

# Coating Thickness Gauges

## DCF-3000EZ-E AND DCFN-3000EZ-E



**Operating Instructions**

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## 1.0 INTRODUCTION

DCF-3000EZ-E = For measurement on steel / iron

DCFN-3000EZ-E = For measurements on steel / iron and non-ferrous metals

The Check•Line 3000EZ-E Series of coating thickness gauges provide accurate, non-destructive measurement of:

- All non-magnetic coatings, such as varnish, paint, enamel, chromium, copper, zinc, etc. on steel and iron. Measurements in the F mode (Ferrous) are carried out according to the Magnetic-Induction method.
- All electrically insulating coatings, such as varnish, paint, enamel on non-ferrous metals (aluminum, brass, stainless steel, etc). Measurements in the N mode (Non-ferrous) are carried out according to the Eddy-Current method.

**NOTE:** 3000EZ-E Series gauges operate in accordance with the following international standards related to coating thickness measurement:

*Magnetic Induction*

DIN EN ISO 2178, ASTM B499, DIN 50 982

*Eddy-Current:*

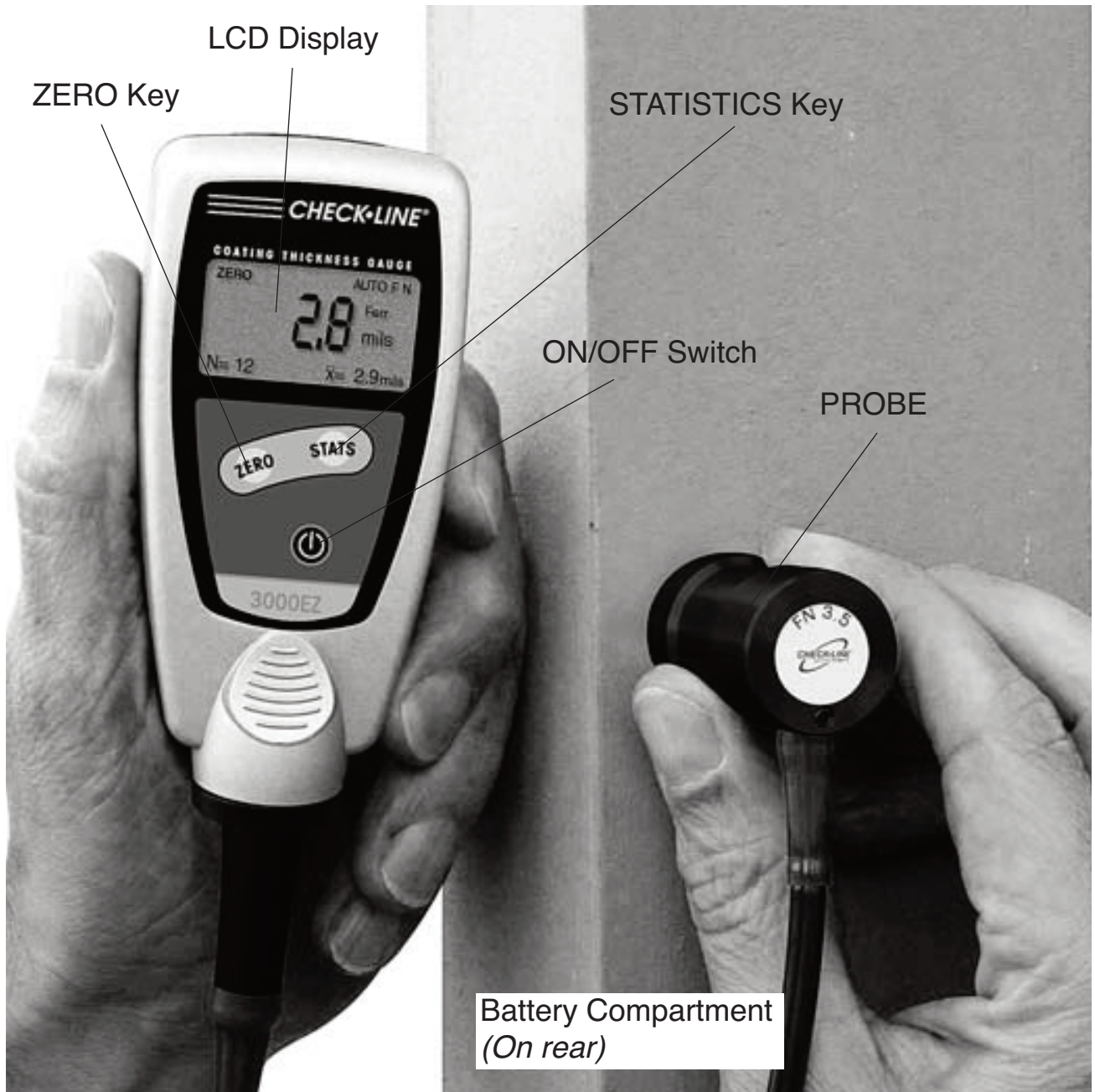
DIN EN ISO 2360, ASTM D1400

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## 2.0 OVERVIEW

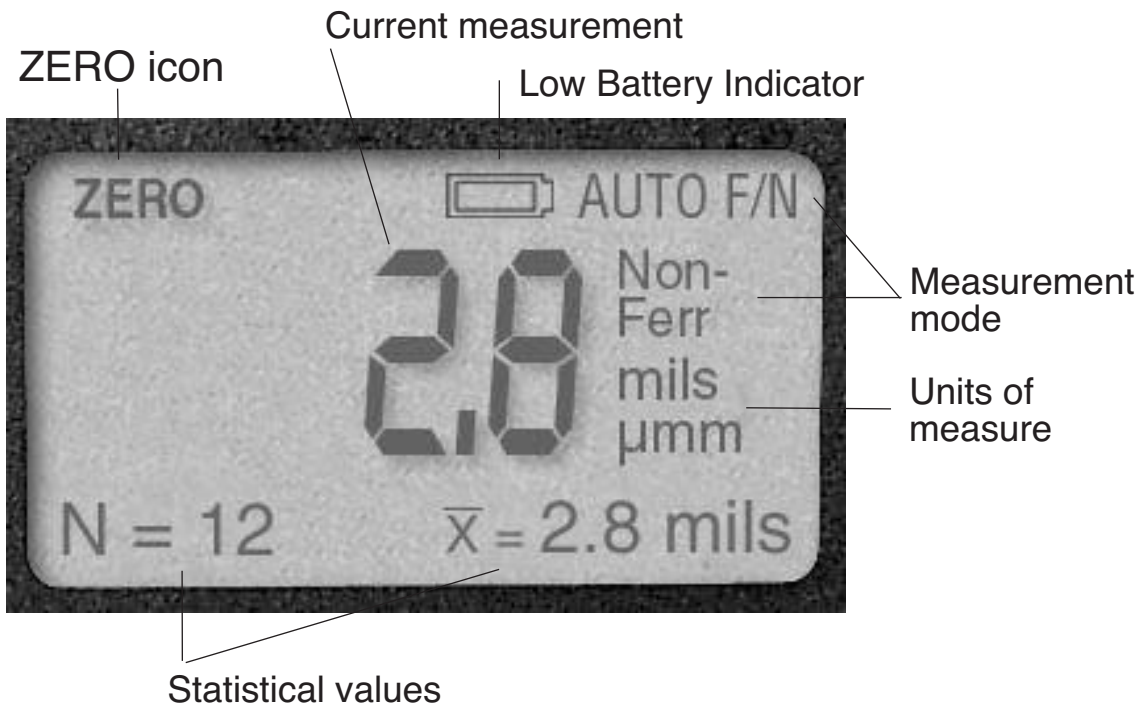
### 2.1 Gauge



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## 2.2 Display



## 2.3 Complete Kit

3000EZ-E Series gauges are supplied as a complete kit, with gauge, plastic test shim, 2x AAA batteries, soft carrying pouch, manual and manufacturer's calibration certificate.

DCF models include a steel zero plate.

DCFN models include steel and aluminum zero plates



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## 3.0 BASIC OPERATIONS

### 3.1 On/Off Switch

To turn the gauge on, press the **ON/OFF Switch** briefly (see photo on page 3). Press and hold the **ON/OFF Switch** for 2 seconds to turn the power off.

**Note:** The gauge will power off automatically after 90 seconds of non-use.

### 3.2 Selection of Measuring Units

1. Make sure the gauge is switched **OFF**.
2. Press and hold the **ZERO** and **STATS** keys simultaneously
3. While continuing to hold down the **ZERO** and **STATS** keys, turn the power **ON**.

### 3.3 Manually setting the measuring mode

#### *DCFN-3000EZ-E Only*

In some cases, especially with varnish applied to zinc on steel, it is advisable to manually set the measuring mode—F mode (Ferrous) for measurements on steel/iron, N mode (Non-ferrous) for measurements on non-ferrous metals.

#### **Setting the measurement mode**

1. Turn the gauge on by pressing the **ON/OFF** switch.
2. Press the **ZERO** and **STATS** keys simultaneously to change the measuring mode. Each time the keys are pressed the mode will change. The display will show the mode selected (see photo, page 4) using the following abbreviations:

**Ferr** — indicates Ferrous Mode.

**Non-Ferr** — indicates Non-Ferrous Mode.

**AUTO FN** — indicates Auto-Select Mode.

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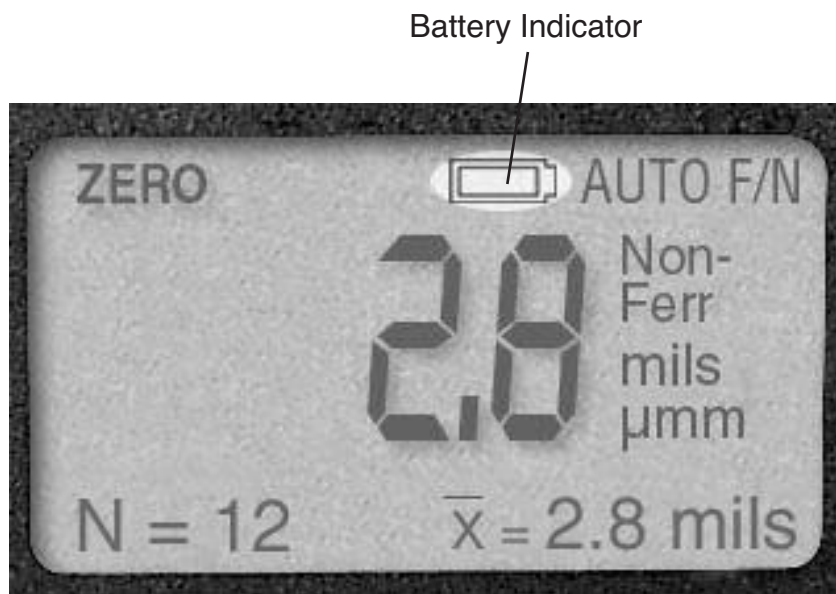
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### 3.4 Total Reset to Factory Defaults

1. Switch the gauge off.
2. Press and hold the **ZERO** key. At the same time, turn on the power using the **ON/OFF** switch
3. An acoustic signal will sound, all statistical values will be deleted and the factory settings  $\mu\text{m}$ , calibration, and AUTO FN (DCFN-3000EZ-E only) will be activated.

### 3.5 Battery Replacement

3000EZ gauges use 2x AAA alkaline batteries. When battery power becomes low, the **BATTERY INDICATOR** will begin to flash. The gauge will continue to operate, but the batteries should be replaced as soon as possible. When battery power is depleted, the Battery Indicator will remain on continuously, indicating that less than 60 seconds of power remains before the gauge will shut off.



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## 4.0 MEASURING USING FACTORY CALIBRATION

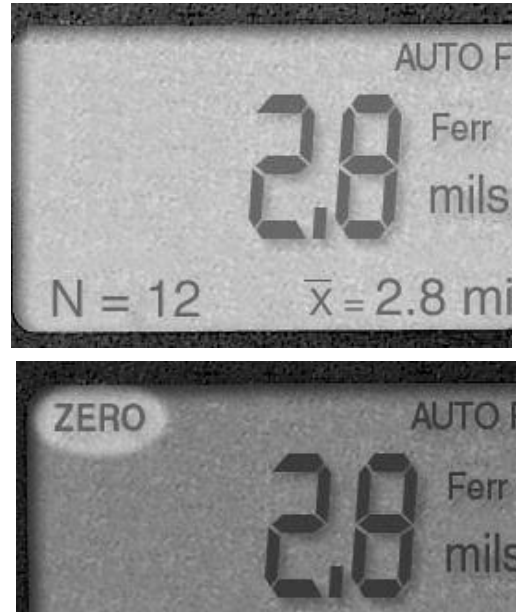
1. Press the **ON/OFF** switch to turn the gauge on.
2. If the **ZERO** icon *does not* appear in the upper left corner of the display, the preset factory calibration is activated.

If the **ZERO** icon does appear, it indicates that a Zero Procedure has been performed. See *Clearing a Zero Setting*, Section 5.2 before continuing.

3. Place the gauge on the test object and read the measurement. Lift the gauge off of the test object by at least 1 inch (2.5 cm) before taking another reading.

**Note:** Using the factory calibration, you can immediately carry out measurements on flat and slightly curved surfaces. **On strongly curved or rough parts it is recommended that a ZERO procedure be performed** (see section 5.0).

**DCFN-3000EZ-E Only:** The DCFN-3000EZ-E automatically recognizes whether the base material is a ferromagnetic steel or a non-ferrous metal and will display the correct reading.





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## 5.0 PERFORMING A ZERO PROCEDURE

To obtain more accurate measurements on strongly curved or rough parts, you should carry out the ZERO Procedure on a similar curved reference piece without coating.

1. Press the **ZERO** key. ZERO flashes in the display.
2. Place the gauge on the bare surface several times. Lift the gauge off of the surface by at least 1 inch (*2.5 cm*) between placements.
3. Press **ZERO** key again. The display shows ZERO
4. You can now carry out additional measurements.

**Note:** Zeroing is required if the convex radius of curvature

- is smaller than *1.2" (30mm)* on steel parts,
- is smaller than *2.4" (60mm)* on non-ferrous metal parts.

### 5.1 Checking accuracy

The foil standard included in the complete kit can be used together with the supplied zero plates (Fe or Al) to check the accuracy of the gauge. After zeroing, the measured thickness of the foil will be displayed within the tolerance of the foil plus the gauge accuracy.

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## 5.2 Clearing a zero setting and restoring factory calibration

If the **ZERO** icon is shown on the display after switching on (see top photo below), a custom calibration is activated. To clear the custom setting:

1. Press the **ZERO** key twice. The **ZERO** icon disappears. The factory calibration is active. You can now take measurements using the factory calibration.



Custom Calibration active



Custom Calibration cleared

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## 6.0 ONLINE STATISTICS DISPLAY

Every time a measurement is take, a pair of statistical values appear in the lower part of the display, as shown at right.

For example:

$$n = 12 \quad x = 2.8 \text{ mils}$$

( $n = \text{number of measurements}$  ;

$x = \text{average}$ )



Each time the **STATS** key is pressed, the number of measurements and a different statistical value will appear, allowing the user to easily scroll through statistics menu in the following sequence:

Press  $n = \text{number of measurements}$ ;  $x = \text{average}$

Press  $n = \text{number of measurements}$   $s = \text{standard deviation}$

Press  $n = \text{number of measurements}$   $\text{max} = \text{maximum reading}$

Press  $n = \text{number of measurements}$   $\text{min} = \text{minimum reading}$

You can pre-select a required pair of values by means of the **STATS** key, for example  $n = 12$   $s = 0.1 \text{ mils}$ , and have it displayed during the entire measurement data recording process.

**Note:** After the stistical values are deleted, or before new measurments are made, the display will show:

$$n = 0 \quad x = \quad \text{mils}$$

**Important:** If a series of measurements is meant to be statistically evaluated, the old statistical values must be deleted before starting a new series of measurements.

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## 6.1 Clearing the statistical values

To clear the statistical values, momentarily press and release the **ON/OFF** switch. A value of zero will be shown in the number or measurements field “n” confirming that the stored statistical values have been cleared.

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## 7.0 SPECIFICATIONS

|                                    |   |
|------------------------------------|---|
| <b>Range</b>                       |   |
| DCF, DCFN                          | <i>Ferrous: 0 - 140.00 mils (0 - 3500 <math>\mu</math>m)</i>  |
| DCFN Only                          | <i>Non-Ferrous: 0 - 120.00 mils (0 - 3000 <math>\mu</math>m)</i>  |
| <b>Accuracy</b>                    | $\pm 0.1$ mils ( $\pm 3\mu$ m) or $\pm 3\%$ of reading whichever is greater                                 |
| <b>Resolution</b>                  | Refer To Section 8.0  |
| <b>Display</b>                     | Back-lit, 4-digit alphanumeric  |
| <b>Minimum Measuring Area</b>      | 0.5" x 0.5" (13mm x 13mm)   |
| <b>Minimum Curvature Radius</b>    | Concave: 0.2" (5mm)   |
| <b>Minimum Substrate Thickness</b> |   |
| DCF, DCFN                          | <i>Ferrous: 20 mils (0.5mm)</i>   |
| DCFN Only                          | <i>Non-Ferrous: 2 mils (50 <math>\mu</math>m)</i>   |
| <b>Calibration</b>                 | Factory calibration, user-set zero calibration,   |
| <b>Statistics</b>                  | Number of readings, mean value, standard deviation, maximum and minimum reading based on 99 readings (max). |
| <b>Operating Temp.</b>             | 32 °F to 122 °F (0 °C to 50 °C)   |
| <b>Surface Temp.</b>               | 5 °F to 140 °F (-15 °C to 60 °C)  |
| <b>Storage Temp.</b>               | -4 °F to 140 °F (-20 °C to +60 °C)  |
| <b>Battery</b>                     | 2x AAA (1.5V)   |
| <b>Dimensions</b>                  | 4.3" x 2" x 1" (110mm x 50mm x 25mm)  |
| <b>Weight</b>                      | 3.2 oz (90 g)   |
| <b>Protection Class</b>            | IP 52 (proof against dust and dripping water)   |
| <b>Standards</b>                   | DIN, ISO, ASTM, BS  |

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## 8.0 RESOLUTION TABLE

### Mils

0- 99.9 mils                      0.1 mils

100.0 - 140.0 mils              0.2 mils

### Microns ( $\mu\text{m}$ )

0 - 999  $\mu\text{m}$                       1  $\mu\text{m}$

1.000 - 2.498 mm                0.002 mm

2.500 - 3.500 mm                0.005 mm

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## 9.0 MEASURING LIMITS

|                                     |                          |
|-------------------------------------|--------------------------|
| Minimum Radius for Convex Surfaces  | 0.2" ( <i>5mm</i> )      |
| Minimum Radius for Concave Surfaces | 2" ( <i>50mm</i> )       |
| Minimum Headroom                    | 4" ( <i>100mm</i> )      |
| Minimum Sample Diameter             | 0.5" ( <i>13mm</i> )     |
| Minimum Substrate Thickness - F     | 20 mils ( <i>0.5mm</i> ) |
| Minimum Substrate Thickness - NFe   | 2 mils ( <i>50 mm</i> )  |

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## **10.0 ERROR MESSAGES**

- Error 1 =**      The probe is too close to the metal
- Error 2 =**      Error of gauge due to the effect of electro-magnetic interference fields
- Error 3 =**      The probe is defective

**For Technical Assistance contact:**

Electromatic Equipment Company

*Telephone:* 1-800-645-4330 (USA & Canada)  
1-516-295-4300

*Fax:* 1-516-295-4300

*Email:*      info@checkline.com



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## **11.0 WARRANTY**

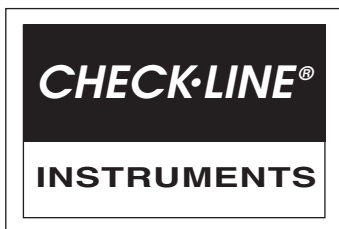
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