

# Digital Static Field Meter Operation and Maintenance



Made in America



Figure 1. Charleswater 99150 Digital Static Field Meter

## Description

The Charleswater Digital Static Field Meter is a high quality, portable non-contacting static fieldmeter which consistently produces accurate readings with ease and provides years of trouble-free operation.

The Digital Static Field Meter indicates surface voltage and polarity on objects up to  $\pm 19.99$  kV at a distance of 2.5 cm (1 inch) with an accuracy of  $\pm 5\%$  of the displayed value. It is chopper-stabilized for use under almost any conditions including ionised environments. The conductive case and ground snap facilitate grounding for accurate measurement. Also featured are a zero knob and a push-button hold function. A unique LED rangefinder system provides accurate positioning of the meter from the target.

Its accuracy is dependent upon three factors:

- Grounding of the meter via a ground cord or a grounded operator.
- The instrument must be properly zeroed.
- The distance from the front edge of the case to the target or surface under examination must be accurately defined.

“Periodic audits of facilities ...shall be undertaken by a nominated person or team using appropriate measuring equipment where required. A check shall be carried out on the adequacy and availability of records. (EN 61340-5-1 clause 10.1 Periodic audits)

“A check shall be carried out to ensure that discarded packaging and other materials that may be electrostatic generative, or not in compliance with the relevant parameters of clauses 5 and 7, are disposed of promptly in a way that does not put ESDS [ESD sensitive items] at risk.” (EN 61340-5-1 clause 10.10 Check of discarded packaging and other materials)

“A check shall be carried out to ensure that electrostatic fields are not greater than those specified in 5.3.5.” [10,000 v/M] (EN 61340-5-1 clause 10.11 Electrostatic fields)

## Packaging

- 1 Digital Static Field Meter
- 1 9V Alkaline Battery
- 1 Cord with 2.5mm Mono Plug
- 1 Certificate of Calibration

## Operation

### Controls

The Digital Static Field Meter has two switches, one for ON/OFF and one for HOLD/MEASURE plus ZERO adjust knob. The push button is two-position. Pressing the button puts it into the lower (MEASURE) position. Releasing the button places it in its upper (HOLD) position. The ZERO knob is turned to the left or right to change the zero setting of the display.

### Turning the Meter ON and OFF

Slide the switch to the ON position. The meter will turn on. To turn the meter OFF, slide the switch to the OFF position. The meter will now be off.

## Battery Check

After turning on power to the meter, check the display and make sure that the low battery symbol is NOT lit. If the battery symbol appears, replace the battery (see page 2).

## Zero the Meter

Turn on the meter with the ON/OFF slide switch. Press the push button down so that it is in the lower or MEASURE position. Place the meter 2.5 cm (1 inch) from a GROUNDED metal surface. The red bullseye (ranging lights) should be in focus on the surface and the meter should read “0.00”. If the display does not read “0.00”, adjust the ZERO knob until the display reads “0.00”.

## Making a Measurement

Place the meter 2.5 cm (1 inch) from the object to be measured. This distance is measured from the front edge of the meter case to the surface of the object. The meter now displays a reading (from 0 to  $\pm 19.99$ ) of the electrostatic field in kilovolts per 2.5 cm (1 inch).

**NOTE:** In the MEASURE position, the RANGING LIGHTS are on. These lights are provided to help place the meter at the correct distance from the object. The lights are set to produce a concentric RED BULLSEYE pattern on a flat opaque surface 2.5 cm (1 inch) from the front edge of the meter. This can be practiced by aiming the meter at a sheet of white paper.

If the numeral “1” appears on the left side of the display, the meter’s range of 20 kV per 2.5 cm (1 inch) has been exceeded. When this occurs, move the meter farther away from the object and multiply the reading by the distance (per 2.5 cm) away from the object being measured (as shown in the figure). The measurement accuracy is dependent on a stable ground reference and the 2.5 cm (1 inch) measuring distance. It is also dependent on the “aspect ratio”, relating the size of the object to be measured to the measurement distance.

**NOTE:** This aspect ratio should be at least 3 for best accuracy, i.e. the object should be at least a 3" square when measuring at a 1" distance. Accurate measurements may be made at other measurement distances by scaling the meter range and observing the proper aspect ratio. For example, at a measurement distance of 3", multiply the meter reading by 3 to give a range of 0 to 60 kilovolts. For accuracy, the object being measured at this distance should be at least a 9" square.

### Holding Last Reading

With the meter positioned 2.5 cm (1 inch) from the object being measured, press the MEASURE/HOLD pushbutton so that it releases to the upper or HOLD position. This will freeze the reading from the object on the display and allows the operator to move the meter where it may be more easily read, or saved for later reference. In the HOLD position the red LED will illuminate. The analog output signal is also held.

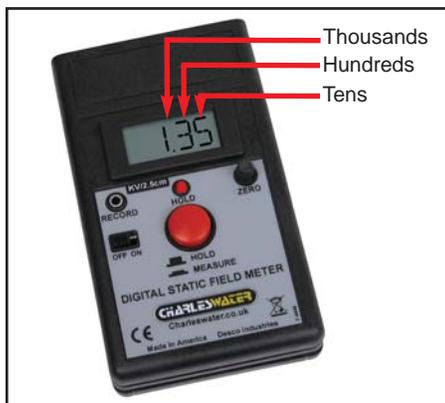


Figure 2. Reading the Digital Static Fieldmeter

**NOTE:** In the HOLD position, the bullseye (ranging lights) will be off. When the push button is returned to the MEASURE position, the bullseye will light.

### Analog Output

The "RECORD" output jack located on the face of the unit accepts a standard 2.5mm monaural phone plug and is provided so the output of the Digital Static Field Meter may be connected to an oscilloscope, strip chart recorder, external meter or other device. Use the included cord to achieve a connection between the field meter and alternate measuring instrument.  $\pm 10$  mV at this jack corresponds to  $\pm 1$  kV.

### Battery Replacement

The Digital Static Field Meter operates from a standard 9 VDC alkaline battery. Battery life is in excess of 30 hours under normal use. When the battery voltage drops below 6.7 volts, a battery symbol will appear in the display. To change the battery, slide the battery cover down at the back of the meter and remove the battery from the battery clip. Replace the battery with a fresh one and reinstall the battery cover. The battery should be removed from the meter if it is to be stored for an extended period of time.

### Maintenance

The Digital Static Field Meter is factory calibrated and no maintenance is required. If for any reason you believe the meter is not working correctly, please contact Charleswater Customer Service. **CAUTION** - There are no user serviceable parts. Any unauthorized service will void the warranty and result in additional repair charges.

### Specifications

#### Display:

3.5 digits, 9.5mm digit height LCD

#### Response:

<1 sec., 10% to 90% equivalent to 5Hz output

#### Range:

$\pm 0.00$  to  $\pm 19.99$  kV/25mm (kV/inch)

#### Accuracy:

$\pm 5\%$  of displayed value

#### Environment:

0 - 50°C at 85% RH  
(non-condensing)

#### Analog Output:

2.5mm phone jack/plug  
 $\pm 10$  mV corresponds to  $\pm 1$  kV

#### Power:

9 VDC alkaline battery  
Battery life in excess of 30 hours

#### Size:

6.1cm x 10.6cm x 3.3cm

#### Weight:

141g (with battery)

### Ionization Test Kit Accessories

Charleswater offers accessories for the Digital Static Field Meter designed to facilitate routine auditing and periodic testing of ionization equipment (Ref: ESD SP3.3). The meter and accessories combination can be used to test an ionizer's overall performance. This highly portable test kit allows the user to make quick and accurate balance level and neutralization efficiency measurements. These accessories are available as Charleswater item# 99151 Test Kit Upgrade which includes the Conductive Plate and Charger.



Figure 3. Installing the 99153 Conductive Plate



Figure 4. Auditing ionization equipment with the Digital Static Field Meter and Conductive Plate

### Personal HBM Test Fixture (Charleswater Item# 99083)

(Requires the 99153 Conductive Plate to be installed first)

The Charleswater 99083 Personal HBM Test Fixture turns your model 99150 Digital Field Meter into a Human Body Model tribo-electric charging tester. This kit will allow you to measure electrical charges generated on the

human body while walking or moving across an insulative or conductive surface. It has been specially designed to measure static charges produced by walking across substrates such as carpeting, vinyl floor tile, and sealed concrete. It can also be used to detect charge generation on surfaces such as conductive or dissipative floor tiles and carpeting. An ESD technician may also use this tool to verify proper grounding between a conductive or dissipative floor surface and a person wearing personal grounding devices such as foot grounders. The amount (or size) of the charge generated will vary from one human body to another. Other factors such as humidity, contamination between the foot and flooring surface, as well as human body capacitance will also affect the amount of charge generated.

### Installation and Removal

If the fixture needs to be removed to allow use of the Field Meter alone, see Figure 5.

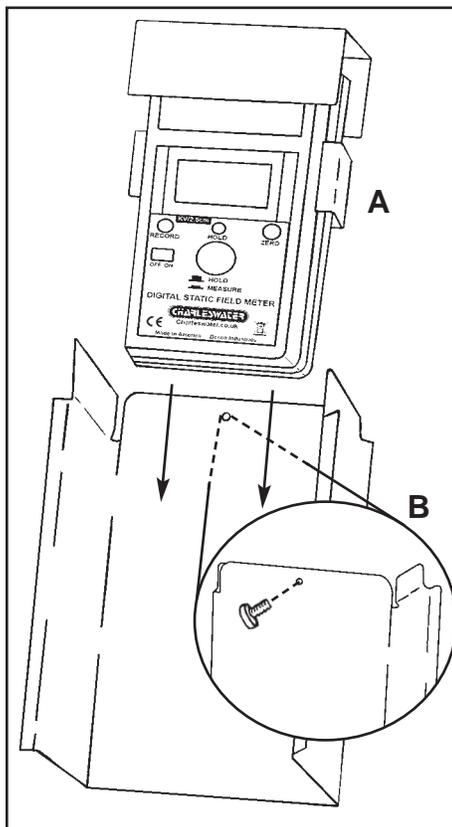


Figure 5. Installing the 99083 Personal HBM Test Fixture on the Digital Static Fieldmeter with Conductive Plate

**A:** Slide the Digital Static Field Meter down into the Personal HBM Test Fixture. **NOTE:** The Conductive Plate is required to use the Personal HBM Test Fixture.

**B:** Insert the screw from the back of the Personal HBM Test Fixture.

To obtain the desired result, a ground cord must be installed onto the Field Meter and attached to a utility or common ground point.

### Method of Operation

In order to obtain the desired test results, the meter must be properly grounded as stated in the Installation and Removal section. Once installed on the Field Meter, the Test Fixture itself is isolated from the meter case and ground and should remain that way.

Cradle the Test Fixture in the palm of your hand. Once the meter is grounded and you are standing on the substrate to be tested, simply walk around, shuffle your feet or raise a foot, to determine if the combination of footwear and substrate produces an electrical charge. If an electrical charge is generated and induced onto the human body, the Test Fixture will transfer that charge onto the Field Meter, and the amount of the charge will be registered. If it is necessary to record the amount of charge, you can save the result by simply pressing the Hold button on the front of the Field Meter, and pressing the button with an insulated object. This test can be done regardless of the type of footwear or substrate combination. Other items in your ESD Control Program may also be tested such as conductive or dissipative chairs. Simply sit in the chair on the desired substrate and move the chair back and forth to determine if the chair and human body combination produces an electrical charge.

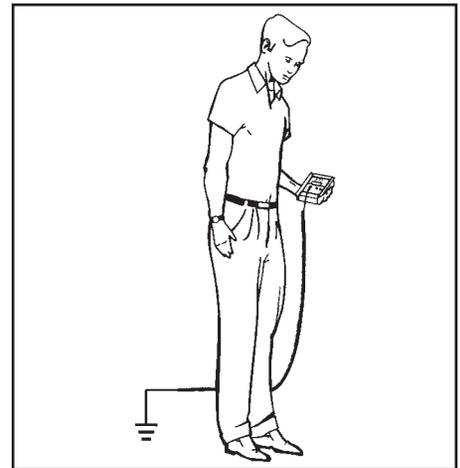


Figure 6. Using the Personal HBM Test Fixture to measure charges on the body

### Limited Warranty

Charleswater expressly warrants that for a period of one (1) year from the date of purchase, Charleswater Digital Static Field Meters will be free of defects in material (parts). Within the warranty period, the material will be tested, repaired or replaced at Charleswater's option, free of charge. Call Customer Service at 00 44 (0) 1892-665313 for a Return Material Authorisation (RMA) and for proper shipping instructions and address. You should include a copy of your original packing slip, invoice, or other proof of purchase date. Any unit under warranty should be shipped prepaid to the Charleswater factory. Warranty replacements will take approximately two weeks.

### Warranty Exclusions

THE FOREGOING EXPRESS WARRANTY IS MADE IN LIEU OF ALL OTHER PRODUCT WARRANTIES, EXPRESSED AND IMPLIED, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE WHICH ARE SPECIFICALLY DISCLAIMED. The express warranty will not apply to defects or damage due to accidents, neglect, misuse, alterations, operator error, or failure to properly maintain, clean or repair products.

### Limit of Liability

In no event will Charleswater or any seller be responsible or liable for any injury, loss or damage, direct or consequential, arising out of the use of or the inability to use the product. Before using, users shall determine the suitability of the product for their intended use, and users assume all risk and liability whatsoever in connection therewith.