

# Elcometer 456 Dry Film Thickness Gauge



## Features

- Specialised probes to meet a wide range of applications
- Integral and separate gauges to measure coatings up to 30mm
- Dust and water resistant rugged design to IP65
- Drop tested to a height of 2m
- Secure probe connection for improved durability
- Bigfoot™ integral probe for accurate and repeatable measurements
- Ergonomic design for comfort during continuous use
- 2.4" colour screen provides enhanced reading visibility at all angles
- Fast reading rate of more than 70 readings per minute
- Large easy to read colour display
- Scratch and solvent resistant screen
- Alpha numeric batch identification
- Large positive buttons with feedback
- USB and to ElcoMaster 2.0 software © *Bluetooth* data output



Bigfoot™ integral probe for accurate and repeatable measurements



Ergonomic design for comfort during continuous use



2.4" colour screen provides enhanced reading visibility at all angles

The Elcometer 456 dry film thickness gauge is available in three different models. Each coating thickness gauge provides the user with increasing functionality - from the entry level Elcometer 456 Model B, to the top of the range Elcometer 456 Model T. The new Elcometer 456 makes measuring coating thickness faster, reliable and accurate. Over 60 years of product design experience has gone into the development of this gauge. The new Elcometer 456 is something special.

## Designed with you in mind

Whilst others have tried to emulate the Elcometer 456 we have continued to develop features to make the new Elcometer 456 even more powerful, rugged and easier to use.

The Elcometer 456 sets new standards; providing reliable and accurate coating thickness measurements; helping you to become more efficient.

### Easy

- Repeatable and reproducible
- Large buttons ideal for gloved hands
- Easy to use menus in multiple languages
- High contrast colour LCD with auto rotate
- High and low reading limit indicators
- Factory calibrated for immediate use

### Accurate

- Measurement capability to  $\pm 1\%$
- Conforms to national & international standards
- Temperature stable measurements
- Increased reading resolution for thin coatings
- Measures accurately on smooth, rough, thin and curved surfaces

### Reliable

- Repeatable and reproducible
- 2-year gauge warranty – register via [www.elcometer.com](http://www.elcometer.com)
- Supplied with fully traceable test certificates
- Batch date and time stamp facility

### Rugged

- Sealed, heavy duty and impact resistant
- Dust and waterproof to IP65
- Scratch and solvent resistant display
- Durable gauge and probe construction
- Suitable for use in harsh environments
- Drop tested to 2m

### Efficient

- Fast reading rate of 70+ per minute
- Multiple calibration memories
- Alpha numeric batch identification
- User selectable calibration methods
- Compatible with all Elcometer software including ElcoMaster 2.0

### Powerful

- Wide range of interchangeable probes
- USB and data output
- Stores up to 75,000 readings in 999 batches
- Measures up to 30mm of coating on metal substrates



Large easy to read measurements in Metric and Imperial units



View up to 8 user selectable statistics on screen



On-screen trend graph displaying last 20 measurement values



Individual batch readings can be reviewed numerically or graphically

## Product Features

	Model B	■ Standard Model S	□ Optional Model T
Fast, accurate reading rate; 70+ readings per minute	■	■	■
Repeatable & reproducible measurements	■	■	■
Easy to use menu structure; in 30+ languages	■	■	■
Tough, impact, water & dust resistant; equivalent to IP64	■	■	■
Bright colour screen; with permanent back light	■	■	■
Scratch & solvent resistant display; 2.4" (6cm) TFT	■	■	■
Large positive feedback buttons	■	■	■
USB power supply; via PC	■	■	■
Test certificate	■	■	■
2-year gauge warranty*	■	■	■
Automatic rotating display; 0°, 90°, 180° & 270°	■	■	■
Ambient light sensor; with adjustable auto brightness	■	■	■
Emergency light	■	■	■
Tap awake from sleep	■	■	■
Gauge software updates <sup>1</sup> ; via ElcoMaster® software	■	■	■
Data output	■	■	■
USB; to computer	■	■	■
Bluetooth®; to computer, Android™ & iOS® devices	■	■	■
On screen statistics	■	■	■
Number of readings; $\eta$	■	■	■
Mean (average); $\bar{x}$	■	■	■
Standard deviation; $\sigma$	■	■	■
Highest reading; Hi	■	■	■
Lowest reading; Lo	■	■	■
Coefficient of variation; CV%	■	■	■
Elcometer index value <sup>2</sup> ; EIV	■	■	■
Nominal dry film thickness; NDFT	■	■	■
IMO PSPC; %>NDFT, %>90	■	■	■
High & low limits; definable audible & visual alarms	■	■	■
Number above high limit;	■	■	■
Number below low limit;	■	■	■
Live reading trend graph; in batch mode	■	■	■
ElcoMaster® software & USB cable	□	■	■
Replaceable screen protectors	□	■	■
Protective case	■	■	■
Plastic transit case	□	□	■
Integral models; with automatic gauge switch on	■	■	■
Probe type; Ferrous (F), Non-Ferrous (N), Dual (FNF) <sup>3</sup>	F, N, FNF	F, N, FNF	F, N, FNF
Measurement range	0-13mm	0-1500µm	0-1500µm
Separate models; with automatic probe recognition	■	■	■
Probe type; Ferrous (F), Non-Ferrous (N), Dual (FNF) <sup>3</sup>	F, N, FNF	F, N, FNF	F, N, FNF
Measurement range	0-30mm	0-30mm	0-30mm
On-screen calibration instructions; in 30+ languages	■	■	■
Multiple calibration methods	■	■	■
Factory; resets to the factory calibration	■	■	■
2-point; for smooth and rough surfaces	■	■	■
1-point; zero calibration	■	■	■
Zero offset <sup>4</sup> ; for calibration according to ISO19840	■	■	■
Predefined calibration & measurement methods	■	■	■
ISO, SSPC PA2, Swedish, Australian	■	■	■
Automatic calibration; for rapid calibration	■	■	■
Calibration memory type; gauge (g) or gauge & batch (gb)	g	gb	gb



	Model B	■ Standard Model S	□ Optional Model T
Number of batches; with unique calibrations		1	2,5
Calibration memories; 3 user-programmable memories			■
Measurement outside calibration warning			■
Calibration lock; with optional PIN code unlock	■	■	■
Delete last reading	■	■	■
Gauge memory; number of readings	Last 5	1,5	150
Individual batch calibrations; sent to PC via ElcoMaster®	■	■	■
Limits; user definable audible & visual pass/fail warnings	■	■	■
Gauge (g) or gauge & batch specific (gb) limits		g	gb
Date and time stamp		■	■
Batch types; normal, counted average, IMO PSPC		■	■
Navsea Mode			■
Batch review graph			■
Review, clear & delete batches		■	■
Copy batches and calibration settings			■
Alpha-numeric batch names; user definable on the gauge			■
Scan & Auto Repeat Modes; with Scan probe connected			■
Fixed batch size mode; with batch linking			■

\* The Elcometer 456 is extendable within 60 days from date of purchase, free of charge, to 2 years

1 Internet connection required

‡ Visit [www.elcometer.com/sdk](http://www.elcometer.com/sdk) to find out how to integrate Elcometer's MFi certified products to your App

2 Elcometer Index Values are used in the automotive industry to assess a coating's overall quality; USA patent number US7606671B

3 FNF patent number USA: 5886522

4 Zero Offset USA patent number US6243661

## Technical Specifications

Display information	2.4" (6cm) QVGA colour TFT display, 320 x 240 pixels
Battery type	2 x AA dry cell batteries, rechargeable batteries can also be used
Battery life	~24 hours of continuous use at 1 reading per second <sup>5</sup>
Gauge dimensions (h x w x d)	141 x 73 x 37mm (5.55 x 2.87 x 1.46")
Gauge weight	161g (5.68oz) including supplied batteries
Operating temperature	-10 to 50°C (14 to 122°F)
Packing List	Elcometer 456 Gauge, calibration foils (integrals only), wrist harness, transit case (T), protective case (B, S, T), 1 x screen protectors (S, T), 2 x AA batteries, operating instructions, USB cable (S, T), ElcoMaster® software (S, T)

5 Using default settings & lithium batteries supplied, alkaline or rechargeable batteries may differ

### Can be used in accordance with :

**AS 2331.1.4, AS 3894.3-B, AS/NZS 1580.108.1, ASTM B 499, ASTM D 1186-B, ASTM D 1400, ASTM D 7091, ASTM E 376, ASTM G 12, BS 3900-C5-6B, BS 3900-C5-6A, BS 5411-11, BS 5411-3, BS 5599, DIN 50981, DIN 50984, ECCA T1, EN 13523-1, IMO MSC.215(82), IMO MSC.244 (83), ISO 1461, ISO 19840, ISO 2063, ISO 2360, ISO 2808-6A, ISO2808-6B, ISO 2808-7C, ISO 2808-7D, ISO 2808-12, NF T30-124, SS 184159 SSPC PA 2, US Navy PPI 63101-000, US Navy NSI 009-32**

Bold standards denote current standards, those in grey have been superseded but are still recognised by some industries





## Coating Thickness Gauges - Digital

Simple to interpret, small and portable gauges for the measurement of coatings on all metal surfaces. Digital coating thickness gauges are more accurate, more repeatable and more reproducible than any other type of coating thickness gauge on the market today.

Elcometer offers the world's most comprehensive range of portable digital coating thickness gauges - for measurements on either Ferrous substrates (F), Non-Ferrous substrates (NF), or on both Ferrous and Non-Ferrous (FNF), Elcometer can provide you with a gauge to meet your need.

With a wide choice of gauges to choose from, the User needs to understand the terminology of Coating Thickness Gauges or, 'The Language of Coatings'.

### The Language of Coatings

In selecting the most appropriate gauge for your application, you need to answer specific questions.

#### 1. What is the substrate (the surface metal) you are coating / inspecting?

Is the metal a Ferrous Substrate (F) or a Non-Ferrous (NF)?

Sometimes this is difficult to answer – the substrate may have already been coated. The easiest way to identify this is to see if a magnet will stick to the surface. If it does, then the substrate is Ferrous, if not, then it is Non-Ferrous.

#### 2. Do you measure only on this substrate?

If you only inspect one type of product, then the answer is yes. If you have a range of products that you inspect, then you need to consider whether they are all of the same type of substrate. You should also consider if you have a future possibility of inspecting other substrates. If so, you should consider a Dual FNF gauge.

#### 3. Typically, what sort of coating thickness do you need to measure?

This helps you select the correct scale range - Scale 1 measures coatings to 1500µm, Scale 2 : 5mm, Scale 3 : 13mm

#### 4. What type of probe do you need?

Depending on your application you can select from:

- Integral Probe (the probe is built into the gauge for single hand measuring on large surface areas, pipes, etc)
- Separate Probe (the probe is connected to the gauge by a cable for all applications).
- PINIP™ (separate probe is directly attached to the base of the instrument – providing, in your separate gauge, all the benefits of an integral unit).

Separate Probes can be selected from our wide range to meet your application requirements. These include:

- *Regular Probes*: Including Straight, Right Angle (90°) and Telescopic options
- *Miniature Probes*: Including Straight, Right Angle (90°), 45° Angle all in either long or short versions.

#### 5. Do you need to save your readings for your ISO records, or as proof of inspection to your customer?

Elcometer gauges are available in three options:

- *Basic Gauge* - with simple statistics, memory of 5, Bluetooth output and optional USB
- *Standard Gauge* - with statistics, links via Bluetooth or USB, limited memory (1,500 readings) in one batch
- *Top Gauge* - with statistics, link via Bluetooth or USB, enhanced memory (150,000 readings), batch capability

### Measurement Options

**Ferrous (F)** operation using electromagnetic induction probes for all non-magnetic coatings on a ferrous (magnetic) substrate, e.g. paint, plastic, enamel, powder, rubber, ceramic, galvanising, zinc, sprayed metal (aluminium or zinc), etc. on steel, cast iron, ferritic and duplex stainless steel, substrates etc.

**Non-Ferrous (N)** operation using eddy current probes for non-conductive coatings on non-ferrous metal substrates, e.g. anodising, paint, powder, lacquer, plastic, etc. on aluminium, brass, zinc, stainless steel, copper, titanium substrates etc.

**Dual (FNF)** operation combines the Ferrous and Non-Ferrous operation in a single probe. The gauge has user selection for auto or manual substrate determination.

### Major Users of the superceded 456 Mark 3 and the 345 :

CSIR • SABS • SA Navy • Defence Force • Armscor • SA Navy • Denel • Naschem • Sonchem • ALL Major Motor Assemblers incl. Daimler Benz • Nissan • Ford / Mazda • BMW • Toyota • VW • Tata • MAJOR Industrial Painters eg. RJ Southey • Gordon Bennett • Paint Manufacturers: Plascon • Dulux • Dekro • Stoncor • Sigma • Jotun • Corrosion Consultants / Inspectors • Anodisers incl Hulets • Portnet • Spoornet & SATS • Transwerk • Transnet • Eskom • ISCOR • Public Works • SASOL • Moss gas • Shell, BP & Caltex Refineries • Anglo American • Vaal Mines • Impala Plat • Telkom • SA Airways & Atlas • Atomic Energy Board • Water Boards • Dept Water Affairs • Dorbyl & Heavy Engin • Universities • Govt & Municipal Authorities • Powder Coaters • Pipeline Co's • Sand / Shot Blasters • Metal Fabricators • Galvanisers • Shipbuilders • NACE • Hot Dip Galvanising Ass. • SAPITI • Corrosion Institute • Bulldog • Group 5



## The Elcometer 456 Integral & Separate model range



The Elcometer 456 is available in four different models: E, B, S and T. Each gauge provides the user with increasing functionality - from the entry level Elcometer 456 E, to the top of the range Elcometer 456 T, with @ memory, alpha-numeric batching and *Bluetooth* communication.

Integral gauges are ideal for single handed operation as the wide footprint of the Bigfoot™ internal probe provides greater stability during measurement - allowing for consistent, repeatable and accurate results.

Separate models, with their wide range of probes, provide even greater measurement flexibility.

All probes are fully interchangeable; whilst ferrous gauges accept any ferrous probe and non-ferrous gauges accept any non-ferrous probes the dual FNF gauges accept all ferrous, non-ferrous and dual FNF probes.



### Integral Model Options

#### Scale 1

Range: 0-1500µm

Accuracy\*: ±1-3% or ±2.5µm

Resolution: 0.1µm: 0-100µm; 1µm: 100-1500µm

	Model B	Model S	Model T	C
Elcometer 456 Ferrous Integral	A456CFBI1	A456CFSI1	A456CFTI1	•
Elcometer 456 Non-Ferrous Integral	A456CNBI1	See separate gauges with N2 PINIP™ Probe		•
Elcometer 456 Dual FNF Integral	A456CFNFB11	A456CFNFSI1	A456CFNF11	•

#### Scale 2

Range: 0-5mm

Accuracy\*: ±1-3% or ±20µm

Resolution: 1µm: 0-1mm; 10µm: 1-5mm

For higher resolution & accuracy on thin coatings Scale 2 gauges can be switched to the Scale 1 mode measurement performance

	Model B	Model S	Model T	C
Elcometer 456 Ferrous Integral	A456CFBI2	See separate gauges with N2 PINIP™ Probe		•

#### Scale 3

Range: 0-13mm

Accuracy\*: ±1-3% or ±50µm

Resolution: 1µm: 0-2mm; 10µm: 2-13mm

	Model B	Model S	Model T	C
Elcometer 456 Ferrous Integral	A456CFBI3	See separate gauges with N3 PINIP™ Probe		•

### Separate Model Options

	Model B	Model S	Model T	C
Elcometer 456 Ferrous Separate	A456CFBS	A456CFSS	A456CFSTS	•
Elcometer 456 Non-Ferrous Separate	A456CNBS	A456CNSS	A456CNTS	•
Elcometer 456 Dual FNF Separate	A456CFNFBS	A456CFNFSS	A456CFNF1S	•

Probes are supplied separately

\* Whichever is the greater

• Certificate supplied as standard

See separate leaflet for all the Separate Probe model options

## Total Quality Assurance

(see separate Datasheet for more info)

Professional inspection reports provide a competitive advantage in today's industrial environment. ElcoMaster® Data Management Software is a fast, easy to use software solution for all your reporting requirements.



## ElcoMaster® Data Management Software at a Glance:

- **Easy to connect** - Using ElcoMaster's® gauge wizard, connecting a gauge & downloading data (via Bluetooth® or USB) is fast and easy
- **Import existing reports** - Scan your existing report into ElcoMaster® and drag & drop all your data where you want it, then simply save and print
- **Export, print or send** - Export, print, .pdf or email directly from ElcoMaster® at the click of a button
- **Cloud** - Multi-site access through secure cloud

## What ElcoMaster® can do:

- Import and combine measurements via Bluetooth® or USB from a full range of Elcometer gauges, including:
  - Surface Profile
  - Salt Contamination
  - Climatic Conditions
  - Oven Data Logging
  - Coating Thickness
  - Corrosion Thickness
  - Adhesion Testing
  - Gloss Measurements
- No need to learn different software for different gauges, all Elcometer products use the same expert platform
- Store data in a simple file tree, by project and by inspection type
- Easy on screen analysis with histograms, statistics, measurements, limits, notes, diagrams and photographs
- Export data direct to Microsoft Excel. csv. txt. Cqatk formats etc to save time and prevent keying in errors
- Generates reports instantly using standard or pre-designed templates in seconds. No need for data manipulation simply connect the gauge, download data and drag & drop
- Combine multiple inspection parameters (such as DFT, profile, climate, adhesion and gloss) together with images, notes and other project specific information in bespoke quality reports to set you apart from the competition
- In many industries multiple sites/locations/production lines are used to fabricate the product components which are brought together at the final assembly line. Different inspection parameters all need to be combined to approve the final product. Using Cloud technology ElcoMaster® gives you real time quality control monitoring inspection projects in any location.