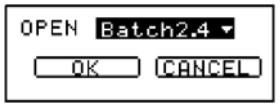
NEW
-closes any currently opened batches and creates a new batch name using the next higher number. For example, if only **BATCH 1** and **BATCH 3** exist, then **BATCH 4** would be created and made the current batch. The icon appears and basic statistics are displayed. All measurements will now be simultaneously displayed on the LCD and stored into this new batch. On screen statistics are immediately updated with each measurement. In list boxes this newly created name will appear last because it is the most recent. New batch names are date stamped at the time they are created.

SUB-BATCH:
-creates a new sub-batch name. A sub-batch is identified with a decimal number. For example **BATCH 2.4** is a sub-batch of **BATCH 2**. Sub-batching allows the user to group related batches so that statistics can be accumulated for them. In this example **BATCH 2** contains the statistics for **BATCH 2.1**, **BATCH 2.2**, etc.

This button only appears if a batch or sub-batch is open. It performs two different operations depending upon what type of batch is currently open. If **BATCH 4** is open, then it is simply renamed **BATCH 4.1**. If **BATCH 4.1** is open, it is closed and a new sub-batch is opened called **BATCH 4.2**. Use the **NEW** button to create **BATCH 5**.

- Create a new batch or sub-batch by pressing ⊕ (shortcut)

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 associated with this batch is also opened (see pg.9).



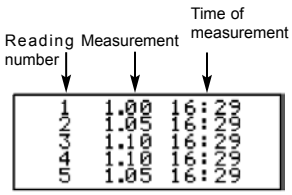
CLOSE:
-stops the recording process, closes the current batch or sub-batch, and removes the statistics from the LCD.

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. For example, if **BATCH 4** is deleted, **BATCH 4.1**, **BATCH 4.2**, etc. are deleted at the same time.

VIEW:

-lists all readings onto the LCD from the current or most recently used batch or sub-batch. It begins by showing the last 4 measurement values. Scroll using the ⊖ or ⊕ buttons. Additional measurements can be taken while in this view screen. Exit by pressing ⊖ ⊕ simultaneously.

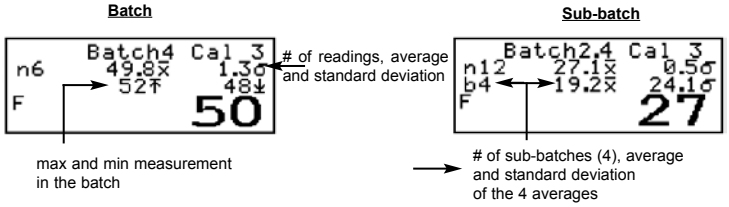


PRINT:

-outputs a statistical summary to the optional IR printer using the built-in IR port, or to a serial printer using the included cable. Individual measurements with their time stamp are also printed if the **READINGS** box is ticked. A histogram is also printed if the **GRAPH** box is ticked. HiLo calculations are printed using current HiLo settings if **HILO** mode is turned on (see pg.16).

NOTES:

- Calibration adjustments cannot be made if any measurements were taken with that setting and stored into a batch.
- Remove the last reading from the current open batch by pressing ⊖ .
- Use sub-batching to deliver the average of a set of average readings as required by SSPC-PA2 guidelines. SSPC is a U.S.-based Society for Protective Coatings. PA-2 is a Paint Application specification. See example on pg.13.
- While a batch or sub-batch is open, the display screen appears as follows:

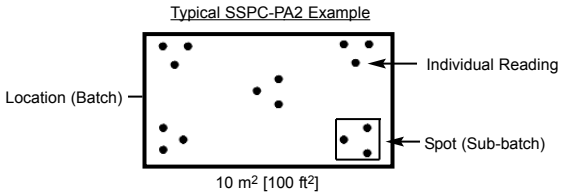


- For optimum Gage performance, it is recommended that a “hard” **RESET** be performed occasionally.

SSPC-PA2 Example

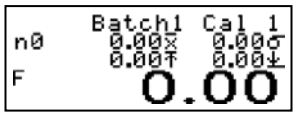
Use sub-batching to deliver the average of a set of average readings as required by SSPC-PA2 guidelines. SSPC is the U.S.-based Society for Protective Coatings. PA-2 is a Paint Application specification.

SSPC-PA2 calls for 5 separate Spot measurements (average of gage readings - typically 3), spaced randomly over each 10 m² (100 ft²) Location to be measured.



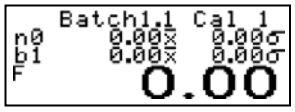
To setup the Gage for PA-2, perform the following steps:

1. Select **BATCHES** -> **NEW**



Batch1 will contain average of all Sub-batches for current Location.

2. Select **BATCHES** -> **SUB-BATCH**



Batch1.1 will contain individual readings for current Spot

3. Take Spot readings. (Typically 3).
4. Press ⊕ to begin new Sub-batch.
5. Repeat Step 3-4 for each Spot area to be measured. (Typically 5)
6. Move to next Location to be measured. Repeat Steps 1-5.
7. Repeat Steps for all Locations to be measured.

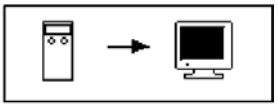
Downloading Measurements Stored In Memory

Measurements stored in the Gage's memory (in batches) can be downloaded to a computer using the supplied RS232 serial communication cable and the supplied ***PosiSoft*** software. Existing communication software can be used providing it can capture data from a COM port. Select the **BATCHES - PRINT** menu buttons. Measurements are not erased from memory after downloading.

PosiSoft® Coating Thickness Software for Windows®

PosiSoft® ver.2.7 or higher version is supplied on a CD for downloading readings to a computer. It runs on Windows-based PC computers using Microsoft Windows® 98 or higher version and having a COM port. It allows entry of notes and annotations, prints histograms and basic charts and is ideal for monitoring coating thickness applications. Complete operating instructions can be accessed by first installing the software, starting the program, then selecting the **HELP - POSISOFT HELP - DOWNLOADING** menu option.

This connection graphic is displayed on the Gage's LCD when communicating with ***PosiSoft***. If it remains on the LCD for more than 5 minutes and ***PosiSoft*** is not connected to the gage, the Gage can be turned off by opening the battery compartment. All readings/batches/settings will be preserved.



Serial Communications Configuration

8 bit words, no parity, 1 stop bit
115200 baud
No handshaking

The supplied serial cable is a 3.5 mm STEREO PLUG to a DB9 F.

Pinout	Description
2	TXD Transmit data (from Gage)
3	RXD Receive data (from PC / Printer)
5	GROUND

Downloading Measurements As They Are Taken

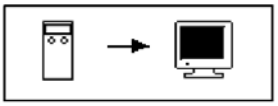
If a serial printer, data collector or computer is connected to the Gage using the supplied RS232 serial cable, readings are immediately sent to the device as they are taken. Output is in the following form (example):

{STX} 15.0mil NONFE{CR}{LF} where: STX = ASCII code 02 = ^B
CR = ASCII code 13 = ^M
LF = ASCII code 10 = ^J

Selecting a default power up baudrate

By default the Series 6000 ships with the default baudrate set to 115200. Users can change this rate using the following method:

1. Run a suitable terminal emulation program on your PC such as HyperTerminal.
2. Set the properties as shown to the right and connect.
3. Perform a hard reset on the gage. (this establishes a default baudrate of 115200 on the gage)
4. Plug in the supplied RS232 cable.
5. Please enter on HyperTerminal. The gage should respond with **OK**
6. Type **ATDT2222222**
7. The gage will respond with: **POSISOFT** and the gage display should show…



8. Press **B** and gage responds with: **Enter Baud Rate**
9. Type numeric baudrate and press enter. (Valid rates are 9600, 19200, 38400, 115200.) Gage responds with: **...setting baudrate to nnnn**
10. Gage will now set the default powerup baudrate to nnnn and terminate the terminal interface. Until the baudrate is changed using this method or the instrument is reset, the baudrate will be nnnn.

Note: PosiSoft expects a baudrate of 115200. Setting the baudrate to anything other than 115200 will cause PosiSoft to fail to connect to the gage.

USB to Serial Adapter

USB to Serial Adapter cables are available for PC's supporting only USB connections. This solution is easy to install and is compatible Windows 98, ME, 2000 and XP.

Contact your dealer for additional information.

Hi Lo Limits

HiLo LIMITS

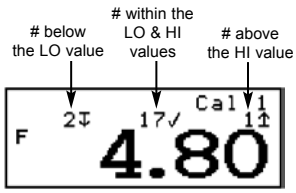
When **HILO LIMITS** is selected, the following appears...

CLEAR
ON
OFF

CLEAR
-zeros all on-screen tabulations.

ON
-displays the current **LO** setting. Adjust down ⊖ or up ⊕ Alternatively, measure a coating with a thickness close to the required value and make final adjustments with the buttons. Press ⊖⊕ simultaneously to accept this value. The current **HI** setting is now displayed. Follow the same procedure to adjust this setting. The ↕ icon will light.

Measurements will now be compared to your defined limits. The Gage beeps and blinks twice if results are within those limits. A single low tone if it is below the **LO** limit, and a HIGH tone if it is above the **HI** limit. The green LED will not blink if readings are outside limits.



OFF
-turns this mode off. Existing tabulations are maintained in memory, but not displayed.

Hi-Resolution Mode

Hi RES ☑

When **HI RES** is selected, the displayed gage resolution becomes 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
0.01 mm	1.00 - 99.99 mm

NOTE:
- Gage accuracy is not affected by the HI-RESOLUTION Mode.
- FT/FH probes do not have HI RES mode.

Slow Off Menu Option

SLOW OFF ☑

Normally the Gage powers-down after approximately 60 seconds of no activity. When **SLOW OFF** is selected the Gage powers-down after approximately 30 minutes of no activity. Additionally, an **OFF** button is placed in the menu. The Gage can always be powered-down at any time by holding both buttons for 5 seconds.

Inch/Metric Conversion

UNITS

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

Back Glow Menu Option

BACK GLOW ☑

The ***6000*** has a unique glow screen that evenly lights the LCD to provide better visibility and contrast. In some lighting conditions this is not necessary, so the glow can be switched off for slightly longer battery life.

FLIP LCD Menu Option

FLIP LCD

This option causes the display to read upside down. On Separate Probe models this feature allows the Gage to be laid on a worktable with the LCD conveniently pointed toward the operator, thus freeing the operator's hands to hold the probe and part to be measured. On Built-In Probe models this feature is useful when the Gage is used upside down to measure on a ceiling.

Setting the Date and Time

SET CLOCK

All batches are *date*-stamped when created, and all measurements are *time*-stamped when stored into these batches. It is therefore important to keep both the date and time current using this menu button. Alternatively, these values can be automatically updated when the gage is connected to ***PosiSoft*** using the **GAGE UTILITIES -> SET CLOCK** function in ***PosiSoft.***

NOTE: Time is entered and displayed in 24 hour format.

Separate Probes

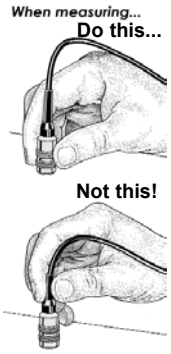
Separate Probe Gages consist of a gage body and a probe. A wide selection of interchangeable probes are available. Each retain their own unique calibration information. *All Gage bodies accept all probes*. To disconnect, power-down and pull the serrated plastic sleeve horizontally away from the Gage body.

On power-up the ***6000*** automatically determines what type of probe is attached and does a self-check. These probes "sense" when they are near metal and immediately attempt a measurement followed by another every 2 - 3 seconds. They stop when removed from the vicinity of metal and power-down after 60 seconds of no activity.

Do not drag the probe sideways. The continuous measurement feature is only intended to allow careful probe placement on small or odd-shaped surfaces. Simply 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 ring down.



FN Combination Probe

An ***FN*** probe combines the capabilities of both "***F***" and "***N***" probes. Switching between the two is automatic.

The probe first 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***".

Non-Ferrous Lock

Select **N LOCK** when operating regularly on non-ferrous substrates. The probe will only use the eddy current principle when measuring. This shortens measurement time and extends battery life.

N LOCK is useful in instances such as measuring paint on galvanized (zinc coated) steel. Normally the probe measures both the paint and zinc over the steel using the magnetic principle. **N LOCK** makes the Gage measure the paint on zinc 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.

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

Thick Coating Probes

(FT, FTS, NTS, FNTS, FHS, NHS)

These probes are designed to operate far from the substrate where changes in magnetic and eddy current response due to coating thickness is difficult to sense. Therefore they are very sensitive to substrate thickness, shape and surrounding metal. Be sure to check calibration with the included acrylic blocks when measuring on a different part.

If readings on thick coatings appear to be inconsistent, take a measurement on the uncoated substrate, remove the probe from the surface by at least 6 inches (15cm), and then hold the probe in the air for 5 seconds. Resume measuring.

Microprobes

(F0S, F45S, F90S, N0S, N45S, N90S)

These small probes have the best accuracy and can measure on very small parts and into hard-to-reach areas.

Excessive downward pressure during measurement may damage them. To avoid damage, do not apply more than ***100*** grams of pressure on the probe tip.

Quick Release Adapter

The straight ***F0S*** and ***N0S*** Microprobes have a quick release adapter that makes them constant pressure probes for alignment on small, flat or curved parts.

This adapter is held in place by a spring. If the sleeve is not required, simply pull it off the probe. To re-attach it, screw it into the spring.

Available Options

Test Stand Fixture

The ***N0S***, ***N45S*** or ***N90S*** (eddy current) microprobes have a very high resolution and are sensitive to the way they make contact with the measuring surface.

Measurements made at different contact angles with the surface or at different contact pressure may produce different readings.

Therefore, to obtain consistent measurement results that are within the published tolerances, the probe, the part to be measured, or both should be placed in a fixture.

A device is available from your dealer that is ideal for use when measuring on small or complex shaped parts. It removes adverse operator influence by fixturing both the probe and the part. Intended primarily for the straight (0 degree) ferrous or non-ferrous microprobes, it ensures that the part is brought up to the probe perpendicular to the part's surface in a controlled, repeatable way.

IR Printer

A convenient, portable printer is available for use with the ***6000***. The Gage transmits data to this battery-operated printer through the IR (infrared) port without connectors or cables.

Traceable Standards

Calibration standards are available for each particular probe. They are ideal for ISO 9000 compliance and for verifying the operation of your Gage. Contact your dealer to determine the best set of standards for your particular probe.

Plastic Shims

A set of Plastic Shims or acrylic blocks is included, depending upon the probe type. They provide a quick operational check of the probe by allowing the user to perform practice measurements. They can also be used to protect the probe when measuring on tacky, rough or hot surfaces. Some Test Methods and Specifications call for their use when making calibration adjustments.

Certified Plastic Shims

Certified plastic shims are a convenient solution for users adhering to formal quality systems. (e.g. ISO 9000, QS 9000 and ISO 17025). They provide full traceability to national or international standards (NIST).

Certification

All probes are shipped with a Certificate of Calibration. Some organizations have a compliance requirement to re-certify probes periodically. This can be done by measuring traceable Standards (shown above) or by returning the Gage and probe to an authorized dealer to be re-certified.

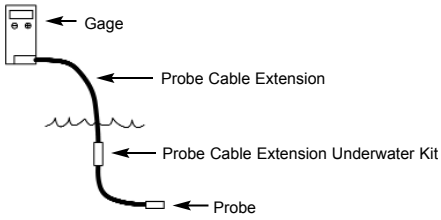
Probe Cable Extensions

Probe cable extensions are available for all PosiTector 6000 probes. They consist of a length of cable with plastic connectors at each end. One end attaches to the gage body; the other end attaches to the probe.

Probe extension cables are available in lengths up to 500ft / 150m.

Probe Cable Extension Underwater Kit

Underwater kits are available for all 6000 extended cables. Please contact your dealer for more information if your application requires such capability.



Troubleshooting

Here are some common reports received by our Service Department along with possible causes. Most conditions can be cleared with a **RESET** (pg. 10). If not, read "Returning for Service" on page 22.

Probe attempts a measurement even while held in the air:

-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.
-black cap must be removed from probe (if outfitted with one).
-an extreme calibration adjustment might have been made.

Gage will not print to the IR printer:

-try placing the Gage IR port close to the printer IR port.
-check printer batteries and darkness settings. Switch it off and then on again.

Temperature

Operating range: +32^0 to +120^{0}F
(0 to +50^{0}C).

The ***6000*** compensates automatically for temperature. Allow a few minutes for the Gage 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.

TIP: Ferrous substrates with extreme temperatures between -150^{0}F and +450^{0}F (-100^{0}C and +230^{0}C) can be measured with the ***PosiPen B***. It is ideally suited for measuring on small, hot or hard-to-reach surfaces. Contact your dealer.

Changing The Batteries

As the batteries become weak the symbol will appear and begin flashing during measuring. If the batteries are allowed to become very weakened, this symbol will remain on without flashing. The Gage can still be used in this condition but the batteries should be changed at the earliest opportunity.

USE ONLY AA ALKALINE BATTERIES

Nickel-cadmium and nickel-metal hydride rechargeable batteries will work but the low battery symbol may stay on.

To retain all user settings and stored memory readings, open the battery door only after the Gage has automatically powered-down.

Returning for Service

Before returning the Gage for service…

1. Install new Alkaline batteries in the proper alignment shown on the door.

2. Examine the probe tip for dirt or damage. Constant-pressure probes should move up and down freely.

3. Perform a *hard* Gage **RESET** (see pg.10).

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 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.

Technical Data

Conforms to: ISO 19840, prEn ISO 19840, ASTM B499/D1186/D1400, SSPC-PA2 and others.

Range:

Microprobes, NAS	0-25 mils & 0-625 microns
FT, FTS, NT, NTS,FNT, FNTS	0-250 mils & 0-6 mm
FHS, NHS	0-750 mils & 0-20 mm
All others	0-60 mils & 0-1500 microns:

Default Resolution:

Microprobes, NAS	0.01 mil / 0.5 µm, then 0.1 mil / 2 µm (> 4 mils / 100 µm)
FT, FTS, NT, NTS,FNT, FNTS	0.5 mil / 0.01 mm
FHS, NHS	1 mil / 0.02 mm
All others	0.05 mil / 1 µm, then 0.1 mil / 2 µm (> 2 mils / 50 µm)

Accuracy:

Microprobes, NAS	±(0.01 mil + 1%) 0 - 4 mils ±(0.1 mil + 3%) > 4 mils	FHS, NHS	±(1 mil + 1%) 0 - 250 mils ±(1 mil + 5%) > 250 mils
	±(0.5 µm + 1%) 0 - 100 µm ±(2 µm + 3%) > 100 µm		±(0.02 mm + 1%) 0 - 6 mm ±(0.02 mm + 5%) > 6 mm
FT, FTS, NT,NTS, FNT, FNTS	±(0.5 mil + 1%) 0 - 100 mils ±(0.5 mil + 3%) > 100 mils	All others	±(0.05 mil + 1%) 0 - 2 mils ±(0.1 mils + 1%) > 2 mils
	±(0.01 mm + 1%) 0 - 2.5mm ±(0.01 mm + 3%) > 2.5 mm		±(1 µm + 1%) 0 - 50 µm ±(2 µm + 1%) > 50 µm

Physical Specifications:

Gage body dimensions:	5.8" x 2.4" x 1.0" (147 x 61 x 25 mm)
Constant Pressure Probe Pressure:	100 grams
Battery Life:	50 hours continuous or 36,000 readings

Warranty

The manufacturer fully warrants its products against defects in workmanship or materials for a period of one year from date of purchase. In the event that a Gage is found to be defective, return the product with proof of purchase to your dealer, and the defective product will be repaired or replaced at the manufacturer's option.

No responsibility is assumed for incidental or consequential damages.

The warranty is voided if the Gage has been opened.

Data subject to change without notice.

DeFelsko®
The Measure of Quality

DeFelsko Corporation

802 Proctor Avenue, P.O. Box 676
Ogdensburg, New York 13669 USA

Tel: 315-393-4450 · Fax: 315-393-8471
e-mail: techsale@defelsko.com
web: www.defelsko.com