# Elcometer 266

# DC Holiday Detector

# Operating Instructions

English

This product meets the emc directive 89/336/EEC, amended 92/31/EEC and 93/68/EEC (see also additional information given in "Working safely" on page 5). This product complies with the safety requirements of the Electrical Equipment Directive (LVD) 2006/95/EEC.

Product Description: Elcometer 266 DC Holiday Detector

Manufactured by: Elcometer Limited, Manchester, England



A copy of this Instruction Manual is available for download on our Website via www.elcometer.com/downloads.

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Thank you for your purchase of this Elcometer 266 DC Holiday Detector. Welcome to Elcometer.

Elcometer are world leaders in the design, manufacture and supply of coatings inspection equipment. Our products cover all aspects of coating inspection, from development through application to post application inspection.

The Elcometer 266 DC Holiday Detector is a world beating product. With the purchase of this instrument you now have access to the worldwide service and support network of Elcometer. For more information visit our website at www.elcometer.com

## 1 ABOUT THIS INSTRUMENT

The Elcometer 266 will detect flaws in protective coatings. The instrument can be used to test coatings up to 7 mm (275 mils) thick and is ideal for inspecting coatings on pipelines and other protective coatings.

- The coating under test can be electrically non-conductive or partially conductive (such as coatings which contain metallic or carbon particles). The coating must be at least 200 µm (0.008") thick, and preferably over 500 µm (0.020"), thick.
- The underlying substrate must be an electrically conductive material such as metal or concrete (concrete is reasonably conductive because of its water content).

Typical flaws are pinholes (a very narrow hole running from the coating surface to the substrate), holidays (small uncoated areas), inclusions (objects trapped in the coating, e.g. grit from blast cleaning), air bubbles, cracks and thin spots.

The handle of the instrument generates a high DC voltage which is applied to the surface of the coating via a probe. An earth signal return cable is connected between the instrument and the substrate. When the probe is passed over a coating flaw, the electrical circuit is completed and current flows from the probe to the substrate. As a result, the instrument gives audible and visual alarms and a spark may be produced at the flaw.

The user can perform the test to any one of a number of international testing standards using a built-in Voltage Calculator.

Your Elcometer 266 features an easy to use menu-driven graphical interface which guides the user during setup of the instrument and during measurement. The instrument will operate in one of three voltage ranges; 0.5 kV to 5 kV, 0.5 kV to 15 kV and 0.5 kV to 30 kV (voltage range is determined by the model of high voltage handle fitted to the instrument - not the instrument itself).

**To ensure safe working and to maximise the benefits of your new Elcometer 266 DC Holiday Detector please take some time to read these Operating Instructions. Do not hesitate to contact Elcometer or your Elcometer supplier if you have any questions.**

## 1.1 FEATURES OF YOUR INSTRUMENT

- Menu-driven backlit graphical user interface
- Three ranges of voltage (5 kV, 10 kV and 30 kV), all continuously variable from 0.5 kV
- Automatic and manual sensitivity modes
- Voltage and sensitivity locks
- Test voltage calculator
- On-board voltage measurement
- Internal jeep tester
- Wide range of probes and accessories
- Multiple languages

## 1.2 WHAT THIS BOX CONTAINS

- Elcometer 266 DC Holiday Detector
- Lithium-ion battery pack
- Connection cable for High Voltage Handle[a] (curly cable)
- Earth signal return cable with crocodile clip, 10 m
- Battery charger and mains cable
- Band brush
- Shoulder strap
- Plastic carrying case
- Operating instructions

Your Elcometer 266 is packed in cardboard and plastic packaging. Please ensure that this packaging is disposed of in an environmentally sensitive manner. Consult your Local Environmental Authority for further guidance.


a. High Voltage Handle must be ordered separately - see “Spares and Accessories” on page 51 for full details.

## 2 WORKING SAFELY

The equipment should be used with extreme care. Follow the instructions given in these Operating Instructions.

The high voltage handle generates a voltage at the probe tip of up to 30 000 V. If the user makes contact with the probe, it is possible to experience a mild electric shock. However, due to the current being very low, this is not normally dangerous.

Elcometer does not advise using the Elcometer 266 if you are fitted with a pacemaker.

An electrical spark indicates detection of a coating flaw; do not use this instrument in hazardous situations and environments, e.g. an explosive atmosphere.

Due to its method of operation, the Elcometer 266 will generate broad band RF emissions when a spark is produced at the probe, i.e., when a flaw in the coating is located. These emissions may interfere with the operation of sensitive electronic apparatus in the vicinity. In the extreme case of a continuous spark of length 5 mm, the magnitude of emissions at a distance of 3 m was found to be approximately 60 dBµV/m from 30 MHz to 1000 MHz. It is therefore recommended that this equipment is not operated within 30 m of known sensitive electronic equipment and that the User does not deliberately generate continuous sparks.

In order to avoid injury and damage, the following dos and don'ts should always be observed:

- ✗ **DO NOT** use the equipment in any combustible, flammable or other atmosphere where an arc or spark may result in an explosion.
- ✗ **DO NOT** carry out tests close to moving machinery.
- ✗ **DO NOT** use the instrument in a precarious, wobbly or elevated situation from which a fall may result, unless a suitable safety harness is used.
- ✗ **DO NOT** use the instrument in rain or a damp atmosphere.

- ✓ **DO** read and understand these instructions before using the equipment.
- ✓ **DO** charge the battery before the first use of the equipment. This will take approximately 4 hours - see “The power supply” on page 7
- ✓ **DO** consult the plant or safety officer before carrying out the test procedure.
- ✓ **DO** undertake testing well clear of other personnel.
- ✓ **DO** work with an assistant to keep the test area clear and to help with the testing procedure.
- ✓ **DO** check that there are no solvents or other ignitable materials from the coating activities left in the test area, particularly in confined areas such as tanks.
- ✓ **DO** switch the instrument off and disconnect the leads when the work is finished and before leaving it unattended, e.g. when charging the battery.
- ✓ **DO** ensure that the earth signal return cable is connected to the conducting substrate before you switch on the instrument.
- ✓ **DO** only use on coatings that are cured, thickness tested and visually inspected and accepted.
- ✓ **DO** only use on coatings having a thickness of at least 200 µm (0.008"). For thicknesses between 200 µm and 500 µm (0.008” to 0.020”), ensure that an appropriately low voltage is applied (to prevent damage to the coating), or use the wet sponge method (using the Elcometer 270).
- ✓ **DO** bond the work piece to a ground potential to minimise the potential for build up of static charge - see page 32.

# 3 GETTING STARTED

This section of the instructions is intended for first-time users of the instrument. It contains essential information about batteries, assembling the instrument, the controls and the display. At the end of this section you will be ready to use the instrument.

## 3.1 THE POWER SUPPLY

Your instrument is powered by a rechargeable Lithium-Ion[b] battery pack which can be charged inside or outside the instrument.

Your Elcometer 266 is dispatched from the factory with the battery discharged. Recharge the battery fully before using for the first time.

One battery pack is supplied with the instrument. To increase productivity on site, Elcometer recommends that you purchase a spare battery pack which can be charged while you are using your instrument. To order an additional battery pack (see “Spares and Accessories” on page 51), contact Elcometer or your local Elcometer supplier.

### CHARGING THE BATTERIES INSIDE THE INSTRUMENT

The rechargeable battery must be fully charged before using the instrument for the first time. Use only the charger supplied with your instrument to charge the battery. Use of any other type of charger is a potential hazard, may damage your instrument and will invalidate the warranty. Do not attempt to charge any other batteries with the supplied charger.

Always charge the battery indoors. To prevent overheating, ensure that the charger is not covered.

b. The instrument is **not** designed to operate using dry cell batteries.

The instrument can be charged while it is switched on or while it is switched off. If the instrument is charged while it is switched on, the high voltage supply to the probe will be disconnected automatically and a battery charging icon will be shown on the display. If the instrument is charged while it is switched off, the display will remain blank.

1. Unscrew the retaining screw and open the access cover on the rear of the instrument.
2. Connect the lead from the charger into the socket marked ‘Charger Input’ behind the interface access cover.
3. Plug the charger supplied into the mains supply. The LED indicator on the charger will glow orange.
4. Leave the gauge charging for at least 4 hours. The LED indicator changes colour from orange to green when charging is complete.
5. When charging is complete, disconnect the charger from the mains supply before removing the lead from the instrument.


## CHARGING THE BATTERIES OUTSIDE THE INSTRUMENT

To remove the battery pack, locate and unscrew the two battery pack retaining screws at the rear of the instrument and slide out the battery pack.

Connect the lead from the charger into the socket on the battery pack and follow the charging instructions given in the previous paragraphs.

While the battery pack is removed from the instrument, do not allow metallic objects to come into contact with the battery terminals; this may cause a short circuit and result in permanent damage to the battery.

**WARNING:** Do not attempt to connect the supply side of the battery charger to generators or any other medium to high power source other than the single phase 50Hz A.C. mains outlet supplied from an approved and safe mains switchboard. Connection to other supply sources such as generators or inverters may have the potential to damage the charger, the battery and/or the gauge invalidating the warranty.

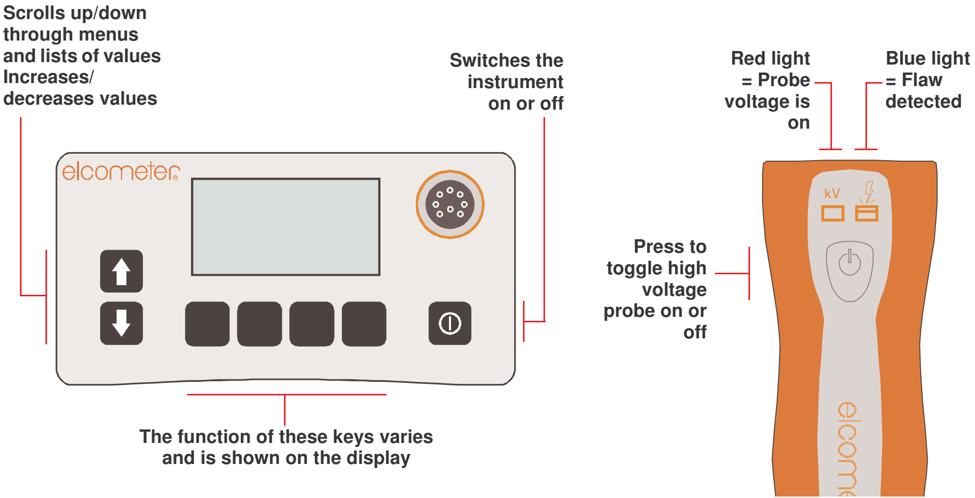
## BATTERY CONDITION INDICATOR

The state of charge of the battery is shown by a symbol on the display:

| Symbol | Battery charge/action required |
|---|---|
|  | 70% to 100% |
|  | 40% to 70% |
|  | 20% to 40% |
|  | 10% to 20%, charging recommended |
|  | <10%, instrument beeps every 10 seconds and symbol flashes - immediate charging required |
|  | 5 loud beeps, instrument switches off automatically |

## 3.2 THE CONTROLS

The Elcometer 266 is controlled using the keypad on the instrument and the button on the high voltage handle.



## 3.3 SWITCHING THE INSTRUMENT ON AND OFF

***Note:*** *Before switching the instrument on for the first time read “Selecting a language” on page 13.*

To switch on or off, press [⏻].

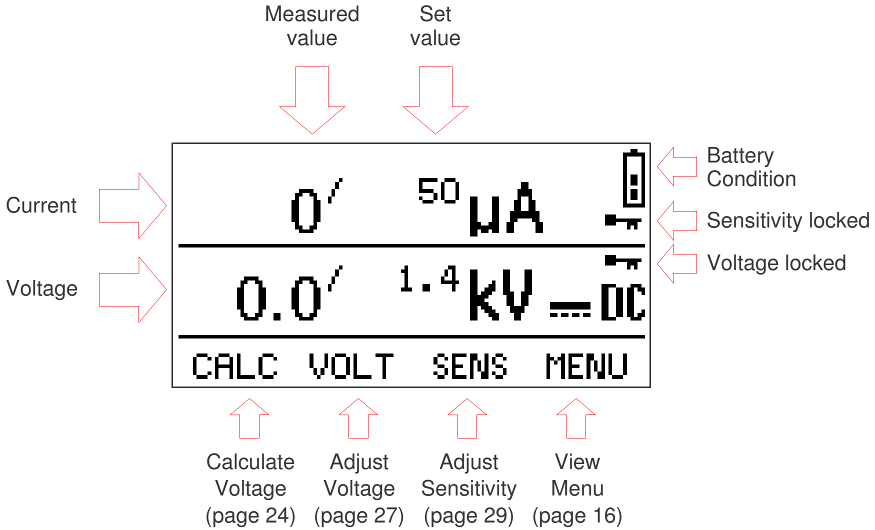
The instrument includes an automatic switch off feature which will help to extend the battery life (time between charges) - see “Menu” on page 16.

## 3.4 THE DISPLAY

Take some time to familiarise yourself with the information shown on the display of your instrument.

When the instrument is switched on an opening (welcome) information screen may be displayed briefly before the main reading screen appears. This welcome screen can be switched on or off - see “Configuring your instrument” on page 16.

The main screen displayed (while you are taking measurements) is the Reading Screen.



## WHAT THE DISPLAYED NUMBERS MEAN

| Value | | Description | Measured/Set by |
|---|---|---|---|
| Voltage | Set | The voltage at which you want to test. | Set by user |
| Voltage | Measured | The value of the voltage at the probe. | Measured by instrument |
| Current | Set | The value of the current returning to the instrument via the earth signal return cable below which no alarm will be triggered. | Set by user<br>or<br>Set by instrument (AUTO) |
| Current | Measured | The value of the current returning to the instrument via the earth signal return cable. | Measured by instrument. |

***Note:*** *If the set value for current is displayed as ‘AUTO’, your instrument is set to automatic sensitivity mode - see “Automatic setting of sensitivity” on page 29 for further details.*

## 3.5 SELECTING A LANGUAGE


Your instrument has a number of built-in languages. When the instrument is switched on for the first time after dispatch from the Elcometer factory the display will show the language selection screen.

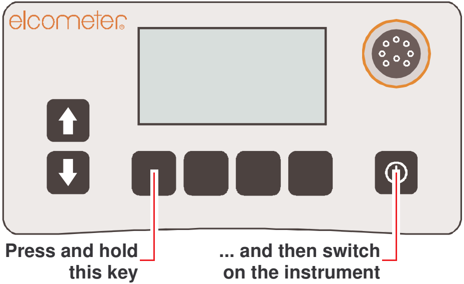
1. Press ⇧ or ⇩ to locate language required.
2. Press SEL to activate the selected language.

To select a language at any time, see “Configuring your instrument” on page 16.

To select a language without using the menus:

1. Switch instrument off.
2. Press and hold left hand key.
3. While holding the left hand key down, switch on instrument.

   The display will show the language selection screen with the current language highlighted by the cursor.
4. Release left hand key.
5. Press ⇧ or ⇩ to locate language required.
6. Press SEL to activate the selected language.




## 3.6 COMPUTER INTERFACE

Your instrument is fitted with an RS232 interface (under the access cover at the rear of the instrument). This interface is used to program the gauge at the factory and has no function for users of the gauge.

### 3.7 CLICKS, BEEPS, ALARMS AND LIGHTS

Your Elcometer 266 emits a range of sounds and lights while it is being use:

| Sound | Lights | Indicates |
|---|---|---|
| Single beep - high pitch | Red light on high voltage handle illuminates | High voltage to probe is switched on |
| Double beep - high pitch | Red light on high voltage handle flashes on/off | The safety interlock on the high voltage handle is not being gripped by your hand |
| Clicks - continuous series of | Red light on high voltage handle is illuminated | High voltage is present at the probe |
| Alarm buzzing | Blue light on high voltage handle flashes on/off | Flaw detected |

### 3.8 VOLTAGE AND SENSITIVITY LOCKS

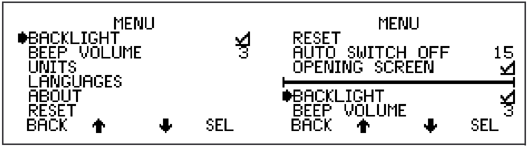
The voltage and sensitivity settings of your Elcometer 266 include a ‘lock’ feature which helps to prevent accidental changes to these values once they have been set.

- The *voltage* lock can be toggled on or off from the main menu - see “Menu” on page 16.
  The *voltage* lock also switches on *automatically* once the voltage has been set using CALC.
- The *sensitivity* lock can be toggled on or off from the main menu - see “Menu” on page 16.

If a voltage or sensitivity lock is switched on, it can be overidden during setting of the value by pressing an UNLOCK key. The lock will re-engage automatically once the value has been set.

# 4 CONFIGURING YOUR INSTRUMENT

To configure your instrument to suit the way you work, press the MENU key to display the main menu. To scroll up/down through the items in the menu, press [⇧] or [⇩]. To leave the menu or any sub-menu, press BACK or ESC.




## 4.1 MENU

| | |
|---|---|
| BACKLIGHT | Press SEL to toggle the display backlight on or off. |
| BEEP VOLUME | Press SEL and then [⇧] or [⇩] to set beep volume; 1 (minimum) to 5 (maximum). Press SEL when finished. |
| UNITS | Press SEL and then [⇧] or [⇩] to select units; µm, mm, mil, thou or inch. Press OK when finished. |
| LANGUAGES | Press SEL and then [⇧] or [⇩] to select display language. Press SEL when finished. |
| ABOUT | Press SEL to view About menu - See 4.2 SUB MENU>ABOUT. |
| RESET | Press SEL to view Reset menu - See 4.3 SUB MENU>RESET. |
| AUTO SWITCH OFF | Press SEL and then + or - to set auto switch off delay; 1 to 15 minutes or off (X). Press OK when finished. |
| OPENING SCREEN | Press SEL to toggle the opening screen on or off. |
| VOLTAGE LOCKED | Press SEL to toggle the voltage lock on or off - see 3.8 on page 15. |
| SENSITIVITY LOCKED | Press SEL to toggle the sensitivity (current) lock on or off - see 3.8 on page 15. |

### 4.2 SUB MENU>ABOUT

| | |
|---|---|
| GAUGE INFORMATION | Press SEL to display technical information about the instrument |
| HANDLE INFORMATION | Press SEL to display technical information about the high voltage handle |
| CONTACT | Press SEL to display Elcometer offices worldwide and (if programmed) Supplier contact details |
| HELP | Press SEL to display an explanation of all the symbols used on the display |

### 4.3 SUB MENU>RESET

| | |
|---|---|
| INTL GAUGE | Press SEL to reset instrument to µm thickness units, default settings and release locks |
| USA GAUGE | Press SEL to reset instrument to mil thickness units, default settings and release locks |

## 5 THE HIGH VOLTAGE HANDLE

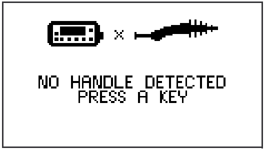
A range of high voltage handles is available for your instrument; a label on the underside of the handle indicates the maximum working voltage of the handle (5 kV, 15 kV or 30 kV).

The choice of which high voltage handle to use depends upon the maximum test voltage required, which in turn depends upon the thickness of the coating being tested and the recommendations of any test standard which may be being followed.

The instrument must be switched off when the high voltage handle is fitted or removed.

Connect the high voltage handle to the instrument using the supplied connecting cable (the grey curly cable). The connecting cable is fitted with a metal screw-type connector at each end. To fit a connector, align the keyway, push the connector into place and then tighten the metal collar.

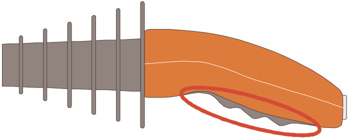
If the instrument is switched on without a high voltage handle fitted a warning message is flashed on the display.



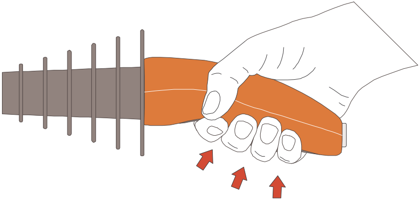

**THIS INSTRUMENT IS FITTED WITH A SAFETY INTERLOCK**

A safety interlock in the high voltage handle helps to reduce the risk of accidental contact with a probe at high voltage.

The safety interlock is the black rubberised grip on the underside of the high voltage handle.



When this section of the handle is held firmly by the hand as shown, the interlock is released and the voltage to the probe can be switched on (by pressing the button on the handle).



If the grip is released while the probe is at high voltage;

- the voltage at the probe will drop to zero immediately,
- the instrument will emit a high pitched beep, and
- the red light on the handle will flash.

If the grip is then grasped again within approximately two seconds the voltage at the probe will be immediately restored. This feature allows the user to move the handle from one hand to the other and continue testing without interruption.

If the grip is not grasped within this two second interval, the high voltage handle is switched off automatically. To continue testing, grasp the handle firmly again and press the button on the handle.

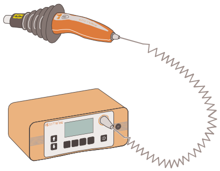
# 6 PREPARING FOR A TEST

**Before you start:**

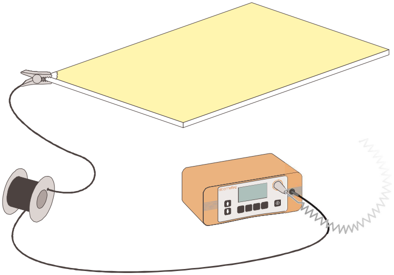
*Have you read and understood “Working safely” on page 5? If not, read it before using the equipment. If in any doubt, contact Elcometer or your local Elcometer supplier.*

## 6.1 CONNECT THE CABLES

1. Connect the high voltage handle to the instrument using the grey curly cable.

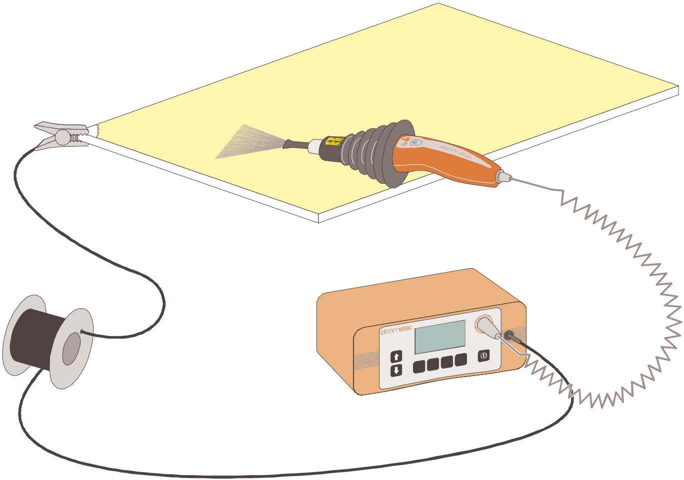


2. Connect the clamp of the earth signal return cable to an exposed section of substrate. Plug the other end of the cable into the instrument.



## 6.2 FIT THE PROBE

Select the probe best suited for the work (see “Probe selection” on page 38), and attach it to the high voltage handle.



## 6.3 CHECK CABLE CONNECTIONS

1. Switch on your instrument.
2. Reduce the voltage and current to their minimum values - see page 24 and page 29.
3. Hold the high voltage handle firmly with the probe in free air and press the button on the handle to switch on.
4. Touch the probe against the bare substrate and check that the instrument signals a flaw.

   If the instrument signals a flaw then the instrument is operating correctly and is ready to use for testing.

   If the instrument does not signal a flaw check all connections and try again. If you are still unable to get the instrument to signal a flaw, contact Elcometer or your local Elcometer supplier for advice.
5. When you have finished, press the button on the handle to switch off.

## 6.4 SET TEST VOLTAGE

Refer to “Setting the probe voltage” on page 24.

## 6.5 SET SENSITIVITY

Refer to “Setting the sensitivity” on page 29.

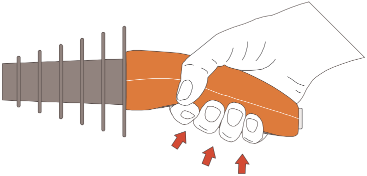
## 6.6 CHECK FOR CORRECT OPERATION

Either find or make a flaw in the coating. Using the procedure outlined in section 7, test that the flaw can be detected.

If the flaw is not detected, confirm that all the preceding steps have been undertaken correctly and check again. If the flaw is still not detected, contact Elcometer or your local Elcometer supplier for advice.

## 7.1 TESTING IN A SINGLE LOCATION

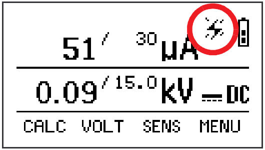
1. Holding the high voltage handle firmly, ensure that your fingers grasp and squeeze the black rubberised grip on the underside of the handle, as shown.
2. With the probe in free air, press and release the button on the handle to switch on the high voltage. The red light on the handle will illuminate and the instrument will emit a regular clicking, indicating that the probe is at high voltage.



3. Place the probe on the test surface.
4. Keeping the probe in contact[c] with the surface, move it over the work area at a speed of approximately one metre every four seconds, 0.25 m/s (10"/s).

   Any flaws in the coating will be indicated by one or more of the following:

   - A spark is seen between the probe and the surface
   - The blue light on the high voltage handle flashes
   - The alarm sounds
   - The alarm icon is shown on the display - see illustration
   - The display backlight flashes




c. The probe must always touch the surface. Gaps between the probe and the coating can result in genuine flaws not being detected.

### 7.2 MOVING TO A NEW TEST LOCATION

If you need to test in more than one location:

1. Always switch off the instrument before disconnecting any cables.
2. After reattaching cables in the new test location and before you recommence testing, repeat the steps given in 6.3, 6.4 and 6.5 on page 22.

### 7.3 WHEN YOU HAVE FINISHED TESTING

Always switch off the detector and disconnect the cables when you have finished testing and when leaving work unattended.

## 8 SETTING THE PROBE VOLTAGE

The voltage of your Elcometer 266 probe can be set automatically or manually.

### 8.1 SETTING THE VOLTAGE - AUTOMATIC

Your Elcometer 266 includes a built-in Voltage Calculator which will determine and set the correct test voltage based upon the test standard and the thickness of coating you are testing.

Using the Voltage Calculator is a two stage process;

- first select your test standard,
- and then select your coating thickness.

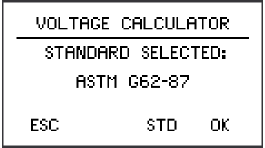
## SELECT THE TEST STANDARD

1. With the reading screen displayed, press the CALC key.

   If the voltage has been +ed (see 3.8 on page 15), a warning screen will be displayed; press UNLOCK to allow the voltage to be adjusted - the lock will re-engage automatically after the voltage has been set by the calculator.


   The 'VOLTAGE CALCULATOR' screen will be displayed.

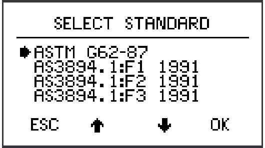
   The current test standard selected is shown.




2. Press STD to display a list of test standards (also see "Standards" on page 45).

3. Using the ⇧ and ⇩ keys, move the arrow to the required test standard and then press OK.

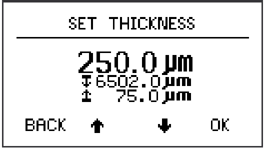
   The selected test standard will be shown.




## SELECT THE COATING THICKNESS

1. With the Voltage Calculator showing the test standard selected, press OK.

   The 'SET THICKNESS' screen will show the last used coating thickness and the upper and lower thickness values for the test standard selected.

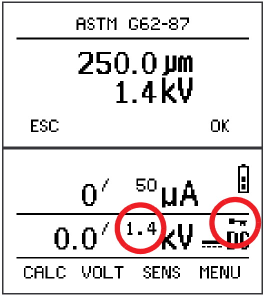



2. Using the ⇧ and ⇩ keys, adjust the coating thickness to the required value and then press OK.

A confirmation screen will be shown which displays the selected test standard, the coating thickness and the calculated test voltage.

3. Press OK to set the instrument voltage to the calculated value, otherwise to return to the reading screen without making any changes, press ESC.

The calculated value of voltage will be shown on the reading screen and a key icon will appear to indicate that the voltage has been locked.



## 8.2 SETTING THE VOLTAGE - MANUAL

First read the notes given in “Calculating the correct test voltage” on page 33 to establish the correct voltage to use.

To adjust the probe voltage manually:

1. With the reading screen displayed, press the VOLT key.

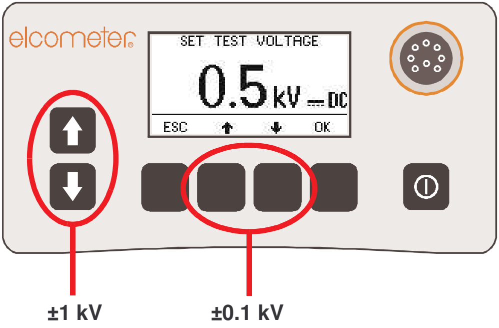
   If the voltage has been locked (see 3.8 on page 15), a warning screen will be displayed; press UNLOCK to allow the voltage to be adjusted - the lock will re-engage automatically after the voltage has been set.

   The ‘SET TEST VOLTAGE’ screen will be displayed.

2. Using the ⇧ and ⇩ keys, adjust the voltage to the required value:

   - the keys on the left of the display adjust in increments of 1 kV;
   - the keys below the display adjust in increments of 0.1 kV.

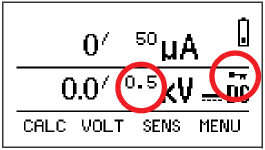
   (Press and hold a key to advance rapidly).



3. Press OK when you have finished.

   The new probe set voltage will be displayed on the reading screen.

   If the voltage lock is active (see 3.8 on page 15), a key icon indicates that the voltage is locked.



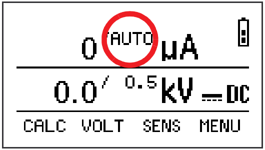
# 9 SETTING THE SENSITIVITY

The sensitivity of your Elcometer 266 can be set automatically or manually.

## 9.1 AUTOMATIC SETTING OF SENSITIVITY

When your Elcometer 266 is set to automatic sensitivity mode, the instrument measures the current returning via the earth signal return cable. If significant changes in the current are detected, the instrument analyses these changes - looking for the electrical 'signature' of a coating flaw. When such a signature is detected, the instrument will signal the presence of the flaw.

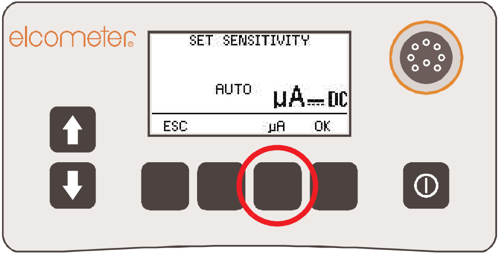
If the set value of the current on the reading screen is displayed as 'AUTO µA', your instrument is already set to automatic sensitivity mode and you need do nothing more. Auto mode is beneficial when conductive coatings are being tested.



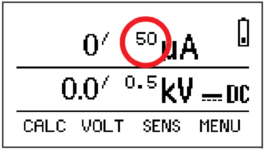

If 'AUTO' is not displayed:

1. Press the SENS key.

   The 'SET SENSITIVITY' screen will be displayed.
2. Press AUTO to switch to automatic sensitivity mode.
3. Press OK to return to the reading screen.
4. Check that 'AUTO' is now displayed as the set value of the current.



## 9.2 MANUAL SETTING OF SENSITIVITY




Manual setting of sensitivity may be required in certain instances and to comply with some test standards. To set the sensitivity of the instrument manually, the set current value must be adjusted.

The set current value is adjustable between 5 µA and 99 µA in 1 µA increments.

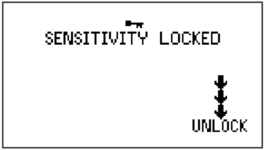
- As the value is increased towards its maximum (99 µA), the instrument becomes LESS sensitive.
- As the value is decreased towards its minimum (5 µA), the instrument becomes MORE sensitive.

Typically, manual adjustment may be required when testing partially conductive coatings at high voltages. The probe is placed onto a section of coating known not to contain any flaws. The measured ‘background’ current flow is noted and the set current value then adjusted to a value a few µA above this figure. Erroneous alarms due to the background current flow are therefore avoided in this instance.

To adjust the set current value:

1. With the reading screen displayed, press the SENS key.

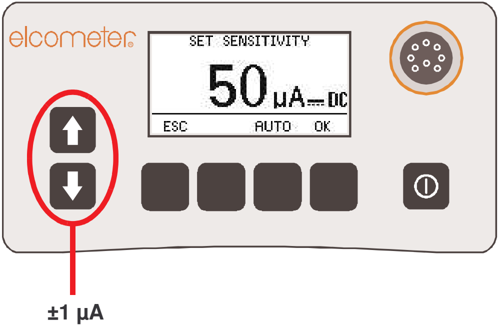
   If the sensitivity has been locked (see 3.8 on page 15), a warning screen will be displayed; press UNLOCK to allow the current to be adjusted - the lock will re-engage automatically after the current has been set.



2. The ‘SET SENSITIVITY’ screen will be displayed.
3. If the sensitivity is set to ‘AUTO µA’, press ‘µA’.

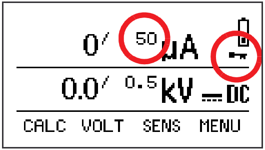
   The last used set current value will be displayed.
4. Using the ⇧ and ⇩ keys, adjust the set current to the required value; each press changes the display by 1 µA.

   (Press and hold a key to advance rapidly).
5. Press OK when you have finished.




The new set current value will be displayed on the reading screen.

If the sensitivity lock is active (see 3.8 on page 15), a key icon indicates that the sensitivity is locked.



# 10 STATIC ELECTRICITY

As the probe is moved over the surface of a coating, a static charge builds up which can:

- Cause objects in contact with the surface to become charged with the same polarity.
- Induce an opposite charge on nearby objects electrically insulated from the surface.

Charged surfaces (or adjacent objects) can be discharged by turning off the high voltage and brushing the surface with the probe.

Induced static on the operator is minimised by means of a dissipative contact point on the handle (the rubber handgrip). Simply holding the handle ensures that the operator is always at the same potential as the earth signal return cable, and therefore the test substrate.

It is recommended that the substrate of the item being tested is bonded to an earth potential, thus preventing any overall build-up of charge, which can otherwise remain on an isolated test piece for several minutes after testing has been completed.

The wearing of rubber gloves and insulating footwear is not necessary, although in certain unusual circumstances there may be a benefit. For further guidance on minimising the effect of static, contact Elcometer or your Elcometer supplier.

# 11 CALCULATING THE CORRECT TEST VOLTAGE

Your Elcometer 266 includes a built-in voltage calculator which will determine and set the correct test voltage based upon the test standard and the thickness of coating you are testing - see “Setting the voltage - automatic” on page 24.

Alternatively, the voltage can be set by the user (see “Setting the voltage - manual” on page 27) using the following guidelines which describe how a safe, but effective, test voltage may be determined.

## 11.1 OVERVIEW

For effective testing, the test voltage must lie between two limits - the upper and lower limits.

- The upper voltage limit is that at which the coating itself would breakdown and be damaged. Therefore, the test voltage should be lower than this value.
- The lower limit is the voltage required to break down the thickness of air equivalent to the coating thickness. If the output voltage is not greater than this value, then a flaw will not be detected.

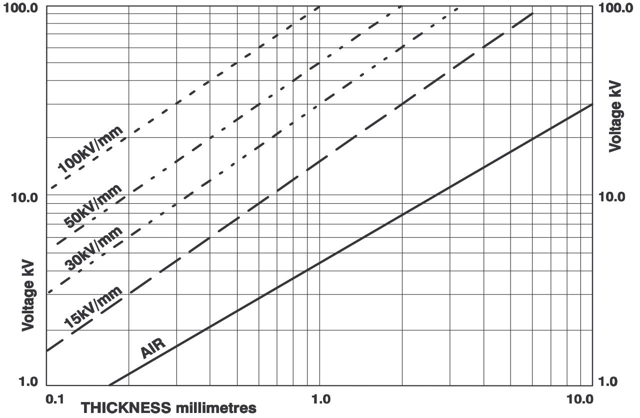
These two limits can be determined and a voltage approximately half way between them selected as the test voltage.

## 11.2 DIELECTRIC STRENGTH

Whatever the material, if a high enough voltage is applied, it will conduct electricity. However, for insulators, such as paint, the level of voltage required to achieve a current flow usually results in irreversible material damage. The voltage at which a particular thickness of material breaks down is termed the dielectric strength. This is usually expressed as the voltage per unit distance, e.g. kV/mm. Its value depends on the type of applied voltage (AC, DC or pulsed), temperature and thickness. The graph shows the relationship between breakdown voltage (DC) and thickness for materials of different dielectric strengths.

The upper voltage limit is the dielectric strength of the material multiplied by its thickness and the lower voltage limit is the dielectric strength of air multiplied by the thickness.

The dielectric strength of coating materials usually lies in the region of 10 kV/mm to 30 kV/mm. The dielectric strength of air ranges from 1.3 kV/mm to 4 kV/mm.




**Breakdown voltage against thickness for materials of different dielectric strengths**

This graph is useful if you do not have a standard to work to and wish to know more about how to establish a test voltage.

## 11.3 ESTABLISHING THE VOLTAGE LIMITS

### THE LOWER LIMIT

The lower limit for effective operation is that required to breakdown the thickness of air equivalent to the coating thickness. The breakdown voltage of a given thickness of air varies with humidity, pressure and temperature but is approximately 4 kV/mm (0.1 kV/mil).

If the coating thickness is known, or can be measured, the lower limit value can be read from the graph given in paragraph 11.2 above, using the line marked AIR. For instance, if the coating thickness is 1.0 mm then the lower limit is approximately 4.5 kV.

If the coating thickness is not known then the minimum value has to be established experimentally. Reduce the voltage setting to minimum and position the probe over an unprotected area of substrate at the normal height of the coating surface. Increase the voltage slowly and steadily until a spark is produced. Make a note of this voltage - it is the lower voltage limit.

### THE UPPER LIMIT

The upper voltage limit may be determined by:

**The job specification** - if available and a test voltage is stated.

**The dielectric strength** - if specified for the applied coating.

Measure the thickness of the layer and refer to the graph given in paragraph 11.2 above. Alternatively, calculate the maximum voltage, allowing for variations in the coating thickness. Note that 1 kV per mm is equivalent to 25.4 V per mil (thou).

**Note:** *This method is only suitable if the dielectric strength values were determined for a DC voltage.*

**Experiment** - Touch the probe on an unimportant area of the work piece. Increase the voltage slowly and steadily until a spark passes through the coating. Make a note of this voltage - it is the upper voltage limit. (The dielectric strength can be calculated by dividing this voltage by the coating thickness).

**Tables and formulae** - from established Codes of Practice, e.g. NACE and ASTM. Examples of tables are given below (see Table 1, Table 2 and Table 3). See also “Setting the voltage - automatic” on page 24 and “Standards” on page 45.

***Once the lower and upper voltage limits have been established, set the voltage approximately halfway between the two values.***

**Table 1: kV values from ASTM G62-87 (up to 1 mm)**

| **Microns** | **Kilovolts (kV)** | **Thou** | **Kilovolts (kV)** |
|---|---|---|---|
| 100 | 1.04 | 5 | 1.17 |
| 200 | 1.47 | 10 | 1.66 |
| 300 | 1.80 | 15 | 2.03 |
| 400 | 2.08 | 20 | 2.34 |
| 500 | 2.33 | 25 | 2.63 |
| 600 | 2.55 | 30 | 2.88 |
| 700 | 2.76 | 35 | 3.11 |
| 800 | 2.95 | 40 | 3.32 |
| 900 | 3.12 | | |
| 1000 | 3.29 | | |

## Table 2: kV values from ASTM G62-87 (above 1 mm)

| mm | Kilovolts (kV) | Thou | Kilovolts (kV)) |
|---|---|---|---|
| 1 | 7.84 | 40 | 7.91 |
| 2 | 11.09 | 80 | 11.18 |
| 3 | 13.58 | 120 | 13.69 |
| 4 | 15.69 | 160 | 15.81 |
| 5 | 17.54 | 200 | 17.68 |
| 6 | 19.21 | 240 | 19.36 |
| 7 | 20.75 | 280 | 20.92 |

## Table 3: kV values from NACE RP0188-99

| mm | Thou | Kilovolts (kV) |
|---|---|---|
| 0.20 to 0.28 | 8 – 11 | 1.5 |
| 0.30 to 0.38 | 12 – 15 | 2.0 |
| 0.40 to 0.50 | 16 – 20 | 2.5 |
| 0.53 to 1.00 | 21 – 40 | 3.0 |
| 1.01 to 1.39 | 41 – 55 | 4.0 |
| 1.42 to 2.00 | 56 – 80 | 6.0 |
| 2.06 to 3.18 | 81 – 125 | 10.0 |
| 3.20 to 3.43 | 126 – 135 | 15.0 |

# 12 PROBE SELECTION

Table 4 shows the most suitable probe to use depending on the characteristics of the surface to be tested, e.g. internal and external pipe surfaces, large surfaces and complex shapes. In addition, long reach applications can be carried out using extension pieces that are suitable for use with all probe types.

All these probes are available from Elcometer or your local Elcometer supplier - see “Spares and Accessories” on page 51 for ordering details.

**Table 4: The best probe for various surface types**

| Type of Surface | Recommended Probe | Notes |
|---|---|---|
| Small area, complex surface, general application | Band brush probe | Provides low contact pressure |
| Large surface areas | Wire brush probe/Rubber probe | Available in different widths.<br>Use rubber probe for light contact and wire brush probe for medium contact |
| Insides of pipes 40 mm to 300 mm (1.5” to 12") diameter | Circular brush probe | Includes 250 mm extension rod |
| Outside of pipes, 50 mm to 1000 mm (2” to 36") diameter | Rolling spring probe | A phosphor bronze spring. |

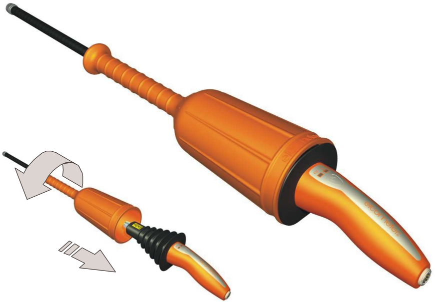
***Note:*** *Only fittings supplied by Elcometer should be used with this detector.*

# 13 THE SECOND HAND GRIP

The Second Hand Grip is an optional accessory which can enhance the use of the instrument.

The grip is fitted between the high voltage handle and the probe and enables the high voltage handle to be held by both hands, rather than just one:

- Allows the user to hold heavy probes or long extension rods with greater ease and for longer periods of time.
- Highly insulated - does not affect the safe use of the instrument.
- Serves as a 0.5 m extension rod.



To fit the Second Hand Grip, slide the grip onto the end of the high voltage handle and then rotate until it is firmly screwed in place. The probe is then attached to the end of the Second Hand Grip using the standard coupling.

For ordering information see *Spares and Accessories* on page 51.

# 14 SPECIAL CONSIDERATIONS

## 14.1 CONDUCTIVE COATINGS

As stated above, if the displayed voltage drops sharply when the probe is applied to the test surface or the alarm sounds continuously, then the coating may be conductive. The usual occurrences of conductive coatings are described in the following.

**Existence of metallic, carbon or other conducting particles in the coating.** During normal use, the particles in this type of coating are not linked. However, when the coating is subjected to high voltages the material between the particles can break down. This results in the coating becoming conductive and the detector indicating the presence of a flaw.

To overcome this effect, the voltage should be reduced so that it is still high enough to detect flaws but low enough to avoid break down of the coating. However, in some cases the coating will still conduct at voltages that are too low to locate a flaw. In this case, the holiday detector is not a suitable method for checking the coating.

**Surface moisture or contamination.** Certain soluble salts attract moisture from the atmosphere and this and other forms of surface contamination can form a path across the surface to the high voltage that is not due to a coating flaw. Under these conditions the detector indicates non-existent flaws. When these circumstances occur, the surface should either be dried using a suitable cloth or cleaned with a non-conducting cleaner or solvent which will not damage the coating.

**Note:** *Ensure that any cleaner or solvent containers are removed from the test area before re-commencing the test.*

**Moisture penetration or absorption.** Moisture can enter materials, e.g. glass reinforced plastic along the reinforcing glass fibres, if the surface is eroded or scratched and then immersed in water. In this case, allow adequate time for the coating to dry prior to testing.

**Rubber linings.** These may be slightly conductive due to their carbon content. As with other conductive coatings, reduce the sensitivity so that the detector indicates a known flaw but does not sound when the probe is placed on sound coating. It may also be necessary to increase the test voltage to compensate for the current flow through the coating.

**Coating may not be fully cured.** In this case the coating still contains solvents which allow the path to the high voltage to be formed even if a flaw is not present. To overcome this problem, allow the coating to cure before undertaking the test.

## 14.2 CONCRETE SUBSTRATES

If a concrete or cement substrate contains enough moisture, then it will conduct electricity and the holiday detector can be used to detect flaws in its coating.

The procedure is generally the same as that described in “Preparing for a test” on page 20 and “Test procedure” on page 23, but the following points should be noted. Hammering a masonry nail, or similar conducting spike, into the concrete or cement makes the earth signal return contact.

The suitability of the concrete for use with a holiday detector can be checked using the following. Make a high voltage return contact by hammering a nail or similar into the concrete. Attach the earth signal return cable to the nail, set test voltage for the thickness of coating, or in the range 3 kV - 6 kV if the test voltage is not known and set the sensitivity to maximum (5 µA current).

Place the probe on uncoated concrete about 4 metres (13 feet) from the nail. If the alarm sounds, then the concrete is sufficiently conductive.

If the concrete is too dry, i.e. the alarm does not sound, then it is unlikely that the holiday detector will be a suitable inspection method.

### 14.3 LENGTHENING THE EARTH SIGNAL RETURN CABLE

Lengthening the return lead by connecting several leads together may well invalidate the EMC performance of the equipment.

## 15 ERROR MESSAGES

Under certain conditions the instrument will display error messages. These messages are normally cleared by pressing one of the keys. The cause of the error will be indicated by the message and should be corrected before proceeding.

| Error message | Causes | Action to take |
|---|---|---|
| SPARKING TO CASE | Current is returning from the probe to the instrument via a route other than the earth signal return cable. | Check that all cables are connected correctly.<br>If the instrument is in contact with the item being tested, move it to a location isolated from the item.<br>Ensure that you are not touching the probe against the metal connector at the end of the high voltage handle connecting cable. |
| 00 | High voltage handle device error. | Remove high voltage handle and refit.<br>If error persists, contact Elcometer*. |

| Error message | Causes | Action to take |
|---|---|---|
| 01, 02 and 03 | High voltage handle ADC error. | Remove high voltage handle and refit. If error persists, contact Elcometer*. |
| 04, 05 and 06 | High voltage handle DAC error. | Remove high voltage handle and refit. If error persists, contact Elcometer*. |
| 07 and 08 | High voltage handle EEPROM error. | Remove high voltage handle and refit. If error persists, contact Elcometer*. |
| 09 | High voltage handle CRC error. | Remove high voltage handle and refit. If error persists, contact Elcometer*. |
| 10 | High voltage handle connecting cable (curly cable) fault. | Return the handle to Elcometer. |
| 11 | Current leakage. | Return to Elcometer* for software upgrade. |
| 12 | Handle not compatible. | Remove high voltage handle and refit. If error persists, contact Elcometer*. |
| 13 | Handle data invalid. | Remove high voltage handle and refit. If error persists, contact Elcometer*. |
| 14 | Handle not recognised. | Remove high voltage handle and refit. If error persists, contact Elcometer*. |
| 15, 16 and 17 | Handle switch presses not recognised | Remove high voltage handle and refit. If error persists, contact Elcometer*. |

* Or your Elcometer Supplier.

# 16 STORAGE

This instrument incorporates a Liquid Crystal Display (LCD). If the display is heated above 50°C (120°F) it may be damaged. This can happen if the instrument is left in a car parked in strong sunlight. Always store the instrument in its case when it is not being used.

# 17 MAINTENANCE

You own one of the finest Holiday Detectors in the world. If looked after, it will last a lifetime.

Keep your instrument, high voltage handle, connecting cables and probes clean. Before cleaning, switch off the instrument and disconnect all cables. To clean, wipe with a damp cloth and then allow ample time to air dry before use. Do not use any solvents to clean the instrument.

At regular intervals, check the instrument, high voltage handle, probe and high voltage return leads and connectors for damage. Replace any parts that are worn or are of doubtful condition. See “Spares and Accessories” on page 51 for replacement parts.

Regular calibration checks over the life of the instrument are a requirement of quality management procedures, e.g. ISO 9000, and other similar standards. For checks and certification contact Elcometer or your Elcometer supplier.

The instrument does not contain any user-serviceable components. In the unlikely event of a fault, the instrument should be returned to your Elcometer supplier or directly to Elcometer. Contact details can be found:

- Stored in the instrument (MENU / ABOUT / CONTACT).
- On the outside cover of these operating instructions.
- At www.elcometer.com

## 18 STANDARDS

The Voltage Calculator included in your Elcometer 266 DC Holiday Detector is programmed with the following standards:

| | | | |
|---|---|---|---|
| ASTM G6-83 | ASTM G62-87 | AS3894.1:F1 1991 | AS3894.1:F2 1991 |
| AS3894.1:F3 1991 | AS3894.1:F4 1991 | ANSI/AWWA C213-91 | EN 14430:2004 |
| NACE RP0188-99 | NACE RP0490-2001 | NACE RP0274-04 | |

Other standards that do not derive the test voltage directly from the coating thickness are not available within the Voltage Calculator function. However, testing to these standards is still possible by selecting the test voltage manually (see “Setting the voltage - manual” on page 27).

The Elcometer 266 DC Holiday Detector can be used in accordance with the following list of standards and test methods:

**Table 5: Standards and test methods**

| Standard or Method No | Date | Title | Notes | Instrument Voltage Setting |
|---|---|---|---|---|
| ANSI/AWWA C214-89 | 1990 | Tape coating systems for the exterior of steel water pipes | Min. Voltage is 6 kV.<br>Use NACE RP-0274 | Manual |
| ANSI/AWWA C213-91 | 1992 | Fusion-bonded epoxy coating for the interior and exterior of steel water pipes | $V = 525 \cdot \sqrt{Thickness}$ (mil) | Voltage calculator or manual |
| AS 3894.1 | 1991 | Site testing of protective coatings. Method 1: Non- conductive coatings – Continuity test – High voltage (brush) method | Testing coatings > 150 µm at voltages >500 V<br>$V = 250 \cdot \sqrt{Thickness\ (\mu m)}$ / factor | Voltage calculator or Manual |
| ASTM D 4787 | 1988 | Continuity verification of liquid or sheet linings applied to concrete | High voltage (above 900 V) test. Set voltage below dielectric breakdown strength of lining. Move probe at 0.3 m/s (1 ft/s) max. | Manual |
| ASTM F 423 | 1975 | PTFE plastic-lined ferrous metal pipe and fittings | Electrostatic test: 10 kV, spark at defect is cause for rejection | Manual |
| ASTM G 6 | 1983 | Abrasion resistance of pipeline coatings | Porosity test prior to abrasion testing. Test voltage is calculated as<br>$V = 1250 \cdot \sqrt{Thickness}$ (mil) | Voltage calculator or Manual |

## Table 5: Standards and test methods

| Standard or Method No | Date | Title | Notes | Instrument Voltage Setting |
|---|---|---|---|---|
| ASTM G 62-B | 1987 | Holiday detection in pipeline coatings | Method B.<br>Thickness <1.016 mm<br>$V = 3294 \cdot \sqrt{Thickness}$ (mm)<br>Thickness >1.014 mm<br>$V = 7843 \cdot \sqrt{Thickness}$ (mm) | Voltage calculator or Manual |
| BS 1344-11 | 1998 | Methods of testing vitreous enamel finishes Part II: High voltage test for articles used under highly corrosive conditions | Same as ISO 2746<br>(Test voltage above 2 kV for enamel thicker than 220 µm) | Manual |
| EN 14430 | 2004 | Vitreous and porcelain enamels - High Voltage Test | DC or pulsed test voltage.<br>V = 1.1 kV to 8.0 kV for thicknesses of 100 µm to 2000 µm | Voltage calculator or Manual |
| ISO 2746 | 1998 | Vitreous and porcelain enamels - Enamelled articles for service under highly corrosive conditions - High voltage test | Test voltage above 2 kV for enamel thicker than 220 µm | Manual |
| JIS G-3491 | 1993 | Asphalt coatings on water line pipes | Inside walls 8-10 kV<br>Dipped Coatings 6-7 kV<br>Outside walls 10-12 kV | Manual |

## Table 5: Standards and test methods

| Standard or Method No | Date | Title | Notes | Instrument Voltage Setting |
|---|---|---|---|---|
| JIS G-3492 | 1993 | Coal-tar enamel coatings on water line pipes | Inside walls 8-10 kV<br>Dipped coatings 6-7 kV<br>Outside walls 10-12 kV<br>Welded areas as inside walls | Manual |
| NACE RP0188 | 1999 | Discontinuity (Holiday) Testing of Protective Coatings | Low and high voltage equipment and tests. | Voltage calculator or Manual |
| NACE RP0274 | 1974 | High Voltage<br>Electrical Inspection of Pipeline Coatings prior to installation | DC or Pulsed test voltage<br>$V = 1250 \cdot \sqrt{Thickness}$ (mil) | Voltage calculator or Manual |
| NACE RP0490 | 2001 | Holiday Detection of Fusion-Bonded Epoxy External Pipeline Coatings of 10-30 mils (0.25mm-0.76mm) | DC in dry conditions.<br>$V = 525 \cdot \sqrt{Thickness}$ (mil). Trailing ground lead of 9 m allowed if pipe is connected to 2-3ft earth spike and soil is not dry | Voltage calculator or Manual |

**Note:** *The above list and comments have been extracted from the documents identified and every effort has been made to ensure the content is correct. No responsibility can be accepted, however, for the accuracy of the information as these documents are updated, corrected and amended regularly. A copy of the relevant standard or method must be obtained from the source to ensure that it is the current document.*

# 19 TECHNICAL DATA

| | |
|---|---|
| Output voltage (depends upon high voltage handle fitted to instrument): | 0.5 kV to 5 kV<br>0.5 kV to 15 kV<br>0.5 kV to 30 kV |
| High voltage output accuracy: | ±5% or ±50 V below 1 kV |
| Measured current flow accuracy (sensitivity): | ±5% of full scale |
| Display resolution, voltage, measured: | 0.01 kV below 10 kV, 0.1 kV above 10 kV |
| Display resolution, voltage, set: | 0.05 kV below 1 kV, 0.1 kV above 1 kV |
| Display resolution, current, measured: | 1 µA |
| Display resolution, current, set: | 1 µA |
| Output current: | 99 µA maximum |
| Operating temperature: | 0°C to 50°C (32°F to 120°F) |
| Power supply: | Internal rechargeable lithium ion battery[a] |
| Battery charger fuse rating (if fitted): | 3 A |
| Battery life (typical): | 8/10 hours continuous use with/without backlight at 30 kV.<br>15/20 hours continuous use with/without backlight at 15 kV.<br>20/40 hours continuous use with/without backlight at 5 kV. |

| | |
|---|---|
| Instrument case: | High impact ABS |
| Dimensions of carry case: | 520 mm x 370 mm x 125 mm (20.5" x 14.5" x 5") |
| High voltage handle cable length (curly cable): | 1.5 m (5’) when stretched |
| Earth signal return cable length: | 10 m (32' 6") |
| Weight: | 2 kg (4.4 lb) (instrument, handle and connecting cable) |

a. Battery packs must be disposed of carefully to avoid environmental contamination. Please consult your local environmental authority for information on disposal in your region. Do not dispose of the battery pack in a fire.

Calibration certificates for the instrument and for the high voltage handles must be requested at the time of ordering the equipment.

## 20 RELATED EQUIPMENT

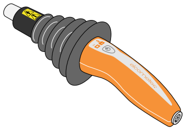
In addition to the Elcometer 266 DC Holiday Detector, Elcometer produces a wide range of other equipment for testing and measuring the characteristics of coatings. Users of the Elcometer 266 DC Holiday Detector may also benefit from the following Elcometer products:

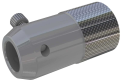
- Elcometer 270 Pinhole Detector
- Elcometer Inspection Kits
- Elcometer Inspection Manuals

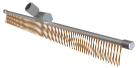
For further information contact Elcometer, your Elcometer supplier or visit www.elcometer.com

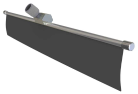
# 21 SPARES AND ACCESSORIES

The following spare parts and optional accessories are available from Elcometer, or your Elcometer supplier. To place an order please quote the sales part number which follows the description of each accessory:

| Description | Complete assembly | Spare brush/ strip/spring only | |
|---|---|---|---|
| High Voltage Handle, 0.5 kV to 5 kV | T26620033-1 | - |  |
| High Voltage Handle, 0.5 kV to 15 kV | T26620033-2 | - | |
| High Voltage Handle, 0.5 kV to 30 kV | T26620033-3 | - | |
| Curly Cable - connects high voltage handle to the instrument | T26619893 | - | |
| Earth Signal Return Cable, 10 m | T99916996 | - | |
| Rechargeable Battery Pack | T26619950 | - | |
| Extension Rod, 0.5 m | T26619988-1 | - |  |
| Extension Rod, 1 m | T26619988-2 | - | |

| Description | Complete assembly | Spare brush/ strip/spring only | |
|---|---|---|---|
| Elcometer models 236 and 136 to 266 Adaptor (connects your existing Elcometer 236 and Elcometer 136 probes to an Elcometer 266) | T26620082 | - |  |
| Models 780, 785, 790, P20, P40 and P60 to Elcometer 266 Adaptor | T26620083 | - |  |
| Models AP, APS, AP/S1, AP/S2, AP/W,10/20, 14/20, 10, 20 and 20S to Elcometer 266 Adaptor | T26620084 | - |  |
| Models PHD1-20 and PHD2-40 to Elcometer 266 Adaptor | T26620252 | - |  |

| Description | Complete assembly | Spare brush/ strip/spring only | |
|---|---|---|---|
| Second hand grip - enables probe to be supported safely during use by both hands - see “The second hand grip” on page 39 | T26620081 | - |  |
| Band Brush Probe (the ‘standard’ probe included with your Elcometer 266) | T26619975 | - |  |
| Wire Brush Probe, 250mm (wire brush probes are most suitable for large relatively flat surface areas) | T26620022-1 | T99926621 |  |
| Wire Brush Probe, 500mm | T26620022-2 | T99926622 | |
| Wire Brush Probe, 1000m | T26620022-3 | T99926623 | |

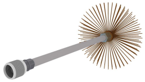
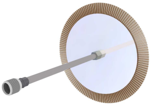
| Description | Complete assembly | Spare brush/ strip/spring only | |
|---|---|---|---|
| Rubber Probe, 250mm<br>(rubber probes are most suitable for large relatively flat surface areas where light contact with the surface is required) | T26620022-11 | T99926731 |  |
| Rubber Probe, 500mm | T26620022-12 | T99926732 | |
| Rubber Probe,1000mm | T26620022-13 | T99926733 | |
| Rubber Probe,1400mm | T26620022-14 | T99926734 | |

| Description | Part Number | |
|---|---|---|
| Elcometer 266 Rolling Spring Holder | T26620086 |  |
| Select the required spring size from the list below | | |
| Rolling Spring Probe: OD 48-54mm; NPS 1.5; DN 40 | T99920438-15A | |
| Rolling Spring Probe: OD 54-60mm; NPS 1.5; DN 40 | T99920438-15B | |
| Rolling Spring Probe: OD 60-65mm; NPS 2; DN 50 | T99920438-20A | |
| Rolling Spring Probe: OD 66-73mm; NPS 2; DN 50 | T99920438-20B | |
| Rolling Spring Probe: OD 73-80mm; NPS 2.5; DN 65 | T99920438-25A | |
| Rolling Spring Probe: OD 73-80mm; NPS 2.5; DN 65 | T99920438-25A | |
| Rolling Spring Probe: OD 80-88mm; NPS 2.5; DN 65 | T99920438-25B | |

| Description | Part Number | |
|---|---|---|
| Rolling Spring Probe: OD 88-95mm; NPS 3; DN 80 | T99920438-30A | |
| Rolling Spring Probe: OD 95-100mm; NPS 3; DN 80 | T99920438-30B | |
| Rolling Spring Probe: OD 100-108mm; NPS 3.5; DN 90 | T99920438-35A | |
| Rolling Spring Probe: OD 108-114mm; NPS 3.5; DN 90 | T99920438-35B | |
| Rolling Spring Probe: OD 114-125mm; NPS 4; DN 100 | T99920438-40A | |
| Rolling Spring Probe: OD 125-136mm; NPS 4.5; DN 114 | T99920438-45A | |
| Rolling Spring Probe: OD 136-141mm; NPS 4.5; DN 114 | T99920438-45B | |
| Rolling Spring Probe: OD 141-155mm; NPS 5; DN 125 | T99920438-50A | |
| Rolling Spring Probe: OD 155-168mm; NPS 5; DN 125 | T99920438-50B | |
| Rolling Spring Probe: OD 168-180mm; NPS 6; DN 152 | T99920438-60A | |
| Rolling Spring Probe: OD 180-193mm; NPS 6; DN 152 | T99920438-60B | |
| Rolling Spring Probe: OD 193-213mm; NPS 7; DN 178 | T99920438-70A | |
| Rolling Spring Probe: OD 213-219mm; NPS 7; DN 178 | T99920438-70B | |
| Rolling Spring Probe: OD 219-240mm; NPS 8; DN 203 | T99920438-80A | |
| Rolling Spring Probe: OD 240-264mm; NPS 9; DN 229 | T99920438-90A | |
| Rolling Spring Probe: OD 264-290mm; NPS 10; DN 254 | T99920438-100A | |
| Rolling Spring Probe: OD 290-320mm; NPS 11; DN 279 | T99920438-110A | |

| Description | Part Number | |
|---|---|---|
| Rolling Spring Probe: OD 320-350mm; NPS 12; DN 305 | T99920438-120A | |
| Rolling Spring Probe: OD 350-375mm; NPS 14; DN 356 | T99920438-140A | |
| Rolling Spring Probe: OD 375-400mm; NPS 14; DN 356 | T99920438-140B | |
| Rolling Spring Probe: OD 400-435mm; NPS 16; DN 406 | T99920438-160A | |
| Rolling Spring Probe: OD 435-450mm; NPS 16; DN 406 | T99920438-160B | |
| Rolling Spring Probe: OD 450-500mm; NPS 18; DN 457 | T99920438-180A | |
| Rolling Spring Probe: OD 500-550mm; NPS 20; DN 508 | T99920438-200A | |
| Rolling Spring Probe: OD 550-600mm; NPS 22; DN 559 | T99920438-220A | |
| Rolling Spring Probe: OD 600-650mm; NPS 24; DN 610 | T99920438-240A | |
| Rolling Spring Probe: OD 650-700mm; NPS 26; DN 660 | T99920438-260A | |
| Rolling Spring Probe: OD 700-750mm; NPS 28; DN 711 | T99920438-280A | |
| Rolling Spring Probe: OD 750-810mm; NPS 30; DN 762 | T99920438-300A | |
| Rolling Spring Probe: OD 810-860mm; NPS 32; DN 813 | T99920438-320A | |
| Rolling Spring Probe: OD 860-910mm; NPS 34; DN 864 | T99920438-340A | |
| Rolling Spring Probe: OD 910-960mm; NPS 36; DN 914 | T99920438-360A | |
| Rolling Spring Probe: OD 960-1010mm; NPS 38; DN 965 | T99920438-380A | |
| Rolling Spring Probe: OD 1010-1060mm; NPS 40; DN 1016 | T99920438-400A | |

| Description | Part Number | |
|---|---|---|
| Rolling Spring Probe: OD 1060-1110mm; NPS 42; DN 1067 | T99920438-420A | |
| Rolling Spring Probe: OD 1110-1160mm; NPS 44; DN 1118 | T99920438-440A | |
| Rolling Spring Probe: OD 1160-1210mm; NPS 46; DN 1168 | T99920438-460A | |
| Rolling Spring Probe: OD 1210-1270mm; NPS 48; DN 1219 | T99920438-480A | |
| Rolling Spring Probe: OD 1270-1320mm; NPS 50; DN 1270 | T99920438-500A | |
| Rolling Spring Probe: OD 1320-1370mm; NPS 52; DN 1321 | T99920438-520A | |
| Rolling Spring Probe: OD 1370-1425mm; NPS 54; DN 1372 | T99920438-540A | |

| Description | Complete assembly | Spare brush/strip/ spring only | |
|---|---|---|---|
| Circular Brush Probe: 38mm (1.5")<br>(used to test internal surfaces of pipes) | T26620071-1 | T9993766- | |
| Circular Brush Probe: 51mm (2") | T26620071-2 | T9993767- |  |
| Circular Brush Probe: 64mm (2.5") | T26620071-3 | T9993768- | |
| Circular Brush Probe: 76mm (3") | T26620071-4 | T9993769- | |
| Circular Brush Probe: 89mm (3.5") | T26620071-5 | T9993770- | |
| Circular Brush Probe: 102mm (4") | T26620071-6 | T9993771- | |
| Circular Brush Probe: 114mm (4.5") | T26620071-7 | T9993772- | |
| Circular Brush Probe: 127mm (5") | T26620071-8 | T9993773- |  |
| Circular Brush Probe: 152mm (6") | T26620071-9 | T9993774- | |
| Circular Brush Probe: 203mm (8") | T26620071-10 | T9993775- | |
| Circular Brush Probe: 254mm (10") | T26620071-11 | T9993776- | |
| Circular Brush Probe: 305mm (12") | T26620071-12 | T9993777- | |

| Description | Complete assembly | Spare brush/strip/spring only |
|---|---|---|
| Rolling Spring Couplings, Set of 2 | T99915562A | - |
| Wrist Harness<br>(attaches to high voltage handle case) | T99916063 | - |