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# DCF-900 / DCN-900

## Coating Thickness Gauge


**USER'S GUIDE**

ABQINDUSTRIAL
PRECISION. RELIABILITY. QUALITY.

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## NOTES





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**IMPORTANT:** These instructions apply to both the DCF-900 and DCN-900 gauges except where noted otherwise.

## 1.0. Introduction & Quick Start Instructions

The DCF-900 and DCN-900 Coating Thickness Gauges represent the latest technology for the non-destructive measurement of coatings and plating. While both gauges are very easy and convenient to use, the first-time user should read this entire manual before operating the gauge for the first time to minimize operating problems and to fully utilize the instrument's capabilities. A glance through the Table of Contents will outline the areas covered by this manual and will give the user a quick indication of where answers may be found to questions that may arise in the future.

### QUICK START OPERATING INSTRUCTIONS

1. Press (ON) key. LCD display shows [ru.n] or [run.]
2. Place probe tip in contact with part being checked, pressing down slightly until the V-notched shell is flush with the surface. A reading in *mils* [XX.X] or *microns* [XXX] will appear.
3. Note reading and lift probe.
4. For additional tests, repeat steps 2 & 3.

**GAUGE AUTOMATICALLY POWERS OFF AFTER 90 SECONDS OF NON-USE**

NOTE: *This gauge normally doesn't require calibration before use. To verify or change calibration – or change units (mils vs. microns) – See User's Guide*

**ELECTROMATIC** Equipment Co., Inc.
Cedarhurst, NY 11516 – USA
TEL 516-295-4300 • FAX 516-295-4399



## 11.0 Limited Warranty

ELECTROMATIC Equipment Co., Inc. (ELECTROMATIC) warrants to the original purchaser that this product is of merchantable quality and confirms in kind and quality with the descriptions and specifications thereof. Product failure or malfunction arising out of any defect in workmanship or material in the product existing at the time of delivery thereof which manifests itself within one year from the sale of such product, shall be remedied by repair or replacement of such product, at ELECTROMATIC's option, except where unauthorized repair, disassembly, tampering, abuse or misapplication has taken place, as determined by ELECTROMATIC. All returns for warranty or non-warranty repairs and/or replacement must be authorized by ELECTROMATIC, in advance, with all repacking and shipping expenses to the address below to be borne by the purchaser.

THE FOREGOING WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO, THE WARRANTY OF MERCHANTABILITY AND FITNESS FOR ANY PARTICULAR PURPOSE OR APPLICATION. ELECTROMATIC SHALL NOT BE RESPONSIBLE NOR LIABLE FOR ANY CONSEQUENTIAL DAMAGE, OF ANY KIND OR NATURE, RESULTING FROM THE USE OF SUPPLIED EQUIPMENT, WHETHER SUCH DAMAGE OCCURS OR IS DISCOVERED BEFORE, UPON OR AFTER REPLACEMENT OR REPAIR, AND WHETHER OR NOT SUCH DAMAGE IS CAUSED BY MANUFACTURER'S OR SUPPLIER'S NEGLIGENCE WITHIN ONE YEAR FROM INVOICE DATE.

Some State jurisdictions or States do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation may not apply to you. The duration of any implied warranty, including, without limitation, fitness for any particular purpose and merchantability with respect to this product, is limited to the duration of the foregoing warranty. Some states do not allow limitations on how long an implied warranty lasts but, not withstanding, this warranty, in the absence of such limitations, shall extend for one year from the date of invoice.

ELECTROMATIC Equipment Co., Inc.
600 Oakland Ave. Cedarhurst, NY 11516—USA
Tel: 1-800-645-4330/ Tel: 516-295-4300/ Fax: 516-295-4399

## 10.0 Specifications

**Range:** 0.1–40.0 mils (1–999 µm)

**Accuracy:**

| | | | |
|---|---|---|---|
| *DCF-900* | ± 0.1 mil | : | 0–10.0 mils |
| | ± 1% reading | : | 10.0-40.0 mils |
| | ± 1 µm | : | 0–250 µm |
| | ± 1% reading | : | 250-999 µm |
| *DCN-900* | ± 0.1 mil | : | 0–5.0 mils |
| | ± 2% reading | : | 5.0–40.0 mils |
| | ± 1 µm | : | 0–50 µm |
| | ± 2% reading | : | 50-999 µm |

**Note:** Accuracy limits require that calibration be made near the measured thickness.

**Resolution:** 0.1 mil (1 µm)

**Battery/Life:** 9 Volt Alkaline / Approx. 6 months

**Dimensions:** 5.7 x 3.1 x 1.5" (145 x 79 x 38 mm)

**Weight:** 9 oz. (250 g)

**Temp. Limits:** *Material:* 15 to 140° F (–10 to 60° C)
*Ambient:* 32 to 125° F (0 to 50° C)

**Cal. Standards**: One steel plate (DCF),
One aluminum plate (DCN)
and two plastic calibration shims

**Warranty:** 1 year



## 2.0 Operating Principle & Applications

### 2.1 DCF-900

When a magnet is brought into direct contact with a bare magnetic metal surface, a magnetic flux circuit is created. The amount of flux created depends on the strength of the magnetizing force and the magnetic reluctance of the bare metal. A non-magnetic coating or metal plating placed in the path of a magnetic flux circuit will create a “magnetic gap” which will increase the reluctance of the circuit. This will then cause a decrease in the circuit flux, proportional to the thickness of the coating or plating. CHECK•LINE® Coating Thickness Gauges measure this decrease in flux intensity to provide an accurate, direct indication of the coating or plating thickness being measured.

The Model DCF-900 gauge measures the thickness of all non-magnetic coatings, finishes and metal plating on iron, steel and other magnetic alloy surfaces. (Examples: paint,powder coatings, plastic, paper, ceramic, rubber, chrome, electroless nickel, brass, non-magnetic stainless steel, tin, zinc, cadmium, etc. . . on iron or steel

### 2.2 DCN-900

An eddy-current-producing probe brought into direct contact with a bare metal surface, creates a magnetic flux circuit. The amount of flux depends on the frequency and strength of the eddy-current force and the magnetic reluctance of the bare metal. A non-metallic, non-conducting coating placed in the path of a magnetic flux circuit will create a “magnetic gap” which will increase the reluctance of the circuit. This causes a decrease in the circuit flux, proportional to the thickness of the coating. CHECK•LINE® Coating Thickness Gauges measure this decrease in flux intensity to provide an accurate, direct indication of the coating thickness.

The Model DCN-900 gauge will measure the thickness of all non-metallic, non-conducting coatings, finishes and films on all non-ferrous metals. (Examples: Anodizing, paint, powder coatings, plastic, paper, ceramic and rubber on aluminum, brass, bronze, titanium, non-magnetic stainless steel, zinc, etc.)

## 3.0 Equipment Supplied

### 3.1 Standard Accessories

DCF-900 and DCN-900 gauges are supplied with the following standard accessories:

a. DCF: One (1) bare steel test plate for setting ZERO.
DCN: One (1) bare aluminum test plate for setting ZERO.

b. Two (2) non-metallic, commercial-grade calibrating shims.

c. One 9-Volt DC alkaline battery.

d. DCF-900 User's Guide.

e. Carrying case.

### 3.2 Optional Calibration Standards

a. Model TS-5CG Set of five (5) commercial-grade, non-metallic, calibration shims (1, 2, 5, 10 & 20 mils / 25.4, 50.8, 127, 254, 508mm).

b. NTS-4 NIST Traceable Plastic Shims
(1.00, 2.00, 4.00 mils / 25, 51, 102mm)
NTS-20 NIST Traceable Plastic Shims
(5.00, 10.00, 20.00 mils / 127, 254, 508mm)

c. NIST Certified Standards

| Part# | Type | Thickness Std's (mils) | | | Thickness Std's (µm) | | |
|---|---|---|---|---|---|---|---|
| **TSF-4** | Fe | 1.50 | 2.50 | 4.00 | 38.1 | 63.5 | 101.6 |
| **TSF-20** | Fe | 2.00 | 10.00 | 20.00 | 50.8 | 254.0 | 508.0 |
| **TSN-4** | NFe | 1.50 | 2.50 | 4.00 | 38.1 | 63.5 | 101.6 |
| **TSN-7** | NFe | 1.50 | 3.00 | 7.00 | 38.1 | 76.2 | 177.8 |



## 9.0 Maintenance, Spare Parts & Service

### 9.1 Maintenance

Except for keeping all parts clean and replacing worn-out batteries, there are no special maintenance requirements.

DO NOT USE ANY LUBRICANTS, SOLVENTS OR ABRASIVES.

A mild soap solution, used sparingly, can be used to clean the housing and connecting cable. Do not use any water or solvent on the probe body or tip. Keeping the probe tip clean is critical for obtaining accurate, repeatable readings. Use a dry cloth to keep the tip clean. It is recommended that the gauge be stored in its carrying case when not in use.

### 9.2 Spare Parts & Service

A complete stock of replacement spare parts and a service facility are maintained at ELECTROMATIC Equipment Co.,Inc., Cedarhurst, NY 11516-USA.

TEL. 800-645-4330 (USA only) or 516-295-4300.
FAX. 516-295-4399

If there are any questions regarding the operation of the DCF-900 or DCN-900 gauge, and before sending any unit back for repair, it is strongly recommended that the user contact ELECTROMATIC's service facility above by telephone or fax.

## 8.0 Changing the Battery

The battery should not be removed while the power is on. Wait for the gauge to automatically power off (after 90 seconds of non-use) before replacing the battery.

**When to Replace:** The gauge will automatically turn off if the battery drops below 7.4 volts DC. If the gauge turns itself off sooner than expected, or if it will not turn on, change the battery.

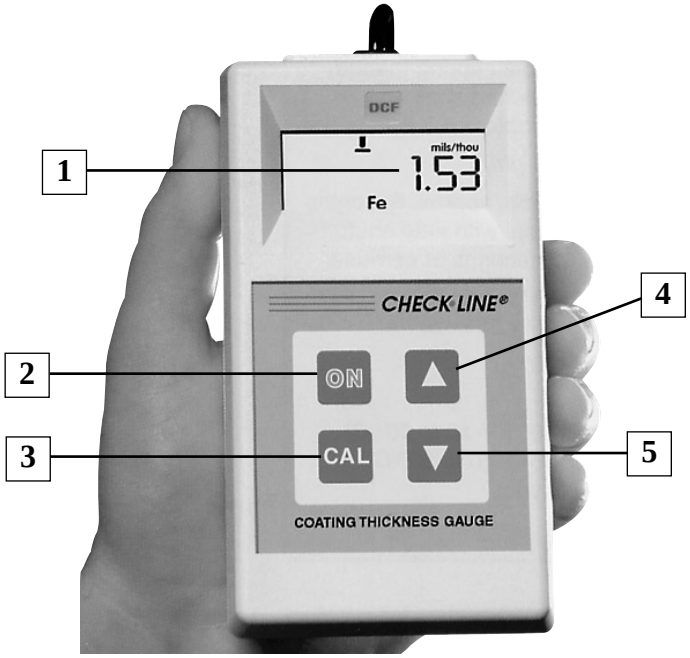
**Battery Type:** Any high-quality 9-volt alkaline battery.

**Battery Life:** Approximately 6 months when the gauge is used for 80 readings per day.



## 4.0 Front Panel Layout and Functions

| *Fig Ref* | *Control or Device* | *Function or Indication* |
|---|---|---|
| 1 | LCD display | Provides measurement value, as well as **CAL** and **run** indicators. |
| 2 | **ON** | Turns the power on. (The power turns off automatically after 90 seconds of non-use.) |
| 3 | **ON** | Enters and exits calibration mode. |
| 4 | △ | Sets “zero” calibration point while in CAL mode. |
| | | Increases displayed value while in CAL mode. |
| 5 | ▽ | Decreases displayed value while in CAL mode. |
| | | Changes units of measure from mils to microns or vice versa while in run mode. |



## 5.0 Operating Procedure

### 5.1 Handle Probe Carefully.

All probes contain sensitive circuitry. Handle them with care. Do not drop or swing them.

AVOID DRAGGING PROBE TIP ACROSS A SURFACE.

For best results, hold probe in place until reading is stabilized, then lift probe away from surface before re-applying to surface for subsequent readings. Clean pole tips with a dry cloth.

DO NOT USE ANY SOLVENTS.

### 5.2. Taking Measurements

1. Press **ON** key to turn on the power. The LCD will display **ru.n** or **run**. The gauge is now ready to take measurements.

   **NOTE:** The presence or absence of a decimal point on the LCD display indicates that the gauge has been set for English *(mils*) or metric *(microns*) units, respectively. To change from *mils* to *microns* and vice versa, refer to 7.0.

2. Hold the probe by the black, outer plastic shell and gently press the tip against the surface to be measured. Use enough pressure to cause the inner V-notched liner to contact the coated surface and prevent the probe from rocking.

   **The thickness reading will be displayed on the LCD display.**



## 7.0 Changing Units of Measure

To change units of measure (*mils* vs. *microns*), proceed as follows:

1. Turn the power on by pressing the **ON** key.

   The display will show:

   **ru.n** Gauge set for mils (0.001”), or

   **run** Gauge set for *microns* (µ*m*)

2. Press the ▽ key and keep it depressed for approximately 2 seconds until a tone is heard. You will notice that the decimal point will either appear or disappear, indicating that the units of measure have changed from *mils* to *microns*, or vice versa, each time the ▽ key is pressed and held. Lift probe.

   **NOTE:** Once selected, units of measure will remain unchanged each time the DCF-900 is turned on and off.

**Setting "Calibration" Point**

5. Place the plastic calibration shim on top of the bare metal part and then place the probe on top of the shim and bare part combination and measure as before.

**Note:** the reading and determine if it matches the indicated value of the shim. If not, press and hold the △ or ▽ keys to increase or decrease the displayed value until it matches the shim value. Remove the probe from the test plate. The display will show **CA.L** or **CAL.**

6. Press and hold the **CAL** key again to enter the "calibration" point into the microprocessor and exit the calibration mode.

   The display will now show **ru.n** or **run,** indicating that calibration is complete and that you are back in the operational mode.

   **You are now ready to take measurements.**

## 6.4 Notes on Calibration

1. If the gauge reads within 0.1 mil or 3 *microns* (2%) of the calibration shim value, it is usually not necessary to change the calibration since it is within accuracy limits.
2. Use a calibration shim whose thickness is equal to or greater than the expected coating thickness to be measured.
3. If greater *reading* accuracy is required, calibration and/or measurements should be performed with the units of measure set for *microns*, since "microns" provides greater resolution than *mils*. (0.1 mil = 2.5 *microns).*



## 5.3. Notes on Measurements

1. The gauge will automatically turn the power off after 90 seconds of non-use. You cannot turn the power off manually.
2. The DCF-900 and DCN-900 are continuous-reading type gauges which will provide readings as long as the probe is in contact with the measured surface. When the probe is removed, the LCD display will show **ru.n** or **run,** indicating that the gauge is in the operational mode.

   If the thickness reading continues to get smaller while the probe is in contact with the coating, it indicates that the coating is soft and that the probe is sinking into the coating.

3 If the last digit alternates between two values during a measurement, the measurement is midway between those two values.

4. Where the base metal departs greatly in shape, thickness, texture or material from the metal standards supplied, the user should always use a sample of the uncoated product bare metal itself for setting ZERO.

# 6.0 Calibration

## 6.1 Introduction

The DCF-900 normally does not require calibration before use. However, whenever the productor part material to be checked *varies greatly* from the steel test plate supplied, in either thickness or shape, it is best to check or verify calibration by using an uncoated sample of the actual product or part with one of the calibration shims supplied. Check calibration as noted in 6.2, below, and change calibration, if necessary, following the procedure of 6.3. If a change is necessary, continue to use the bare part in lieu of the test plate supplied when checking or changing calibration.

**NOTE:** Be assured that the calibration checking and hanging procedures are very simple. They take only a few minutes to perform and should only be considered when the product material thickness or shape changes.

## 6.2 Checking Calibration

1. Turn the power on by pressing the **ON** key. Display will show **ru.n** or **run.**
2. Holding the probe by its plastic shell, place the tip on the uncoated metal part. Gently push the probe shell until the V-notched sleeve contacts the bare surface. If the display reads **0.0,** proceed to step 3.

   If the display reads any value other than **0.0,** proceed no further since the calibration must be changed, as noted in 6.3.
3. Next, place the plastic calibration shim on top of the bare metal part and the probe tip on top of the shim and metal part and measure as in 5.2.
   If the displayed value matches the value indicated on the shim, within the accuracy limits of the DCF-900 Specifications noted in 10.0, calibration has been verified. THE GAUGE IS NOW READY FOR USE.
   If it differs from the shim value, the gauge should be re-calibrated, as indicated in 6.3.

## 6.3 Changing Calibration

1. Turn the power on by pressing the **ON** key.

   The screen will display **ru.n** or **run**, to indicate English (*mils*) or metric (*microns*) measuring units, respectively. To change units, refer to 7.0.
2. Press and hold the **CAL** key until **CA.L** is displayed, to start the calibration process.

**Setting "Zero" Point**

3. Holding the probe by its plastic shell, place the tip on the bare metal. Gently push the shell until the V-notched sleeve contacts the surface.

   The display will read **0.0**, or any other value.
4. Maintaining probe contact with one hand, press and hold the △ key with the free hand until a beep sounds. This indicates that the "zero" point is properly set and entered into the gauge's microprocessor. Remove probe.