HI-4413
Fiber Optic RS-232 Interface
with ProbeView™ 3600

User Manual

ETS·LINDGREN™
An ESCO Technologies Company

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Revision Record

MANUAL, HI-4413 w/PROBEVIEW 3600 | Part #H-600102, Rev. A

Revision	Description	Date
A	Initial Release	July, 2007

Internet Address
http://www.ETS-Lindgren.com

USA	**Finland**
1301 Arrow Point Drive Cedar Park, TX 78613 USA Tel: +1.512.531.6400 Fax: +1.512.531.6500 Email: support@ETS-Lindgren.com	Mekaanikontie 1, 27510 Eura, Finland Tel: +358.2.838.330 Fax: +358.2.865.1233 Email: info@ETS-Lindgren.eu.com
Japan	**China**
4-2-6, Kohinata Bunkyo-ku, Tokyo 112-0006 Japan Tel: +81.3.3813.7100 Fax: +81.3.3813.8068 Email: info@ETS-Lindgren.co.jp	B507A Technology Fortune Ctr No. 8 Xue Qing Road Haidian District Beijing Postcode: 100083 China Tel: +86.010.827.30877 Fax: +86.010.827.55307 Email: info@ETS-Lindgren.net

Safety Information and Notices

Safety Symbol Definitions

This product and related documentation must be reviewed for familiarization with safety markings and instructions prior to operation.

Safety Symbol	Definition
⚠ OR ⚠	**Refer to Manual**: When product is marked with this symbol, refer to the instruction manual for additional information.

General Safety Considerations

Safety Symbol	Definition
	CONTACT ETS-LINDGREN PRIOR TO SERVICING. Servicing (or modifying) the unit by yourself may void your warranty. If you attempt to service the unit by yourself, disconnect all electrical power before starting. There are voltages at many points in the instrument that could, if contacted, cause personal injury. Only trained service personnel should perform adjustments and/or service procedures upon this instrument. Capacitors inside this instrument may still be CHARGED even when instrument is disconnected from its power source.
	ONLY QUALIFIED PERSONNEL should operate or service this equipment.

Safety Symbol	Definition
	When disconnecting the fiber optic cables, apply the included dust caps to the ends to maintain their integrity. When re-connecting the fiber optic cables, clean the tips with the cleaning tape provided. Prior to re-connecting the in-line connectors, use moisture-free compressed air to clean them. Failure to perform these tasks may result in damage to the fiber optic cable.

Waste Electrical and Electronic Equipment (WEEE) Directive

	(European Union) At end of useful life, this product should be deposited at an appropriate waste disposal facility for recycling and disposal. Do not dispose of with household waste.

Table of Contents

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1.0 Introduction

The HI-4413 Fiber Optic RS-232 Interface and ProbeView™ 3600 software provide extensive data gathering and display options for use with the HI-3603 VLF Survey Meter or HI-3604 ELF Survey Meter. ProbeView 3600 provides real-time display, logging, and analysis of probe data. It displays a variety of test information, both numerically and graphically.

Required Components

The following components are required to install and operate the HI-4413 with ProbeView 3600 software:

- HI-4413 Fiber Optic RS-232 Interface

- Fiber optic cable (part number 491106-*xx*, where *xx*=length in meters)

- Power supply (part number H-30BB-333D)

- *ProbeView™ 3600*—Download ProbeView 3600 software from the ETS-Lindgren website, www.ets-lindgren.com. From the home page, click **Downloads**.

- Personal computer with Microsoft® Windows® operating system (XP, 2000, 98, or 95) and one available serial port.

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2.0   Receiving Your Order

Unpacking and Acceptance

Step 1. Upon delivery of your order, inspect the shipping container(s) for evidence of damage. Record any damage on the delivery receipt before signing it. In case of concealed damage or loss, retain the packing materials for inspection by the carrier.

Step 2. Remove the product from its shipping container(s). Save the container(s) and any protective packing materials for future use.

Step 3. Check all materials against the packing list to verify that the equipment you received matches what was ordered. If you find any discrepancies, note them and call ETS-Lindgren Customer Service for further instructions.

Make sure you are satisfied with the contents and condition of your order prior to placing the product into service.

Service Procedures

To return a system or system component for service:

Step 1. Contact ETS-Lindgren Customer Service to obtain a Service Request Order (SRO).

Step 2. Briefly describe the problem in writing. Give details regarding the observed symptom(s) or error codes, and whether the problem is constant or intermittent in nature. Please include the date(s), the service representative you spoke with, and the nature of the conversation. Include the serial number of the item being returned.

Step 3. Package the system or component carefully. If possible, use the original packing materials to return a system or system component to ETS-Lindgren at the following address:

ETS-Lindgren
Attn: Service Department
1301 Arrow Point Drive
Cedar Park, TX, USA 78613
Phone: +1.512.531.6400
Customer Service: +1.512.531.6498
www.ets-lindgren.com

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3.0   Maintenance

Maintenance is limited to external components such as cables or connectors.

If you have any questions concerning maintenance, contact ETS-Lindgren Customer Service.

Maintenance of Fiber Optics

Fiber optic connectors and cables can be damaged from airborne particles, humidity and moisture, oils from the human body, and debris from the connectors they plug into. Always handle connectors and cables with care, using the following guidelines.

Before performing any maintenance, disconnect the fiber optic cables from the unit and turn off power.

When disconnecting fiber optic cables, apply the included dust caps to the ends to maintain their integrity.

Before connecting fiber optic cables, clean the connector tips and in-line connectors.

Before attaching in-line connectors, clean them with moisture-free compressed air.

Failure to perform these tasks may result in damage to the fiber optic connectors or cables.

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4.0   Getting Started

Install ProbeView 3600

See *Required Components* on page 7 for a list of hardware and software required to install and operate ProbeView™ 3600.

The following installation instructions are intended for use with Microsoft® Windows® operating system (XP, 2000, 98, or 95).

1. Download ProbeView 3600 software from the ETS-Lindgren website, www.ets-lindgren.com. From the home page, click **Downloads**.

2. To begin the installation program, click **setup.exe**. ProbeView 3600 installs in **C:\Program Files\ProbeView 3600**.

Connect Components

Connect white-to-white, and yellow-to-yellow
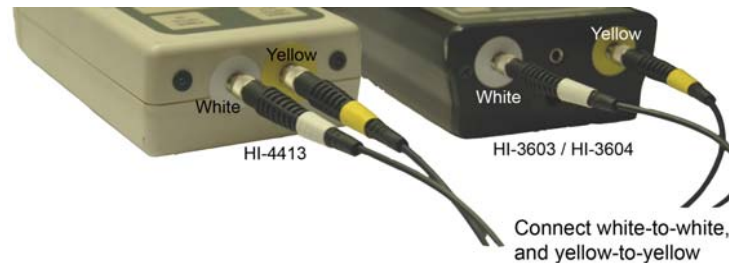
1. Connect the power supply to an AC outlet, making sure that the voltage selector switch is set to the correct line voltage.

2. Plug the power supply jack into the power connector on the HI-4413.

3. Plug the fiber optic cables from the HI-3603 VLF Survey Meter or HI-3604 ELF Survey Meter into the HI-4413, connecting white-to-white and yellow-to-yellow.

4. Connect the serial cable to the HI-4413, and then plug the other end into the RS-232 port on the computer (communication port 1, 2, 3, 4, or 5).

5. Turn on the HI-3603/HI-3604 survey meter.

6. Start ProbeView 3600. Click **Start**, **All Programs**, **ProbeView**, and then click **ProbeView 3600**.

7. The first time ProbeView 3600 is launched an option box displays to allow selection of a communication port. Select the port number where the HI-4413 was connected in step 4.

To choose a different port after the initial selection, select the **Communications** pull-down menu after ProbeView 3600 starts. For more information, see page 27.

8. ProbeView 3600 will look for a probe until one is detected, and then performs testing to determine the type of probe that is connected.

If the HI-4413 is connected to the selected communication port, the LEDs on the HI-4413 will flash. Only one flashing LED indicates the communication port is working correctly but the connected probe is not responding.

5.0   HI-4413 with HI-3603 / HI-3604

This section provides the commands, protocol, and format required to write a program for the remote operation of the HI-3603 VLF Survey Meter or HI-3604 ELF Survey Meter with the HI-4413 Fiber Optic RS-232 Interface.

→   The HI-4413 must be properly connected to the computer and the HI-3603/HI-3604 survey meter. Use an ETS-Lindgren DB-9 cable (part number H-2239615) and fiber optic cable (part number H-491003-04), or substitute cables verified to work properly. For information on connecting the hardware, see *Connect Components* on page 13.

Command Set

Command	Description
BT	**Battery voltage—**Displays the battery voltage. This command works similarly to the **MX** command. The termination of the protocol is delayed two seconds. See protocol 4 in *Communication Protocols* on page 17.
CL	**Clear Log—**Clears the logged data points. This command requires a delay of three seconds between the **CL** and **KR** commands. See protocol 4 in *Communication Protocols* on page 17. This simulates holding the clear switch through the fail-safe time.
DD	**Display—**Changes the significant digits of the display from three to four. The display uses zero suppression. For example, there may be four significant digits, but only three digits display. This occurs when the number is less than 1000.
EH	**E-/H-field switch—**Switches between E-field and H-field measurements.
KR	**Key Release—**Simulates the release of a key on the remote control device. This command is embedded in the protocols listed in *Communication Protocols* on page 17.

Command	Description
LG	**Log**—Logs a data point. RDG1 of protocol 5 in *Communication Protocols* on page 17 is the memory location where the data is logged. This number is displayed for one second and then the data appears in RDG2, resulting in an approximate one-second delay between RDG1 and RDG2.
MX	**Max**—Displays the maximum reading observed since the last max display. The max reading is displayed for two seconds before switching back to the normal display. The *C* returned by the HI-3603/HI-3604 survey meter will be delayed by that amount of time.
NS	**Number of samples**—Returns the number of data points that have been logged. This makes reading the log buffer easier.
NX	**Next**—Displays the next data point. This command works similarly to the **LG** command. See the **LG** command and protocol 5 in *Communication Protocols* on page 17.
PR	**Previous**—Displays the previous data point. This command works similarly to the **LG** command. See the **LG** command and protocol 5 in *Communication Protocols* on page 17.
RD	**Read**—The read command causes the HI-3603/HI-3604 survey meter to return its preset reading. See *Data Format* on page 19 for format of data returned.

Command	Description
SC	**Scale**—Changes scales on the HI-3603/HI-3604 survey meter. To return to autorange, the sending of the key release command must be delayed by three seconds. This performs the same as pressing the scale button on the HI-3603/HI-3604 survey meter to return to autorange.
SP	**Sample pointer reset**—Resets the pointer used in the **PR** and **NX** commands. This allows reading logged data from a known point.

Communication Protocol

The HI-3603/HI-3604 survey meter responds to 13 two-letter commands, and the command structure is designed to simulate key closures. The protocol typically consists of a command and terminator sent by the remote control device followed by data, and a series of handshake bytes returned by the HI-3603/HI-3604 survey meter.

There are five different handshake protocols. The five protocols are summarized in the following:

The protocols represent bidirectional communications. Use the *Key to Command Protocol* on page 18 to determine the origin of the signals. The HI-3603/HI-3604 survey meter is case sensitive, requiring the use of all capital letters. Spaces shown in the protocols are used for clarity, but should not be included in the transmission.

Number	Protocol	Commands
1	CMD [CR] [LF] RDG [CR]	{RD NS}
2	CMD [CR] [LF]	{KR SP}
3	CMD [CR] KR [CR] [LF] C [CR]	{SC EH DD}
4	CMD [CR] RDG [CR] KR [CR] [LF] C [CR]	{MX BT CL}
5	CMD [CR] RDG1 [CR] RDG2 [CR] KR [CR] [LF] C [CR]	{LG PR NX}

Key to Command Protocol

Syntax / Command	Description
Normal case	Commands and control characters to HI-3603/HI-3604
Underline	Commands and control characters from HI-3603/HI-3604
[CR]	Carriage return sent to HI-3603/HI-3604
[LF]	Line feed returned from HI-3603/HI-3604
[CR]	Carriage return returned from HI-3603/HI-3604
CMD	Command sent to HI-3603/HI-3604
RDG	Reading returned from HI-3603/HI-3604
KR	Key release command sent to HI-3603/HI-3604

Data Format

Readings are returned from the HI-3603/HI-3604 in a 15-byte string. The bytes are defined as follows:

Byte =>	1 R	2 D	3 X	4 X	5 X	6 X	7 E	8 1	9 G	10 4	11 N	12 A	13 N	14 1	15 5
	Command		Reading (0 to 1999)				E-field / H-field	Range number (0 to 4)	Gauss / Amp / Volt display units (G/A/V)	Number of significant digits (3/4)	Normal / Under / Over range (N/U/O)	Autorange / Normal (A/N)	Normal / Warn / Fail battery status (N/W/F)	Number of bar segments (0 to 20)	

➜ The reading that is returned is the mantissa. The decimal point location is derived from the range and E/H information along with the type of measurement.

Ranges

Following is a summary of the different ranges for the HI-3603/HI-3604 survey meter.

HI-3603 SURVEY METER

Range Number	E-Field Volts/meter	H-Field mAmps/meter
0	19.99 V/m	19.99 mA/m
1	199.9 V/m	199.9 mA/m
2	1999 V/m	1999 mA/m
3	NA	NA
4	NA	NA

HI-3604 SURVEY METER

Range Number	E-Field Volts/meter	H-Field Gauss
0	19.99 V/m	1.999 mG
1	199.9 V/m	19.99 mG
2	1.999 kV/m	199.9 mG
3	19.99 kV/m	1.999 G
4	199.9 kV/m	19.99 G

RS-232 Settings

Following are the RS-232 settings to communicate with the HI-3603/HI-3604 survey meter through the HI-4413.

Word Length:	8 bits
Stop Bits:	1
Baud Rate:	2400
Parity:	None

Connector Pinouts

The HI-4413 connector pins are described in the following.

Pin Assignment	Signal	Source	DB25 Pin Number
1	Rlsd (470 Ω pullup)	HI-4413	8
2	Tx data	HI-4413	3
3	Rx data	Computer	2
4	N.C.		20
5	GND	HI-4413	7
6	DSR (470 Ω pullup)	HI-4413	6
7	N.C.		4
8	CTS (470 Ω pullup)	HI-4413	5
9	N.C.		22

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6.0   ProbeView 3600 Operation

Data is stored to **C:\Program Files\ProbeView3600**, and is saved in a text format for analysis by a variety of software. The data is saved as a **csv** (comma separated values) file type. Microsoft® Office Excel® recognizes this format to allow easy loading of the data. To open the file and view the data, click the **csv** file.

- **Sample Limit—**ProbeView™ 3600 has a 32,000 data points limit before the data needs to be saved to a file. The **Log** function will disengage automatically if this limit is reached. No other indication will be given.

- **Averaging—**ProbeView 3600 does not average the data samples.

Avoid other tasks during data logging, or the sample rate may vary. Irregular time stamp intervals in the recorded data can occur if this is ignored.
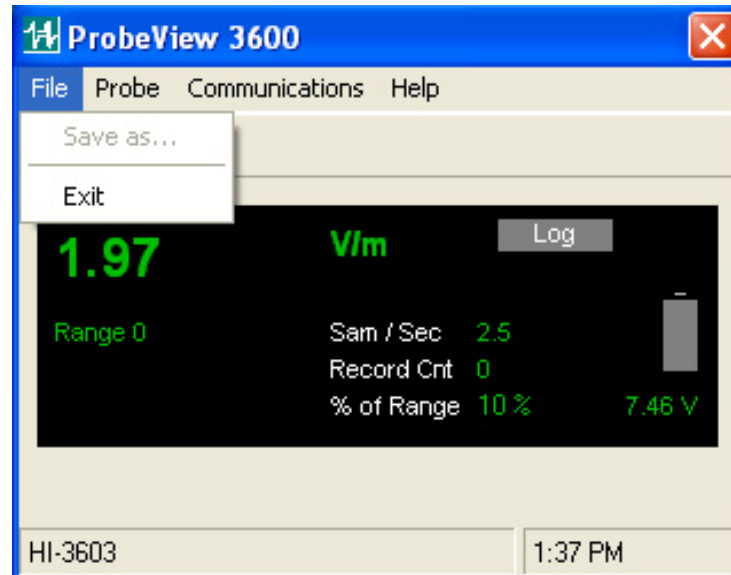
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7.0 ProbeView 3600 Menus

ProbeView™ 3600 commands are organized into a series of pull-down menus: **File**, **Probe**, **Communications**, and **Help**. The following example screens assume a probe is active and collecting data.

File Menu

File Menu	Description
Save As	Saves logged data in a text format to a **csv** file. This comma-separated values file may be opened in several data analysis programs, including Microsoft® Office Excel®.
Exit	Exit ProbeView 3600.

Probe Menu
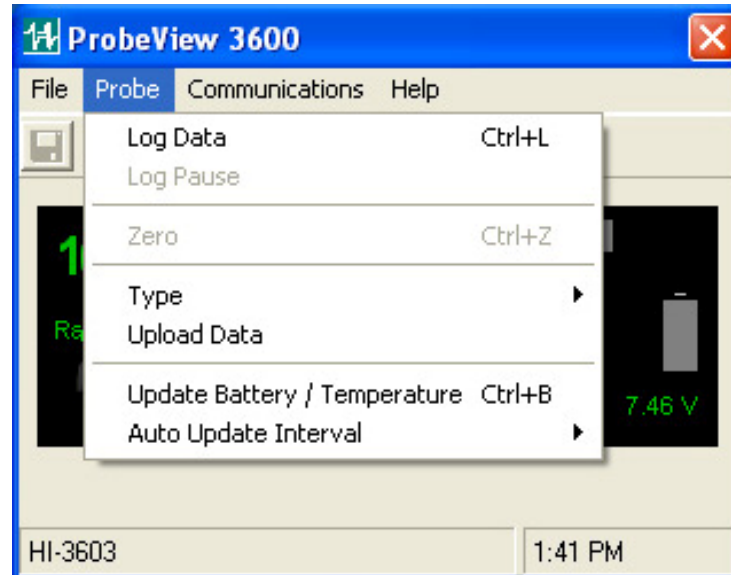
Probe Menu	Description
Log Data	Activates the program to collect data from the probe.
Log Pause	Pauses probe data logging.
Zero	Zeros the probe. This feature cannot be accessed while data logging is active, and is not available for probes that do not have a zero function.

➡ Make sure the probe is in a zero field environment before zeroing a probe. See the probe manual for more information.

Type	Selects either the HI-3603 VLF Survey Meter or the HI-3604 ELF Survey Meter.
Upload Data	Uploads saved data from attached HI-3603/HI-3604 survey meter.

Probe Menu	Description
Update Battery / Temperature	Commands ProbeView 3600 to immediately update battery and temperature information.
Auto Update Interval	Updates the battery and temperature status at selected intervals: **5 minutes**, **30 minutes**, and **60 minutes**. These values can be updated immediately by clicking the **Temp** label.

➡   These values are not updated during data logging.
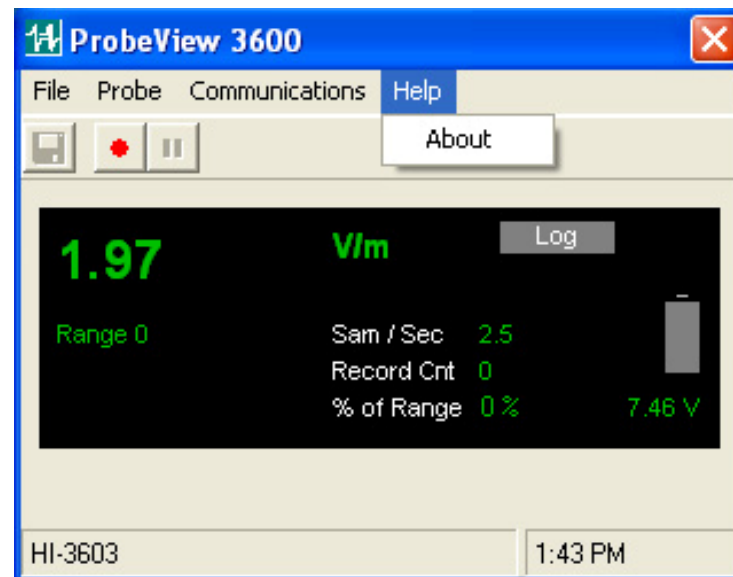
Communications Menu
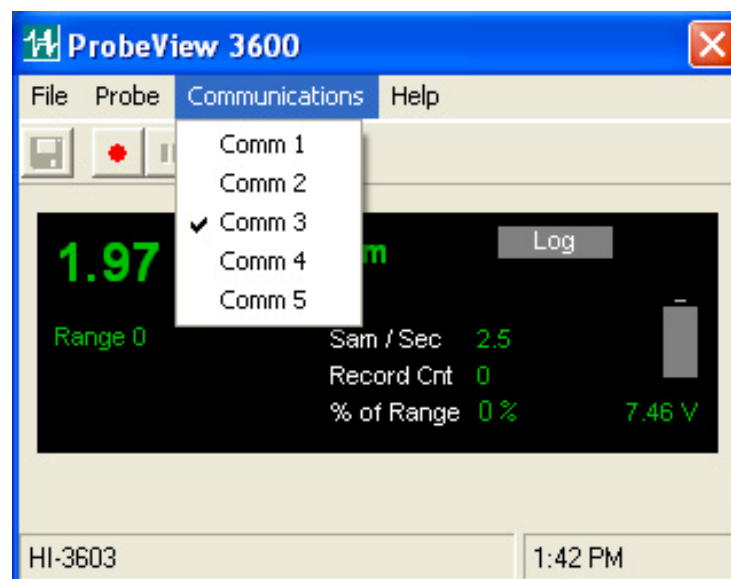
| Communications Menu	Description
Comm. 1	Select communication port 1.
Comm. 2	Select communication port 2.
Comm. 3	Select communication port 3.
Comm. 4	Select communication port 4.
Comm. 5	Select communication port 5.

➡ Once selected, the port number is written to **probeviewII.cfg**, and the communication port number is set as the default.
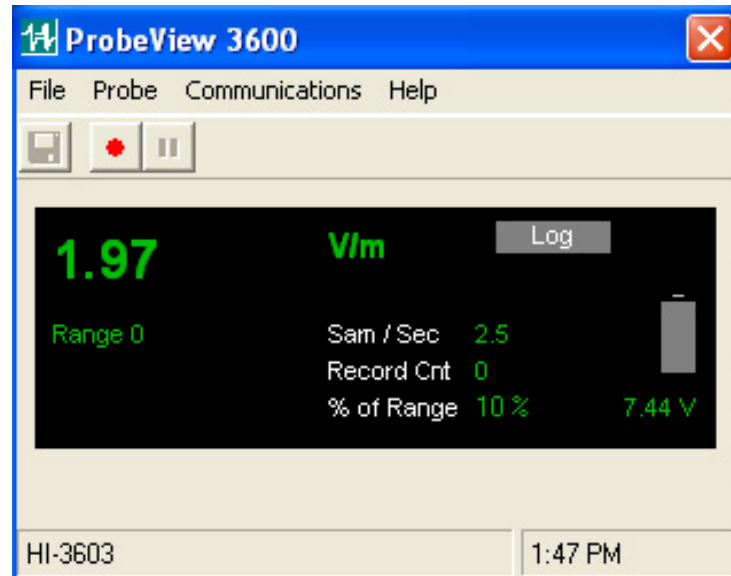
Help Menu

Help About: Provides information about the software revision and probe in use.
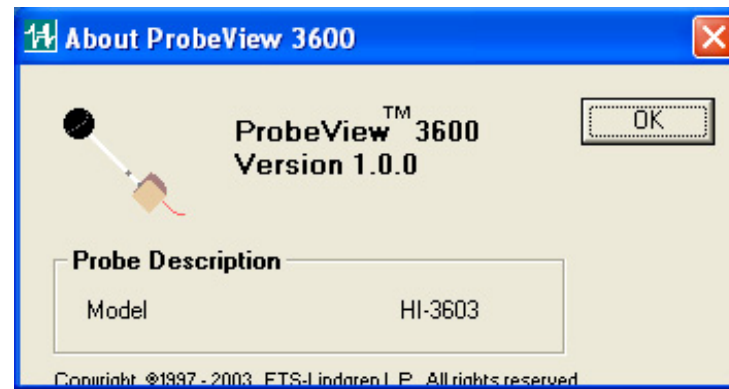
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8.0   Probe Interaction Screen

Probe Status Screen	Description
Field	Field value—The total field strength or power density is shown in a large font at the top of the screen.
Temperature	Current temperature returned from probe—Units may be changed to Fahrenheit or Celsius using the **Probe** pull-down menu. To update the temperature and battery status, click the **Temp** label
Sam/Sec	Samples per second.
Record Cnt	Total number of data points that have been logged at this time.
Battery %	The approximate percentage of charge or life in battery. The battery icon provides a graphical percentage.
Log	A red icon indicates that data is being logged. A yellow icon indicates that logging is paused.

Probe Status Screen	Description
Range	Displays current range. Click to set. For more information, see the next section, *Manually Setting Range*.
Time	Current time.
Units	Units of field strength or power density available for the attached probe. Click to change the units.
Communication Status	The bottom border of the screen indicates the probe model that is currently connected, and the status of the attached probe. *No Probe* indicates the probe is not connected properly, not powered on, or is experiencing a low battery condition.

➔ The units cannot be changed while logging.

Manually Setting Range

The **Range** is indicated on the data screen, and can be set manually using three methods:

- **Functions keys—**Press the **F1-F4** function keys. For some probe models, the **F5** key can be pressed.

- **On screen—**Click **Range** on the data screen to command the probe to increase range until the highest range is reached. The next click will command the probe to **Range 1**.

- **Pull-down menu—**Select the **Probe** pull-down menu, and then click **Range**.

Additionally, the data screen may display **Over Range** or **Under Range**.
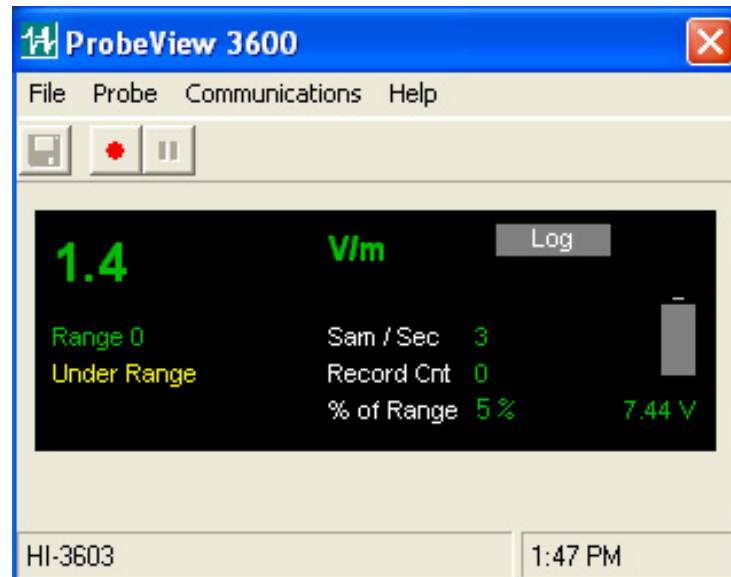
- **Over Range**—Indicates the probe reading is over the upper limits of the selected range. For example, if the probe is set to **Range 1** with approximately 10 V/m as the upper setting, any reading greater than 10 V/m will cause an **Over Range** condition.

- **Under Range**—Indicates the probe is reading less than approximately 10% of the full scale of the current range. For example, if the probe is set to **Range 1** with approximately 10 V/m as the upper setting, any reading less than 1 V/m will cause an **Under Range** condition.

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Appendix A: EC Declaration of Conformity

The EC Declaration of Conformity is the method by which ETS-Lindgren L.P. declares that the equipment listed on this document complies with the EMC Directive and Low Voltage Directive.

Factory	Issued by
ETS-Lindgren, L.P.	ETS-Lindgren, L.P.
1301 Arrow Point Drive	1301 Arrow Point Drive
Cedar Park, TX, USA 78613	Cedar Park, TX, USA 78613

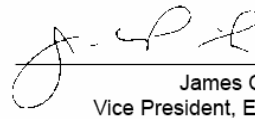The products listed below are eligible to bear the CE mark:

– HI-4413 Fiber Optic RS-232 Interface

APPLICABLE REQUIREMENTS

Standard	Criteria
EN 50082-1	– Electromagnetic compatibility – General immunity standard – Part 1: Domestic commercial and light-industrial environment
EN 55011	– CISPR 11 (1990) ed.2 – Threshold values and measuring methods for radio interference by HF equipment for industrial scientific and medical purposes
EN 61010-1	Safety requirements for electrical equipment for measurement, control and laboratory use

AUTHORIZED SIGNATORIES

Bryan Sayler,
General Manager

James C. Psencik,
Vice President, Engineering

The authorizing signatures on the EC Declaration of Conformity document authorize ETS-Lindgren L.P. to affix the CE mark to the indicated product. CE marks placed on these products will be distinct and visible. Other marks or inscriptions liable to be confused with the CE mark will not be affixed to these products. ETS-Lindgren, L.P. has ensured that appropriate documentation shall remain available on premises for inspection and validation purposes for a period of no less than 10 years.