

elcometer®



concrete
covermeters
& half cell

About Elcometer

Elcometer are a leading manufacturer of inspection equipment. Established in 1947, Elcometer are a family run company and are manufacturers of high quality inspection equipment for concrete, coatings and industrial metal detection. We listen to you, our customers, and have built the features and functionality into our products that you want and need to make your life easier.

Elcometer are a worldwide operation with offices in the UK, USA, Germany, France, Belgium and Singapore and with distribution outlets in 150 locations worldwide. This ensures that whatever you or your customer's industry, application or location, there is an Elcometer specialist local to you.

Our technical capabilities, commitment and investment in research and development, innovation and our quality and service make Elcometer the perfect choice for your inspection equipment.

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What is a **covermeter**?



A Covermeter, or rebar locator, is a gauge that measures the thickness of concrete cover over steel reinforcement bars and metal pipes.

The covermeter can tell you the depth of the concrete, the location and orientation of reinforcement bar (rebar) or metal pipe and can even determine the diameter of the rebar.

The Elcometer 331 covermeters are able to accurately determine where the metal is, even when there are complicated crossings of mesh support structures and can locate tendon ducts deep within the structure.

This takes the guesswork out of rebar and pipe location as a drill making contact with a rebar or tendon duct can not only destroy the drill bit, but can also cause serious structural damage.

What is a **half cell** gauge?



A Half Cell gauge measures the condition and potential corrosion of rebars and steel structures in concrete.

When corrosion occurs the ferric oxide protective layer surrounding the rebar breaks down allowing an electrochemical reaction between the steel and the concrete.

In the half cell test, the reference electrode is passed over the surface of the concrete and the potential voltage difference is recorded. The readings show where corrosion is likely to be or is currently present.

Periodic monitoring of the condition of the rebars and metal supporting structures in buildings, bridges etc. identifies signs and severity of corrosion - long before there are any physical indications of damage. Thus enabling more accurate forecast of projected lifetime.

When the covermeter readings are combined with half cell readings, the user has a powerful surveying tool. This can be easily achieved using the Elcometer Covermaster® software.

covermeters & half cell

elcometer®

The Elcometer 331 range has been specifically designed to meet all of your inspection needs. The Elcometer 331 accurately measures concrete cover thickness over steel and stainless steel reinforcement - precisely, rapidly and easily locating rebars and their direction.

With the ability to measure and record half cell data to establish potential corrosion of rebars, this 'all-in-one' gauge is perfect for your surveying needs.

Accurately locate and measure both high tensile steel and stainless steel rebar.

Rugged, waterproof IP65 case is protected against the elements and is tough enough to work in harsh environments.

Rebar locator, covermeter & Half Cell measurement all available in one easy to use gauge.

Probe storage for easy portability.



Noisy environment? The headphone socket is there so you can always hear your gauge.

Graphic plotting allows an immediate, easy to read indication of results.

Ergonomically shaped case has a gentle curve to fit snugly against your hip.

Range of fully interchangeable search heads including standard, narrow pitch, deep cover, borehole probe and half cell.

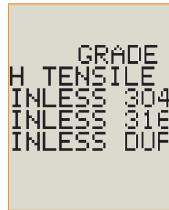
Memory and data logging with data output to PC or direct to printer .



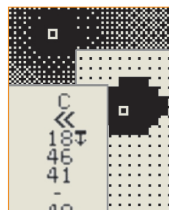
Intuitive menus in multiple languages allow you to start using the gauge as soon as you receive it.



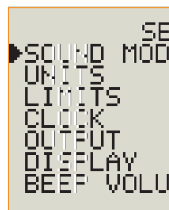
Backlit screen for easy viewing in dark environments - designed to be as tough as the gauge.



Battery packs can be recharged inside or outside the gauge, enabling use for as long as is required.



International bar ranges includes Metric, Japanese, Canadian & US Bar Numbers making it the practical choice wherever you are in the World.



Most functions can be accessed and controlled through 4 simple keys on the search head - ideal for single handed operation.



The range of search heads are fully interchangeable by the user and do not require a return to the factory for recalibration. These include standard, narrow pitch, deep cover, borehole probe, half cell and for the model THD, stainless steel heads.

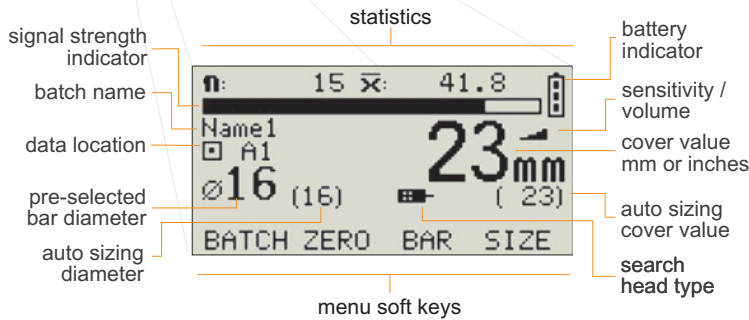
Rebar locator, concrete covermeter and half cell measurement all available in a single gauge - saving money and making site visits quicker and more convenient.

Locate and measure high tensile and stainless steel rebar. Stainless steel rebars are becoming more widely used due to their higher resistance to corrosion. The Elcometer 331 THD is the only gauge on the market today which can do this.

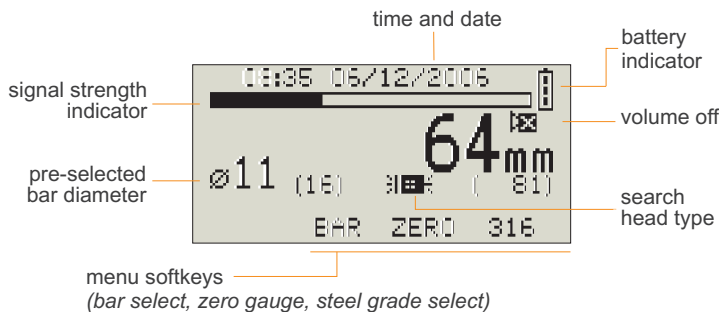
Graphic plot on the gauge allows you to visually identify where low cover or potential corrosion areas are. When used in threshold view a pass/fail analysis is clear to see. Up to 240,000 readings on selected models can be stored on the gauge for detailed reporting.

Intuitive menus enable each gauge to be used straight from the box. The automatic search head recognition, clear backlit screens and simple menu structures make this one of the most advanced, yet easiest to use gauges available today.

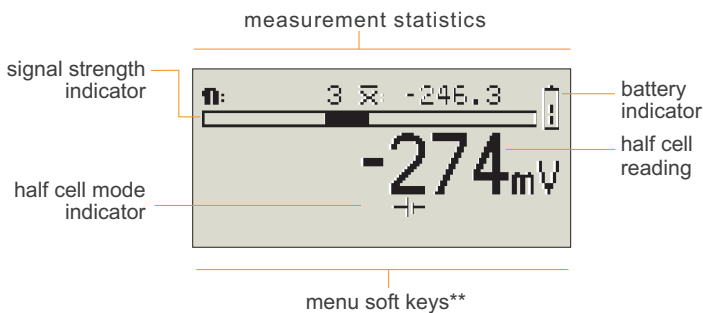
Designed for use on site, the gauge has been specifically designed to be rugged, robust, waterproof and tough enough to handle even the harshest of environments.



This typical view of the cover display screen shows you everything you need to know. Screens can be backlit for dark conditions. The easy to use menus, in multiple languages, enable you to access all the data you need while on site, without constant reference to the instruction book!

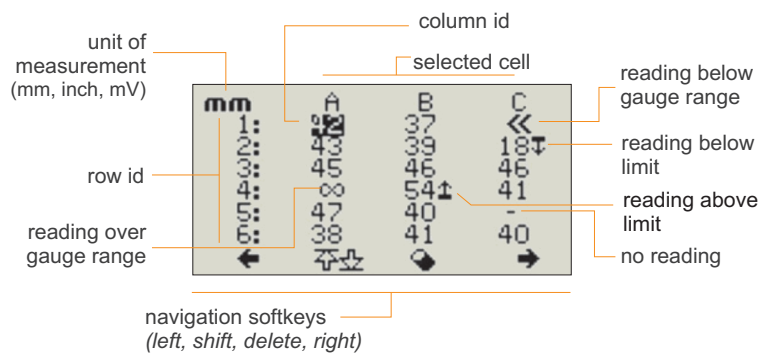


This alternate view shows the typical display when in use with the deep cover with stainless steel detection head. The bar size and depth of cover is manually inputted to suit specific requirements. The text in the bottom right of the reading screen indicates which grade of bar is selected, in this case 316 grade stainless steel.

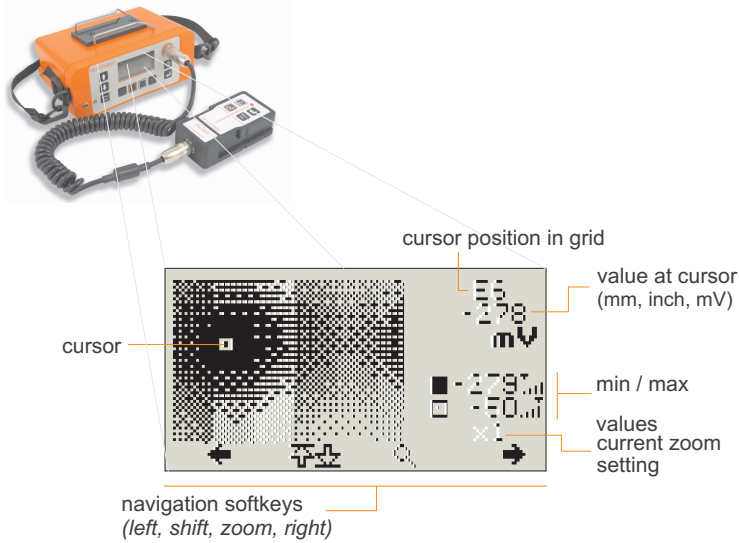


The gauge can read both cover and half cell values.* A typical screen when using half cell mode. For data logging, the information you need to see is displayed on screen.

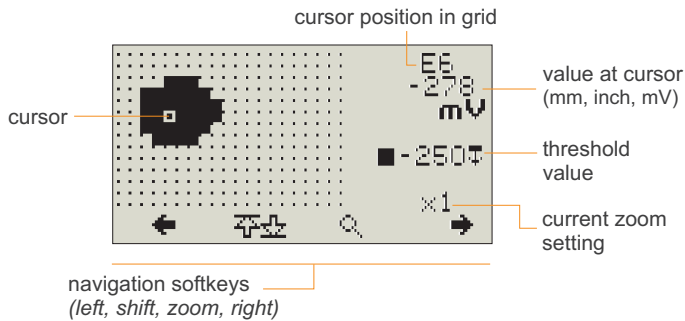
* Except Elcometer 331 Model B which can read cover only.
 **Menu soft keys visible in SH and TH Models.



A typical data review screen clearly displays where readings are below or above a user specified tolerance, where a reading has not been taken. Units of measurement can be displayed in mm or inches for cover, or mV for half cell.



In graphics plot mode the gauge indicates the areas with the most potential for corrosion in half cell mode or depth of cover in covermeter mode. Black indicates most potential for corrosion, while white indicates least potential for corrosion with varying greyscale shades in between. The zoom feature allows you to take a closer look at different areas that are of interest to you.



Using the threshold view is an ideal method for a simple pass or fail analysis. Once the threshold value has been set, anything before the value is shown in black, while anything over the value is shown in white.

Detecting stainless steel

Due to their high resistance to corrosion from chlorides, stainless steel rebar is regularly chosen over traditional carbon steel rebar in those areas which are exposed to high salt levels. Bridge decks, multi-storey car parks and marine structures such as piers, jetties and sea barriers are regularly constructed using stainless steel reinforcement.

Stainless steel grades of rebar have a number of different compositions and all are essentially non-magnetic. It is due to this that traditional covermeters and rebar locators cannot accurately detect them.

The Elcometer 331 THD when used with the Dual Head is the only gauge that can be used to locate, orientate, determine the rebar diameter, and accurately determine the depth of traditional high tensile steel rebar and the most common grades of stainless steel; Type 304 (also known as 18-8), Type 316 and Duplex Stainless Steel.

For the Elcometer 331 BH, SH, TH and THD models, all search heads, the borehole probe and half cell probes are fully interchangeable without the need to return your gauge to Elcometer. The Elcometer 331 Model B does not have half cell capability and cannot be used with the half cell probes. Elcometer 331 SH, TH and THD models are also supplied with Covermaster® & EDTS+ Excel® link transfer software and PC cable.

Model B covermeters are supplied with a standard search head. When ordering all other models, please order your choice of search head or half cell kit separately.



TW33119124-1A

Standard Search Head

Designed to meet most of your measurement requirements.

Range:	40mm / 1.6" bar	15mm to 95mm / 0.6" to 3.75"
	8mm / 0.3" bar	8mm to 70mm / 0.3" to 2.75"
Dimensions:	155 x 88 x 42mm / 6.1 x 3.5 x 1.65"	
Sensing area:	120 x 60mm / 4.72 x 2.36"	



TW33119124-2A

Narrow Pitch Search Head

Accurately measures the cover thickness when the gaps between each of the rebars (pitch) are close together.

Range:	40mm / 1.6" bar	8mm to 80mm / 0.3" to 3.1"
	8mm / 0.3" bar	5mm to 60mm / 0.2" to 2.4"
Dimensions:	155 x 88 x 42mm / 6.1 x 3.5 x 1.65"	
Sensing area:	120 x 60mm / 4.72 x 2.36"	



TW33119171A

Deep Cover Search Head

The ideal search head for accurately measuring rebars that are deep within the structure.

Range:	40mm / 1.6" bar	35mm to 180mm / 1.4" to 7"
	8mm / 0.3" bar	25mm to 160mm / 1" to 6.3"
Dimensions:	170 x 94 x 54mm / 6.7 x 3.7 x 2.1"	
Sensing area:	160 x 80mm / 6.3 x 3.15"	



TW33120014D

Dual Search Head for high tensile and stainless steels

The ability to detect high tensile steel and three grades of stainless steel (304, 316 and Duplex). For use with Model THD only.

Range:	40mm / 1.6" bar	35mm to 180mm / 1.4" to 7"
	8mm / 0.3" bar	25mm to 160mm / 1" to 6.3"
Dimensions:	170 x 94 x 54mm / 6.7 x 3.7 x 2.1"	
Sensing area:	160 x 80mm / 6.3 x 3.15"	



Short: TW3319223-1A
Long: TW3319223-2A

Borehole Probe

The solution for locating tendon ducts and multiple layers of rebar lying deep within the concrete. For more information contact Elcometer or visit the website

Measurement depth: Short probe: 0 - 40cm / 0 - 16" Long probe: 0 - 100cm / 0 - 40"
Approximate detection ranges: Tendon duct (70mm/2.75" diameter): up to 90mm / 3.54"



TW331CUKIT
TW331AGKIT

Half Cell Kit

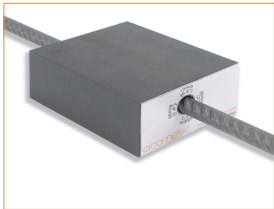
Consisting of either a copper electrode in a copper sulphate solution or a silver electrode in a silver chloride solution, each half cell is a sealed unit - no need to mix chemicals on site. Supplied with a 25m / 80' cable, every half cell probe is guaranteed for 5 years.



TW33119683

Extension Cable 100m / 325ft

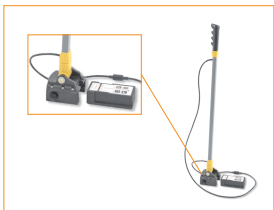
The extension cable for use with the Half Cell kits gives the flexibility to take readings in normally inaccessible areas.



TW33119218

Calibration Test Block

The calibration test block allows the user to check calibration of their gauge in order to ensure maximum measurement accuracy.



TW33119222

Extension Arm Kit

This kit allows the user to scan bridge decks and floor areas from a standing position and can be connected to either the standard or narrow pitch search head.

Additional Accessories

Part Number	Description
TW33119678	25m / 80ft Cable
TW33119038	Additional Battery Pack
TW33119201	Straight Search Head Cable 1.8m / 5.9ft
T99916716	USB Interface Cable

Data Logging

The statistics are a powerful tool within the Elcometer 331 and the data logging features on the SH, TH and THD models are also there to make your job easier.

The Elcometer 331 SH allows up to 10 batches of 1,000 cover or half cell readings, with measurement statistics, to be stored in the gauge's memory for evaluation and report generation.

mm	A	B	C
1:	42	37	<< 18
2:	43	39	18
3:	45	46	46
4:	∞	54	41
5:	47	40	-
6:	38	41	40

The Elcometer 331 TH and THD models boast user definable memory batches and provide both linear and grid batch data logging modes.

Linear memory is where data is stored in a batch one reading after another. Grid batches allow data to be stored in a spreadsheet format with each cell relating to a survey area which is marked out on the concrete in user defined grids when surveying large structures.

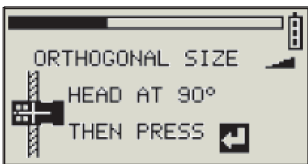
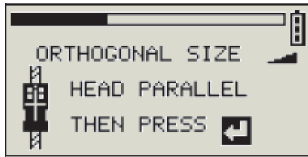
This grid batch feature facilitates fast surveying for both cover and half cell readings. Problem areas that do not fall within specification can be immediately identified and marked directly on the concrete, you can even take cover and half cell readings in each grid space.

Powerful Statistics

Elcometer 331 Covermeters have a statistics feature that calculates and displays the statistical analysis of readings as they are taken. So, while the covermeter is in use, you are always in control and know exactly how your site survey is progressing. Statistics values are also calculated for the readings within each batch and these values are stored.

The following statistics and values can be viewed and stored within the gauge:

Icon	Icon meaning	Description
η	Number of readings	The running value for the number of readings taken in a group
\bar{x}	Mean	The average of a group of readings; the sum of the individual readings divided by the number of readings
σ	Standard deviation	A statistical measure of the spread of values in a group of readings
CV%	Coefficient of variation	The standard deviation divided by the mean for a group of readings, expressed as a percentage
\downarrow	Lowest reading	The value of the lowest reading taken in a group of readings
\uparrow	Highest reading	The value of the highest reading taken in a group of readings
<<	Under range	The number and percentage of readings under range
\downarrow or <	Low limit	The number and percentage of readings below the limit
	Within limits	The number and percentage of readings within limits
\uparrow or >	High limit	The number and percentage of readings above the high limit
∞	Over range	The number and percentage of readings over range (or infinite)
□	Blank readings	Number and percentage of blank readings (skipped / not recorded / deleted)



Selecting a bar size

The dimensions of reinforcement bars are stored in the covermeter and include the following four standard bar series: Metric, US Bar, ASTM/Canadian and Japanese. Due to this wide selection of bar sizing, the Elcometer 331 Covermeters can be utilised worldwide with accurate results. When taking measurements for high tensile steel or Grades 304, 316 and Duplex Stainless Steel details for the Bar Grade and Bar size can be manually input into the Covermeter, or the gauge can be used in autosizing mode.

Autosizing and orthogonal size function

Autosizing automatically calculates an estimate for the size of rebar and the depth of cover. If this figure differs greatly from your expected rebar size, or you do not know the expected rebar size, the orthogonal size function provides an accurate measurement of bar size. The step by step directions on the covermeter make the accurate sizing of bars quick and easy.

Bar Size Dimensions

Metric		US Bar		ASTM/Canadian		Japanese	
Bar Size	Diam. (mm)	Bar Size	Diam. (Inch)	Bar Size	Diam. (mm ²)	Bar Size	Diam. (mm)
5	5	#2	0.250	10M	100	6	6
5.5	5.5	#3	0.375	15M	200	10	10
6	6	#4	0.500	20M	300	13	13
7	7	#5	0.625	25M	500	16	16
8	8	#6	0.750	30M	700	19	19
9	9	#7	0.875	35M	1000	22	22
10	10	#8	1.000	45M	1500	25	25
11	11	#9	1.125	55M	2500	29	29
12	12	#10	1.250			32	32
14	14	#11	1.375			35	35
16	16	#12	1.500			38	38
18	18	#13	1.625			41	41
20	20	#14	1.750			44	44
22	22	#15	1.875			48	48
25	25	#16	2.000			51	51
28	28	#18	2.250			57	57
32	32						
36	36						
40	40						
44	44						
50	50						

Stainless Steel Bar Sizes

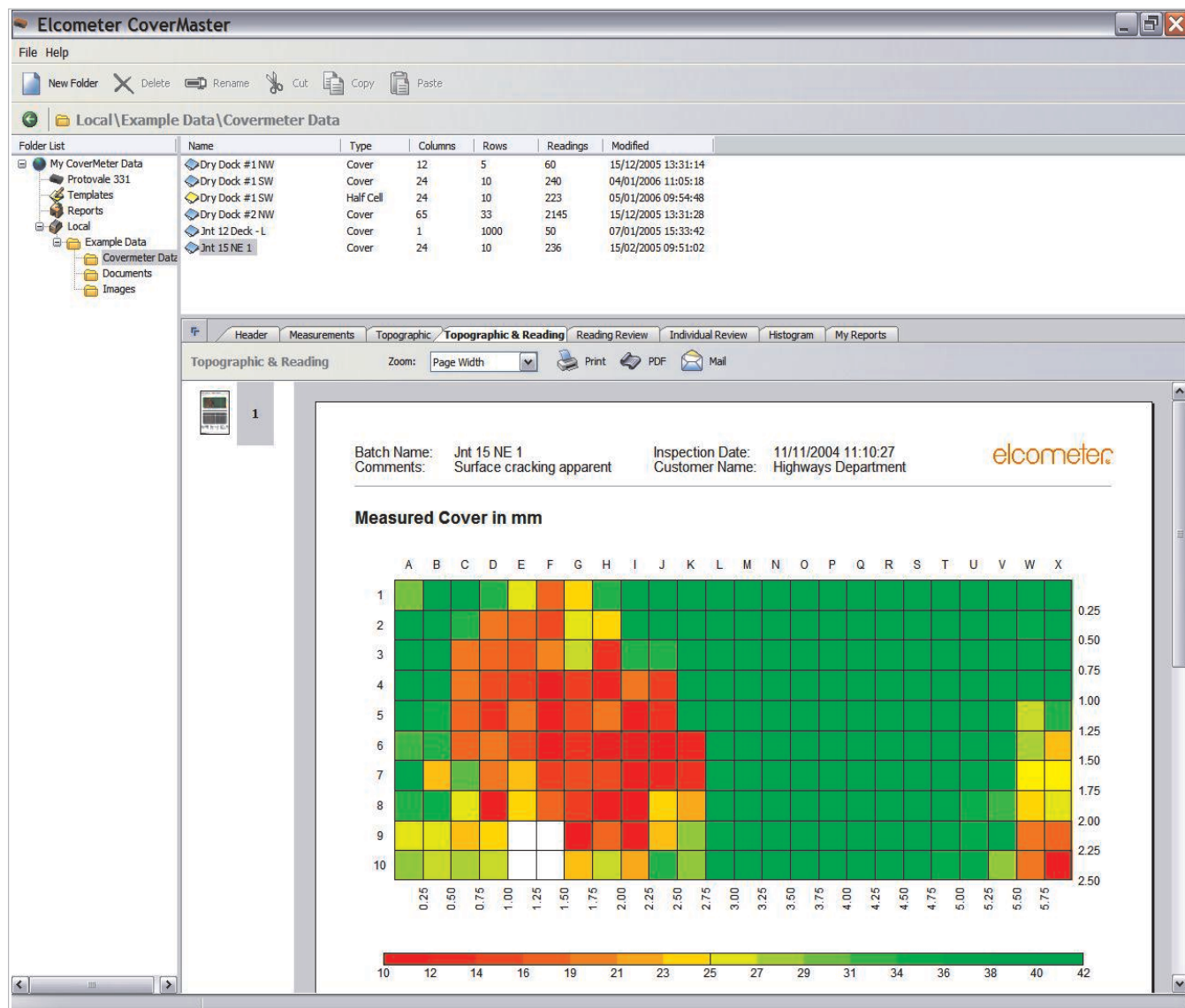
Bar sizes of stainless steel grades 304, 316 and Duplex can also be selected when using the THD model.

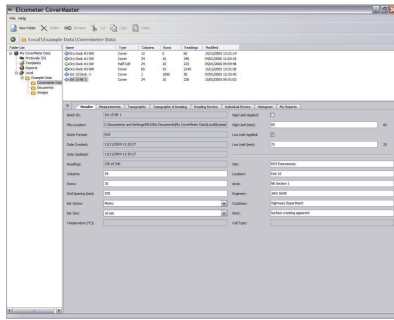
Covermaster® Software

Elcometer's Covermaster® software is designed to help manage your data effectively.

Connecting to a PC via RS232 is easy and data is transferred quickly into the Covermaster® software data management system. Covermeter and half cell readings can be stored along with associated photographs, Word® documents, Excel® spreadsheets and other files.

Covermaster® software is supplied free of charge with all Elcometer 331 models with memory.

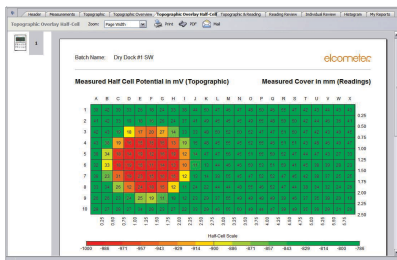




The Header page contains all the details of the particular site.

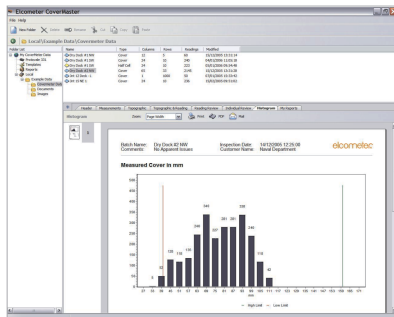
This includes information such as batch ID, creation date, site name, location, engineer name, customer name, notes etc.

The batch data is displayed in grid or linear form. These figures are downloaded from the Elcometer 331 straight into this format, so there is no need for time consuming manual inputting of readings.



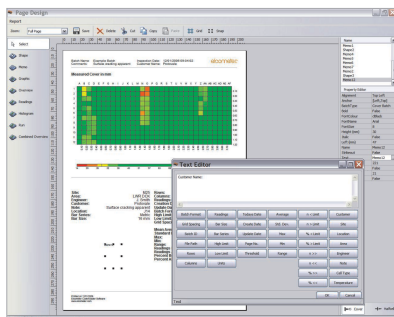
The data is easily translated into a topographic view giving you all the information you need at a glance.

Data for each reading can be presented in colour or can be shown in greyscale, complete with reading values in each grid. Site data that uses both cover and half cell measurements, can be shown on the same topographic (or gradient) chart. This makes data comparison and manipulation as easy, fast and user friendly as the gauge.



Reports can be fully customised giving you the ability to add your own corporate identity, photos, memos and include as much of the information as is necessary for your or your customers' records.

Once a report is generated, it can be saved to your PC, printed out and can even be saved as a Portable Document File (.pdf) ready to e-mail wherever it needs to go - all from within the Covermaster® software.



As all your information is in one place, and Covermaster® links up directly with photographs, Excel®, Word® and PowerPoint® files, it is simple to analyse and assess your findings. This avoids loss of valuable time switching between different types of programme to view the different information. Covermaster® software - it's all you need to manage your data. Everything is simply archived, ready for use whenever you need it. It is easy to switch between views and results and decide which report style you want to use to display your findings.



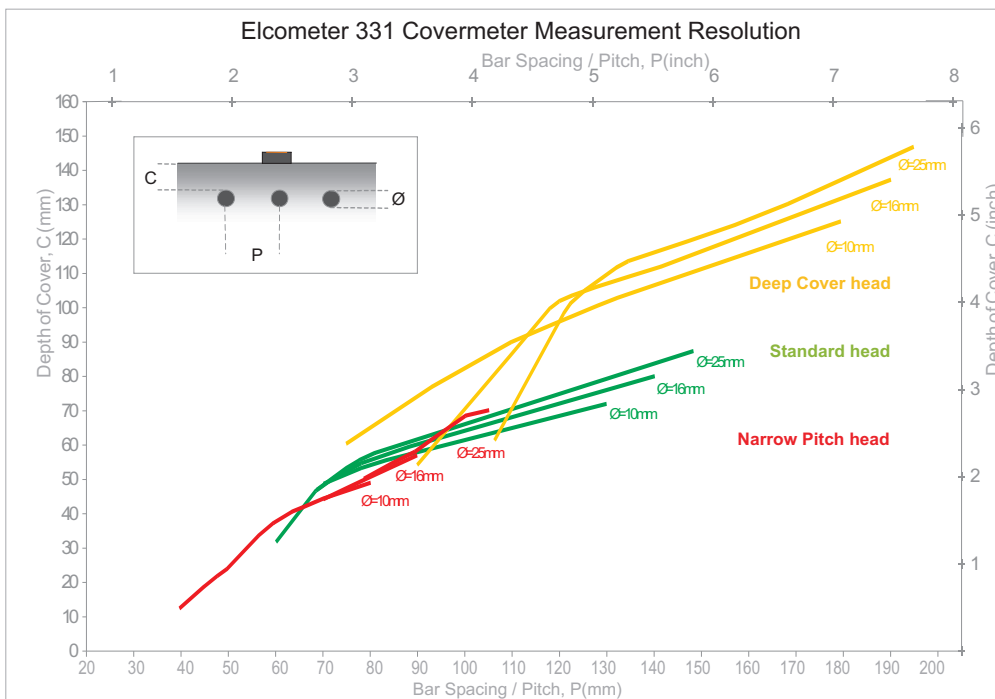
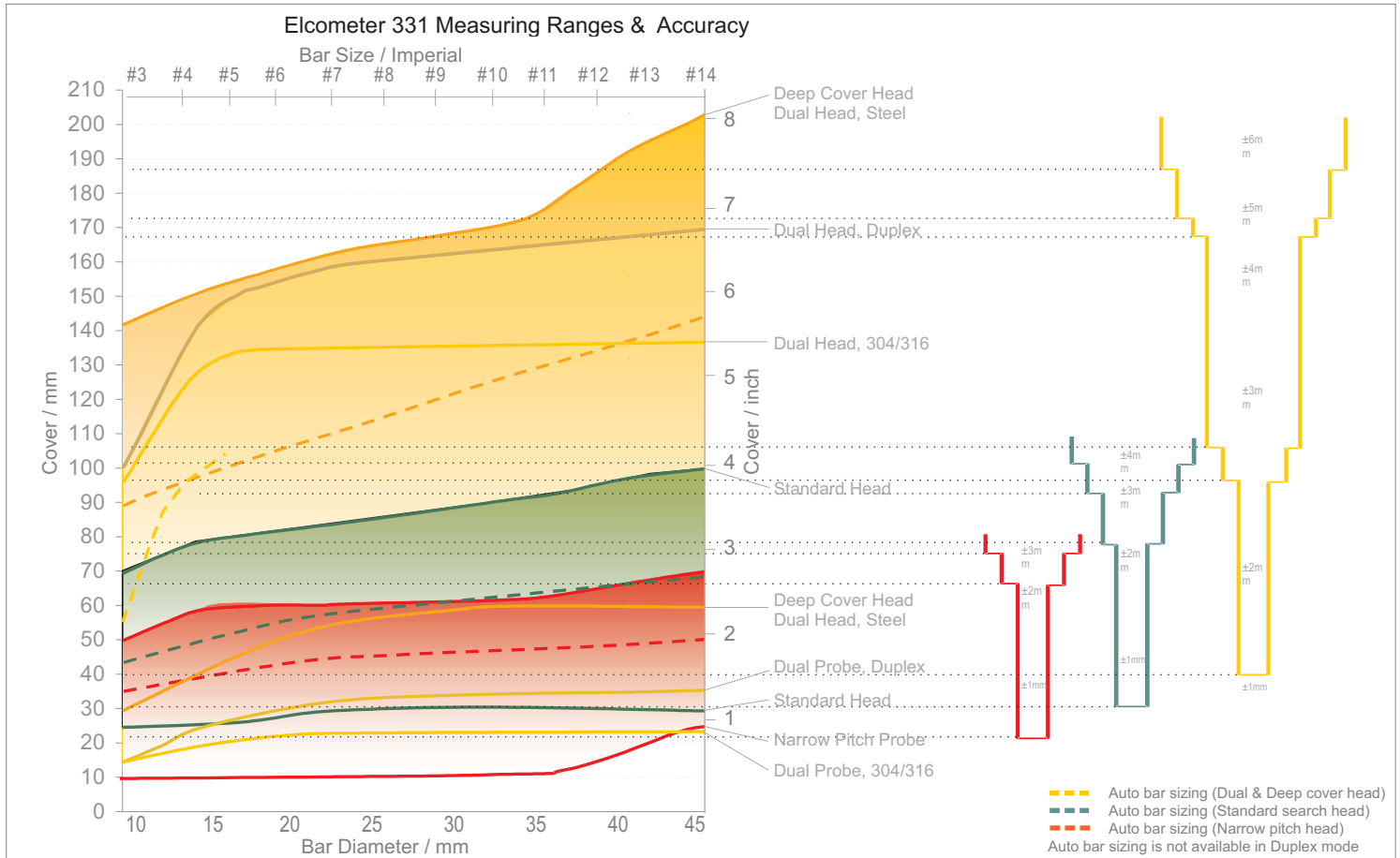
Store data, survey notes, inspection reports, photographs, PDF files and any other inspection information all in one easy to access, easy to use programme - Covermaster®. The end result is a software programme you can really use and tailor to your requirements, producing professional, detailed reports quickly, easily and effectively.

Description	Elcometer 331 Models				
	B	BH	SH	TH	THD
Covermeter / Rebar location	✓	✓	✓	✓	✓
Half Cell measurement		✓	✓	✓	✓
Rebar orientation	✓	✓	✓	✓	✓
Depth of cover	✓	✓	✓	✓	✓
Large cover (thickness) reading mm or inches	✓	✓	✓	✓	✓
Large graphics display with backlight	✓	✓	✓	✓	✓
Multiple language menu structure	✓	✓	✓	✓	✓
Signal strength bar	✓	✓	✓	✓	✓
Interchangeable heads with LED & keypad	✓	✓	✓	✓	✓
User selectable bar range sizes & numbers	✓	✓	✓	✓	✓
Rugged waterproof case (IP65)	✓	✓	✓	✓	✓
Adjustable beep volume & earphone socket	✓	✓	✓	✓	✓
Measurement sound modes	✓	✓	✓	✓	✓
Locate (<i>tone increases as head approaches rebar</i>)	✓	✓	✓	✓	✓
Under Cover (<i>tone only sound for low cover</i>)	✓	✓	✓	✓	✓
Maxpip™ (<i>tone only as head passes rebar centre</i>)	✓	✓	✓	✓	✓
Half Cell capability		✓	✓	✓	✓
Large half cell reading mV		✓	✓	✓	✓
Autosize mode bar diameter determination			✓	✓	✓
Orthogonal mode bar diameter determination			✓	✓	✓
RS232 Output - direct to printer or PC			✓	✓	✓
EDTS+ Excel link software			✓	✓	✓
Covermaster® software			✓	✓	✓
Statistics			✓	✓	✓
Minimum & maximum cover limits			✓	✓	✓
Date & time			✓	✓	✓
Memory			✓	✓	✓
Linear batch memory			10 linear batches of 1,000 readings each	Up to 200 batches of 1000 readings (a)	Up to 200 batches of 1000 readings (a)
Grid batch memory				Up to 240,000 readings (a)	Up to 240,000 readings (a)
User certified batch size				✓	✓
Graphics plot				✓	✓
Threshold plot				✓	✓
Stainless Steel measurement mode					✓
Bar dimension ranges			See page 11		
Rechargeable power supply			7.4 V lithium ion battery pack provides up to 32 hours of continuous use (20 hrs if backlight is on). Rechargeable in 4 hours either inside or outside the gauge using an external charger.		
Maximum operating temperature			50°C / 122°F		
Unit dimensions			230 x 130 x 125mm / 9 x 5.1 x 4.9"		
Unit weight			1.54kg / 3.4lbs		
Part numbers			W331B---*	W331BH--*	W331SH--* W331TH--* W331THD--*

Replace * with 1, 2 or 3 to complete part number. 1 = 240V UK, 2 = 220V Euro, 3 = 110V US

(a) Linear batch mode: up to 200 batches of 1,000 readings each Grid batch mode: up to 1,000 batches, maximum number of readings: 240,000

As with all covermeters, the accuracy of the readings alter at differing depths and bar sizes. The range from Elcometer boasts one of the best measurement accuracy features available on the market today. With the Elcometer 331 Covermeters, you can be safe in the knowledge that the readings you take are accurate and precise. The focussed search heads enable accurate measurement in congested situations, giving you the detailed information you need for your site survey.



The class leading resolution of the Elcometer 331 range allows accurate readings when there is a minimal distance between rebars.

With a choice of interchangeable search heads, automatically recognised by the unit, the Elcometer 331 can deliver the results you need quickly, easily and accurately.

Using the Elcometer Borehole Probe you can extend the Elcometer 331's measurement range to locate and orientate additional layers of rebar and tendons up to 100cm / 40" below the surface. For more information, contact Elcometer or visit www.elcometer.com

Standards information

All our covermeters can be used in accordance with the following standards and guidelines:

ACI 318	DGZfP:B3
ASTM C876	DIN 1045
BS 1881:201	EC 2
BS 1881:204	SIA 162
BS 8110	SIA 2006
CP 110	TR60
DGZfP:B2	UNI10174



Typical applications

Construction

At construction sites to locate rebars and metal pipes.

Maintenance

During routine maintenance of structures such as bridges, to check on corrosion of supporting metal structures in concrete.

Building renovation

To locate existing supporting metal work and assess levels of corrosion.

Before drilling and coring

Using a covermeter enables clear identification of “safe spots” for drilling and coring. This saves the cost of expensive drill bit replacement when metal supports are inadvertently hit.

High salt exposure environments

Areas exposed to high salt levels such as bridge decks, multi-storey car parks and marine structures widely use stainless steel reinforcements. The THD model is the only gauge to accurately locate, measure and orientate stainless steel rebars.

Due to our commitment to continuous research and development, we reserve the right to alter prices and specifications without notice. Elcometer® & Covermaster® are the registered trademarks of Elcometer Instruments Ltd. All other trademarks are acknowledged.

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