

# FIELDSCOUT®

## EC 110 Meter

### DATA LOGGER MANUAL

Item # 2220



***Spectrum***  
***Technologies, Inc.***

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This manual will familiarize you with the features and operation of your new data logging EC 110 meter. Please read this manual thoroughly before using your instrument. For customer support, or to place an order, call Spectrum Technologies, Inc.

(800)248-8873 or (815) 436-4440  
between 7:30 am and 5:30 p.m. CST,  
FAX (815)436-4460,  
e-mail: [specmeters.com](mailto:specmeters.com).  
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# GENERAL OVERVIEW

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Thank you for purchasing the data logging EC 110 meter from Spectrum Technologies, Inc. This user's guide deals with the features that are unique to the data logging EC 110 meter. Information on general meter operation is contained in the accompanying Instruction manual.

The integrated data logger allows the user to easily collect field data with the EC 110 meter. The logger can be used with or without GPS/DGPS. After data has been collected, it is transferred to a PC using the included software. The data is in ASCII text file format and can be exported into mapping software or popular spreadsheet software for analysis.

**Caution: Avoid touching the tip of probe as this can affect the accuracy of the readings (see p. 13)**

NOTE: THIS BOOKLET CONTAINS INSTRUCTIONS ON OPERATING THE DATALOGGER AND MAINTAINING THE DIRECT-INSERT PROBE. INFORMATION REGARDING THE METER'S GENERAL OPERATION, CALIBRATION PROCEDURE, AND DESCRIPTIONS OF ERROR MESSAGES ARE DETAILED IN THE ACCOMPANYING MANUAL.

# DATA LOGGER OPERATION

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The data logger has two modes of operation: **Communication** and **Measurement**. These modes are indicated by the green LED in the lower left corner of the meter. When this light is flashing, the meter is in **Communication** mode. When the light glows steadily, the meter is in **Measurement** mode.

## Communication Mode

When the meter is turned on, it will be in **Communication** mode for approximately 10 seconds. While in this mode, the green LED will flash. It is only in this mode that a user can initiate a logger communication (download or reconfiguration). If communication between the logger and software is attempted during this 10-second period, the logger will remain in **Communication** mode indefinitely. The meter must be turned off and then on to change to **Measurement** mode (see following section).

## Measurement Mode

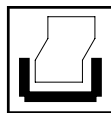
Approximately 10 seconds after turning on the meter, the LED light will glow steadily. This indicates the logger is in **Measurement** mode. In this mode, you can calibrate the meter and record data. When you are finished collecting data, the meter must be put into **Communication** mode by turning it off and back on (see previous section). If you are collecting data from several sites and need to turn off the meter between data collection sessions, wait until the meter transitions from **Communication** to **Measurement** mode after turning the meter back on.

## Calibration

The procedure for calibrating the meter is given in the accompanying meter instruction manual.

## Taking and Data Logging Measurements

When the probe is inserted in soil or water, the meter's LCD will immediately begin indicating the EC. When this value stabilizes, the meter locks on to that value and the LCD will display READY in the upper right corner. To capture this value with the data logger, press the **HOLD/ENTER** button followed by the **Print** button. The **Print** button is on the lower right corner of the keypad next to the **Range** button.

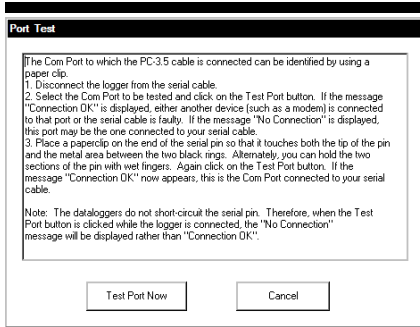


The LED also indicates whether the data logger is receiving the GPS signal. See **GPS Connection** (p. 11) for more details.

### Measuring Range

The meter has 5 EC measuring ranges (listed in section 4.1 of the accompanying meter instruction manual). When using the 2.76 mS/cm calibrating solution, the meter should, ideally, be in range r4. However, the range the meter is using is not generally visible on the LCD. Pressing the **Range** button allows the user to manually select a different range. When the **Range** button is pressed, the meter will transition to the next range which will briefly be displayed on the LCD in place of the temperature. When initially inserted into a sample, the meter will transition to the most appropriate range.

# IDENTIFYING THE CORRECT COM PORT

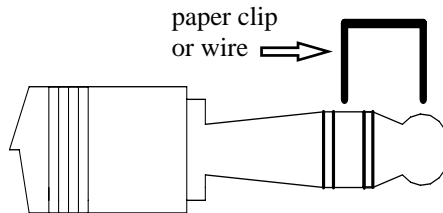


The computer **Communications Port** to which the cable is connected can be identified by using a paper clip.

1. Disconnect the serial cable from the meter.

2. To bring up the **Port Selection** screen, click on the **Com Port** Button, select the com port to be tested and click the **Port Test** button. Click the **Test Port Now** button. If the message "Connection OK" is displayed, another device (such as a modem) is probably connected to that port. If the message "No Connection" is displayed, this port may be the one connected to your serial cable and you can proceed to the next step.

3. Place a paperclip on the end of the serial pin so that it touches both the tip of the pin and the metal area between the two black rings. Again click on the **Test Port Now** button. If the message "Connection OK" now appears, this is the com port connected to your serial cable.



**NOTE:** The meter does not short-circuit the serial pin. Therefore, when the **Test Port Now** button is clicked while the meter is connected, the "No Connection" message will be displayed.

# CONNECTING TO A PC

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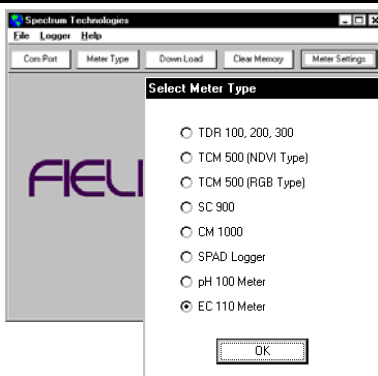
The EC 110 Meter software comes with a black PC interface cable. This cable connects to the USB port of your computer and to the meter's computer port. The meter's configuration can be modified by clicking on the **Meter Settings** button (see **Meter Settings**, p. 8). The **Com Port, Meter Type, Download, Clear Memory** and **Meter Settings** buttons are explained in the **Logger Software** section (p. 8).

**Note:** Prior to 2014, the meter was shipped with a gray cable that connected to a 9-pin serial port. This cable will still work but may require a USB-to-serial adapter.

# LOGGER SOFTWARE

## Meter Type

The Field Scout software supports all of Spectrum Technologies' portable data logging meters. Be sure to select the EC 110 Meter from the **Select Meter Type** screen



## Meter Settings

Clicking on this button will bring up the **Meter Settings** screen. This screen allows you to configure the data logger. The **Meter Name** will be the title on the first line of the downloaded files.

If the box below the logger name field is checked, the logger will store GPS data only if it has been differentially corrected. If the differential correction is not found, only the pH reading will be stored in the data file. A time zone correction should be entered in the last box.

**Meter Settings**

Meter Info:

Serial #: 9      Model #: 200      Firmware Version: 1.0

Meter Name: Wanjiru  
(Max Length = 32 Characters)

Logger Settings:

Set Meter to Record Only GPS Readings with Differential Correction

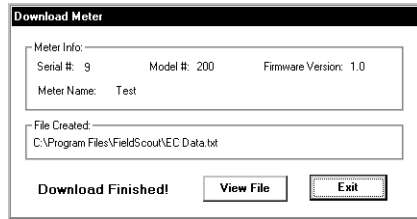
5 Enter Time Zone Correction Number (i.e. 5 for USA Central Time Zone)

Save      Cancel



## Download

After clicking the **Download** button, a progress bar will confirm that data is being extracted from the logger. When completed, the **Save Data As** box will appear. From here you can give the data file a descriptive name and select a folder in which to save it. The folder selection field on the right allows you to browse to any folder in your system.



When the file has been saved, the software will give you the option of immediately viewing the file. The data file is stored as a comma-delimited text file and may be viewed in any text editor or spreadsheet software.

## Clear Memory

Data is not automatically removed from the logger memory after a download. The **Clear Memory** button clears all data from the memory.

# DATA FILES

	A	B	C	D	E	F
1	Name:	Test				
2	Serial #:	9				
3	Datum:	WGS 84				
4	Longitude	Latitude	Number	EC	Type	Temp
5			Logger Started: 17:59:05			
6	-96.65594	33.04899	N=1	1295	uS	23.4
7	-96.65594	33.04900	N=2	1105	uS	23.5
8	-96.65595	33.04901	N=3	1113	uS	23.5
9	-96.65596	33.04902	N=4	1425	uS	23.5
10	-96.65596	33.04903	N=5	1270	uS	23.5
11			Logger Started			
12			N=1	1.10	mS	23.2
13			N=2	1.42	mS	23.1
14			N=3	1.86	mS	23
15						

*Sample data showing results of data collected with and without GPS activated. Note: GPS signal not found when recording data in lines 12 through 14.*

The data is stored in comma-delimited text files. These files can be opened with text-editing software (e.g. Microsoft Word) or spreadsheet software (e.g. Excel).

The first two lines of the data file give the logger's name and serial number. The third line indicates that latitude and longitude are referenced to the 1984 World Geodetic Survey datum. The fourth line shows the column headings for the rest of the data file.

Logging sessions are started and completed by turning the meter on and off. The start of a logging session is indicated by the data line "Logger Started." If a GPS signal was found at the start of a logger session, a time stamp is included on the "Logger Started" line.

The data is separated into 6 fields: Latitude and Longitude (blank if a GPS unit was not connected), sample number, EC value, EC units, and temperature. Possible measurement units for EC are  $\mu\text{S}/\text{cm}$ ,  $\text{mS}/\text{cm}$  or ppm. The units of temperature match what has been selected on the meter.

# GPS CONNECTION

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## Cable Connections

A GPS/DGPS cable (item # 2950CV5) is required to connect the EC 110 meter to a GPS unit. This cable has a 9-pin male connection and a stereo pin that connects to the meter's data port. You will also need a cable that allows the GPS unit to connect to a 9-pin male serial port. If this cable doesn't come standard with your GPS unit, it should be available from the manufacturer. This cable is generally used to upload information from a computer to the GPS unit. These components should be connected as shown in the figure below.

## GPS Setting

Your GPS unit must be set for NMEA 0183 input/output messages. If the meter has trouble receiving the GPS signal, check that it has the following settings:

Data bits: 8

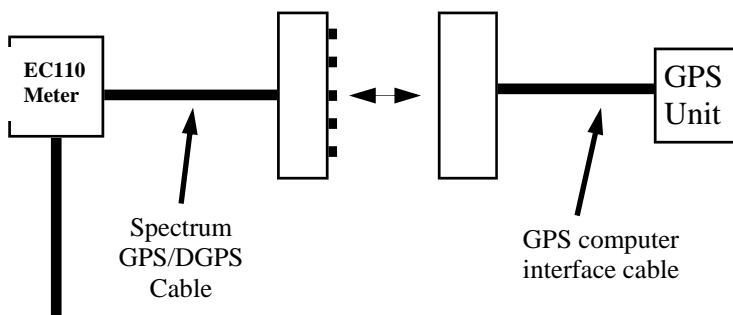
Stop bits: 1

Baud rate: 4800 bps

Parity: None

Timing: 1 second

GGA data string



### **Initial GPS connect**

If the meter does NOT detect an incoming GPS signal, it will flash steadily for 10 seconds and then glow steadily once it gets into **Measurement** mode. If it does detect the GPS signal (satellites found etc.), it gives a series of 3 rapid flashes before going to the steady glow for **Measurement** mode. If a GPS signal is not found during power-up, the meter will not search for it when taking readings and no geo-referenced data will be collected during that sampling session. If the meter is turned off and back on, it will again search for the GPS signal. Be sure the meter is in **Measurement** mode (see p. 4) before taking any readings.

### **Taking measurements**

If the meter did NOT detect the GPS initially, once in **Measurement** mode, the LED will go off and on very quickly when a measurement is taken.

If it did detect the GPS signal initially, once in **Measurement** mode, it will look for the GPS signal at the time of every measurement. There are two possibilities:

1. If it sees the GPS signal at the time of measurement, the LED will go off for a noticeably longer time and then come back on as a steady glow. Latitude and longitude values will be added to the data file. The meter is again ready to take a reading when the LED returns to a steady glow.
2. If it does NOT see the GPS signal at the time of measurement (signal lost, batteries die, cable gets pulled out), the LED will flash briefly and then come back on as a steady glow .

**Tip: If you have your GPS unit set properly and have checked the connection but still are not getting geo-referenced data, uncheck the box requiring the digital correction in Meter Settings (pp. 8 - 9) .**

# DIRECT-INSERT PROBE

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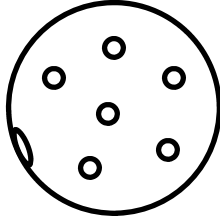


Figure 1. Orientation of pins on probe/meter interface

## Connecting the Probe

The female connector for the direct-insert probe pushes straight onto the 6-pin male socket on the digital reader (see fig. 1). When inserting the probe, rotate the plug to align the notch on the probe with the guide on the inner wall of the socket. Secure the plug by rotating the locking ring until it is snug.



Figure 2. Probe sensor tip

## Probe Maintenance

The EC value measured by the sensor is highly sensitive to surface contamination, especially from skin oil. Therefore, the probe tip (see fig. 2) should be cleaned regularly with rubbing alcohol to ensure accurate conductivity measurements.

# SERVICE AND SUPPORT

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In the unlikely event that you have a problem with the hardware or software, please read the following.

## **Who do I contact?**

**Contact the company that you bought the loggers from: Spectrum Technologies, Inc. or a Spectrum Authorized Dealer.**

Before calling, you can evaluate and often solve your problem if you try the following.

1. Read this manual. It may only take a few moments to get the answer you need.
2. Write down the events that led to the problem. Have you changed anything in your computer recently? Are you doing anything differently?

**When Contacting Spectrum Technologies, Inc.** please indicate that you need Technical Support. Be prepared to:

1. Provide details on the hardware and software configuration of your computer including: manufacturer, model number, peripherals, and versions of the operating system.
2. Completely describe the problem. The more information you provide, the faster and more accurately we will be able to respond.

# SPECIFICATIONS

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**Measurement Capacity:**

- 1,080 data points without GPS
- 648 data points with GPS

**Operating Environment:**

- Weather Resistant

**Power:**

- 4 x AAA batteries
- Provides 40 hours of logging

**Software Requirements:**

- Windows 95 or higher
- Field Scout Software v. 3.4 or higher (included)

# WARRANTY

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This product is warranted to be free from defects in material or workmanship for one year from the date of purchase. During the warranty period Spectrum will, at its option, either repair or replace products that prove to be defective. This warranty does not cover damage due to improper installation or use, lightning, negligence, accident, or unauthorized modifications, or to incidental or consequential damages beyond the Spectrum product. Before returning a failed unit, you must obtain a Returned Materials Authorization (RMA) from Spectrum. Spectrum is not responsible for any package that is returned without a valid RMA number or for the loss of the package by any shipping company.



This equipment has been manufactured for  
Spectrum Technologies, Inc.  
3600 Thayer Court  
Aurora, IL 60504 USA

The Manufacturer's **DECLARATION OF CONFORMITY** is on file at the above address, and certifies conformity to the following:

Model Number: 2220  
Description: Data Logging Electrical Conductivity Meter  
Type: Electrical Equipment for Measurement, Control, and Laboratory Use  
Directive: 89/336/EEC  
Standards: EN 61326 (1997)  
EN 55022  
EN 61000-4-2/-3

The meter also contains an add-on data logger that has been installed in other products that have received CE certification.

Douglas L. Kieffer,  
Soil/Water Products Manager

March 4, 2009

# ***Spectrum<sup>®</sup>*** ***Technologies, Inc.***

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