

FI-500

FiberInspector™ Micro Video Microscope

Users Manual

The FI-500 FiberInspector Micro video microscope is a hand-held probe and display used to inspect fiber optic endfaces on patch cord and bulkhead connectors.

Safety Information

Warning

To avoid possible fire, electric shock, personal injury, or damage to the video microscope:



- Carefully read all instructions.
- Read all safety information before you use the Product.
- Use the Product only as specified, or the protection supplied by the Product can be compromised.
- Use this Product indoors only.
- Do not use the Product around explosive gas, vapor, or in damp or wet environments.
- Do not use the Product if it operates incorrectly.
- Do not use the Product if it is damaged.
- Disable the Product if it is damaged.
- Remove the batteries if the Product is not used for an extended period of time, or if stored in temperatures above 50 °C. If the batteries are not removed, battery leakage can damage the Product.
- The battery door must be closed and locked before you operate the Product.
- Do not put metal objects into connectors.

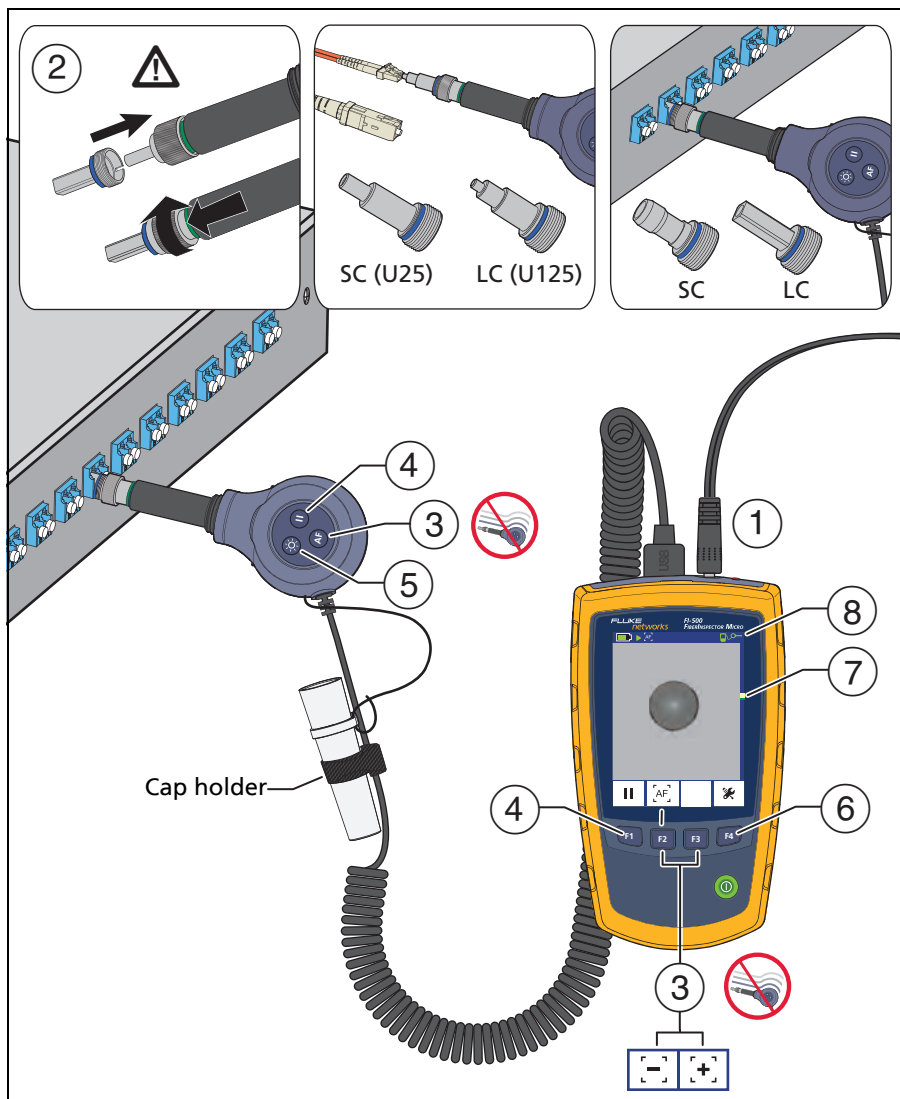
Safety and Compliance Symbols

	Warning or Caution: Risk of damage to or destruction of equipment or software.
	See the user documentation.
	Warning: Risk of electrical shock.
	Conforms to relevant European Union directives
	Conforms to relevant Australian standards
	40 year Environment Friendly Use Period (EFUP) under China Regulation - Administrative Measure on the Control of Pollution Caused by Electronic Information Products. This is the period of time before any of the identified hazardous substances are likely to leak out, causing possible harm to health and the environment.
	Conforms to the Appliance Efficiency Regulation (California Code of Regulations, Title 20, Sections 1601 through 1608), for small battery charging systems.
	EMC approval for Korea. Class A Equipment (Industrial Broadcasting & Communication Equipment). This product meets requirements for industrial (Class A) electromagnetic wave equipment and the seller or user should take notice of it. This equipment is intended for use in business environments and is not to be used in homes.
	This product complies with the WEEE Directive marking requirements. The affixed label indicates that you must not discard this electrical/electronic product in domestic household waste. Product Category: With reference to the equipment types in the WEEE Directive Annex I, this product is classed as category 9 "Monitoring and Control Instrumentation" product. Do not dispose of this product as unsorted municipal waste. To return unwanted products, contact the manufacturer's web site shown on the product or your local sales office or distributor.

Features and Use

Refer to Figure 1.

<div>1</div>	<div> </div> <div>Charge the batteries for about 4 hours before you use them for the first time. See "Charge the Batteries" on page 7. To ensure continuous operation, connect the ac adapter whenever possible.</div>
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Figure 1. Features and Use

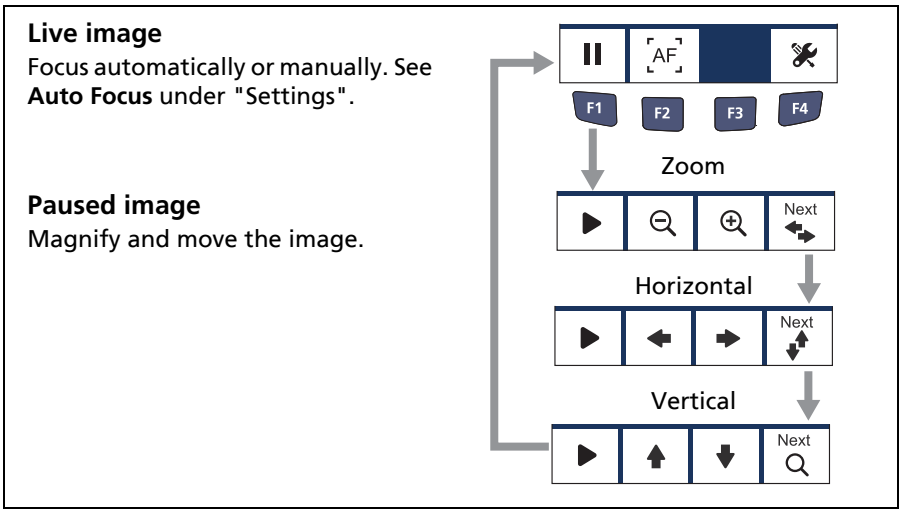
②

Screw an adapter tip onto the fiber probe to match the connection you will inspect. Tips with blue rings are for PC and UPC connectors. Tips with green rings are for APC connectors.

⚠ Caution

To avoid damage to the probe, use only tips specified for the FI-500. Do not use tips from other video microscopes.

<p>③</p>	<div data-bbox="207 66 352 136">  </div> <div data-bbox="200 172 357 245">  </div> <div data-bbox="245 261 314 331">  </div> <p>In live mode when the Auto Focus setting is On, press AF to automatically focus the image.</p> <p>In live mode when the Auto Focus setting is Off, press + and - to focus the image manually.</p> <p>Keep the probe still when you use the auto focus function.</p>
<p>④</p>	<div data-bbox="165 350 391 423">  </div> <p>Switch the probe between live and paused modes. Figure 2 shows the button functions in paused mode.</p> <p>When you pause the image, the display centers the image and uses the zoom setting you used the last time you paused the image.</p>
<p>⑤</p>	<div data-bbox="261 558 309 607">  </div> <p>Turns the probe light on and off.</p>
<p>⑥</p>	<div data-bbox="240 626 320 699">  </div> <p>See "Settings" on page 6.</p>
<p>⑦</p>	<p>The blue, vertical bar is the range of focus. The yellow mark shows where the focus is within that range. The green mark shows where the image will be focused.</p>
<p>⑧</p>	<div data-bbox="219 829 341 886">  </div> <p>The probe is connected.</p> <div data-bbox="229 902 325 959">  </div> <p>The probe is not connected.</p> <div data-bbox="229 976 325 1032">  </div> <p>The display does not recognize the connected probe.</p> <div data-bbox="224 1057 341 1114">  </div> <p>Shows you when the display is live or paused.</p> <div data-bbox="219 1138 341 1195">  </div> <p>Shows you the display's focus mode. AF is auto focus. MF is manual focus. See "Settings" on page 6.</p> <div data-bbox="224 1243 341 1308">  </div> <p>See "Upgrade the Software" on page 9.</p>

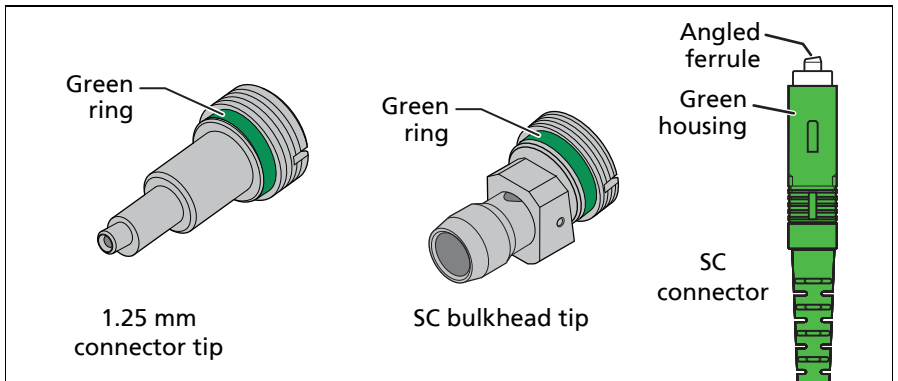


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Figure 2. Image Controls

View APC Endfaces

Probe tips for APC (angled physical contact) connectors have a green ring (Figure 3). When you view an APC endface, rotate the probe or the connector while you use the auto focus function until you get the best image. If you cannot get a good image, focus the image manually.



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Figure 3. APC Tip and Connector Examples

Settings

Refer to Figure 4.

- **Display and probe software versions:** If a software update is available, you can download it from the Fluke Networks website. See "Upgrade the Software".
- **Power Down:** The display turns off after the selected period of inactivity.
- **Standby:** The display goes into low-power mode after the selected period of inactivity.
- **Dim Display:** The display dims after the selected period of inactivity.
- **Probe Light:** The probe light stays on for the selected time.
- **Brightness:** Changes the brightness of the display. Keeping the display at less than 100% brightness increases the battery life.
- **Dimmed Brightness:** Changes the brightness of the display when the display is dim.
- **Auto Focus**
 - **On:** Press **AF** on the probe or **AF** on the display to focus the image automatically. The display will also focus the image automatically when you press **II** on the probe or **II** on the display.
 - **Off:** Press **-** **+** to focus the image manually.
- **Save and Exit:** Saves the settings and exits the settings menu.

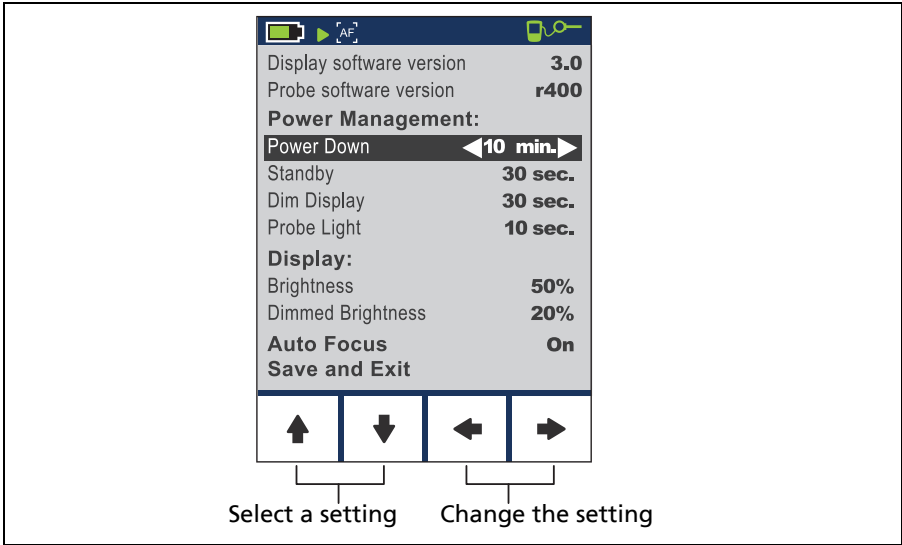


Figure 4. Settings






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Charge the Batteries

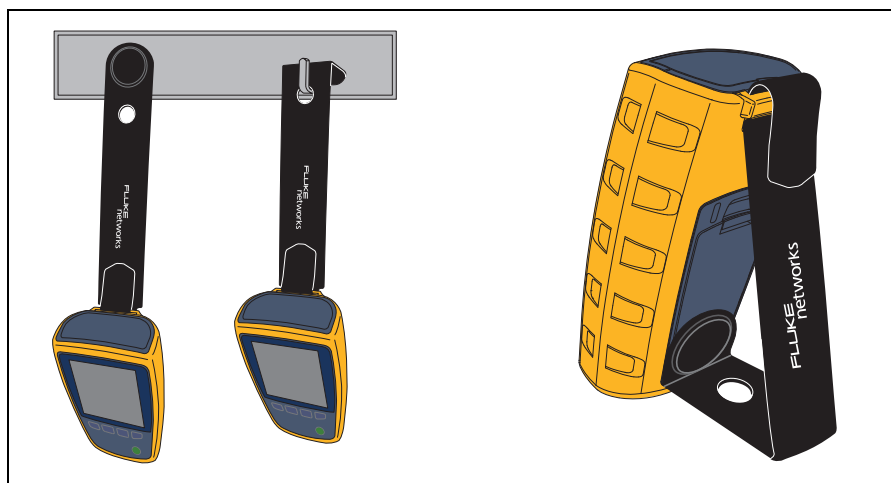


To avoid possible fire, electric shock, personal injury, damage to the video microscope, or incorrect operation:

- Use only the ac adapter/charger provided to power the display and charge the batteries.
- Disconnect the battery charger and move the Product or batteries to a cool, non-flammable location if the rechargeable batteries become hot ($>50^{\circ}\text{C}$, $>122^{\circ}\text{F}$) during the charge period.
- Do not recharge non-rechargeable batteries.
- Batteries contain hazardous chemicals that can cause burns or explode. If exposure to chemicals occurs, clean with water and get medical aid.
- Repair the Product before use if the battery leaks.
- Do not keep cells or batteries in a container where the terminals can be shorted.
- Do not put battery cells and battery packs near heat or fire. Do not put in sunlight.

	When the battery charges, the LED is red. Charge the batteries for about 4 hours before you use them for the first time.
	The charger is connected and no batteries are installed.
	When the battery is fully-charged, the LED is green. Fully-charged batteries last about 3 hours when the display is on continuously.
	When the battery is very low, the battery icon shows a red bar.
	<p>The LED blinks red and green and the yellow battery icon shows if you connect the power adapter when the wrong type of batteries are installed. See the specifications for the correct battery types.</p> <p>The microscope will operate with alkaline batteries, but they will drain quickly. The display will not try to charge alkaline batteries.</p>

Magnetic Strap



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Figure 5. Magnetic Strap

Maintenance



To prevent possible electrical shock, fire, or personal injury:

- Do not operate the Product with covers removed or the case open. Hazardous voltage exposure is possible.
- Use only specified replacement parts.
- Have an approved technician repair the Product.

Clean the LCD display with a soft, lint-free cloth.

Clean the display and probe housings with a soft cloth dampened with water or a mild detergent. Do not use solvents or abrasive cleansers.

If the probe lens is dirty, clean it with optical-grade cleaning supplies.

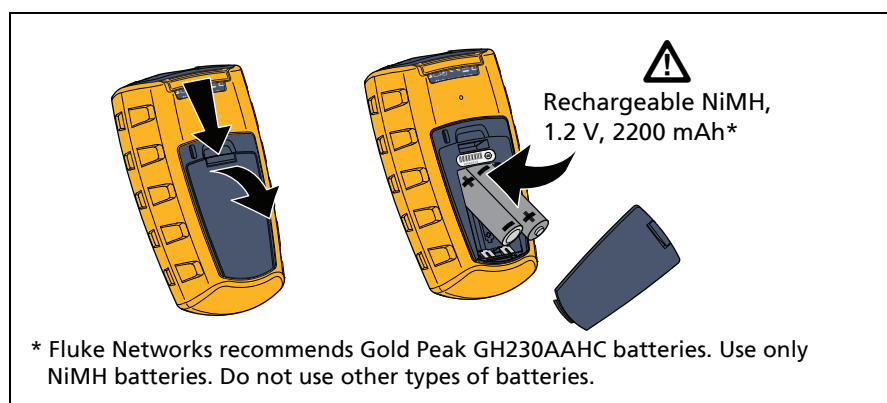
Replace the Batteries



Warning

- Replacement cells used shall have closely matched capacities, be of the same design, be of the same chemistry and be from the same manufacturer and age.
- Use only the specified type of batteries, correctly installed, to power the display. See the specifications for battery types.
- Replace the rechargeable batteries after 5 years of moderate use or 2 years of heavy use. Moderate use is defined as recharged twice a week. Heavy use is defined as discharged to cutoff and recharged daily.

Replace the NiMH batteries at intervals described under “Charge the Batteries” on page 7. Figure 6 shows how to remove and install the batteries.



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Figure 6. Replace the Batteries

Upgrade the Software

If new software is available, you can download it from the Fluke Networks website at no charge. Figure 7 shows how to install new software in the display and probe.

- ① Download the upgrade file from the Fluke Networks website to the root folder of a USB drive. If the file is a .zip file, unzip the files before you put them on the USB drive.
- ② Connect the drive to the display. The software update icon shows in the status bar, and the display imports the upgrade file. The screen shows the software versions loaded from the USB flash drive (Figure 8).

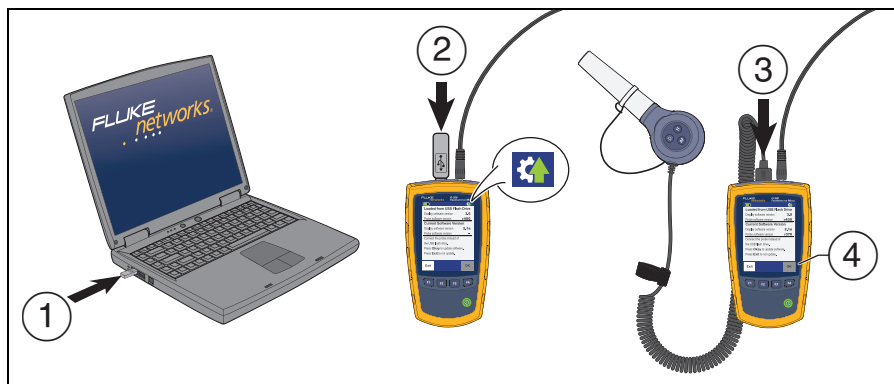
If there is not a software update file in the root folder of the drive or if you press **F1 Exit**, the USB drive icon shows:

-continued-

- ③ Connect the probe to the display.
- ④ To upgrade the software, press **F4** **OK**.

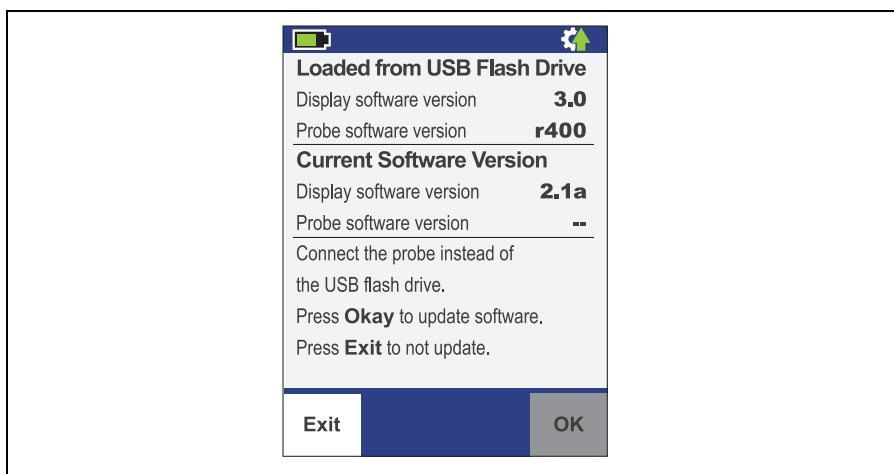
To cancel the upgrade, press **F1** **Exit**.

When the upgrade is completed, press **F1** **Exit** to restart the display.



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Figure 7. Upgrade the Software



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Figure 8. Software Update Screen with the USB Drive Connected

Get Service

Contact Fluke Networks for information on authorized Fluke Networks service centers.

Register Your Product

Registering your product with Fluke Networks gives you access to valuable information on product updates, troubleshooting tips, and other support services. To register, fill out the online registration form on the Fluke Networks website.

Accessories

For a complete list of fiber test equipment and accessories, visit the Fluke Networks website at www.flukenetworks.com

Contact Fluke Networks



www.flukenetworks.com/support



info@flukenetworks.com



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Fluke Networks operates in more than 50 countries worldwide. For more contact information, visit our website.

Open Source Software

This product uses freeRTOS and FatFS software. The software license statements and files that contain the binary and source code for the open source software are on the CD supplied with the product and on the Fluke Networks website. For more information, go to <http://www.freertos.org> and http://elm-chan.org/fsw_e.html.

Specifications

General Specifications

Temperature range*	Operating: 32 °F to 122 °F (0 °C to +50 °C) Storage: -22 °F to +140 °F (-30 °C to +60 °C)
Humidity range	Operating: 0 % to 95 % (32 °F to 95 °F, 0 °C to 35 °C) RH non-condensing Storage: 0 % to 95 % (95 °F to 113 °F, 35 °C to 45 °C) RH non-condensing
Altitude	Operating: 4,000 meters; Storage: 12,000 meters
Vibration	2 g, 5 Hz to 500 Hz
Shock	1 meter drop test
Safety	IEC 61010-1: Pollution Degree 2
EMC	<p>IEC 61326-1: Controlled Electromagnetic Environment; IEC 61326-2-1 CISPR 11: Group 2, Class A</p> <p>Group 2: Equipment contains ISM RF equipment in which radio-frequency energy in the frequency range 9 kHz to 400 GHz is intentionally generated and used or only used, in the form of electromagnetic radiation, inductive and/or capacitive coupling, for the treatment of material or inspection/analysis purposes.</p> <p>Class A: Equipment is suitable for use in all establishments other than domestic and those directly connected to a low voltage power supply network which supplies buildings used for domestic purposes. There may be potential difficulties in ensuring electromagnetic compatibility in other environments, due to conducted and radiated disturbances.</p> <p>USA (FCC): 47 CFR 15 Intentional Radiators: This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. (15.19). Changes or modifications not expressly approved by Fluke could void the user's authority to operate the equipment. (15.21)</p> <p>Emissions which exceed the levels required by CISPR 11 can occur when the Product is connected to a test object.</p>
<p>* Without the power adapter. With the power adapter, operating range is 0 °C to +40 °C and storage range is -20 °C to +60 °C.</p>	

Display

Frames per second	≥12
Battery type*	Rechargeable NiMH, 2 x 1.2 V, 2200 mAh
Battery life*	3 hours of continuous probe use 6 hours of typical probe use
Charging time and temperature	4 hours minimum 50 °F to 113 °F (10 °C to 45 °C)
Power adapter	Input: 100 to 240 VAC ±10%, 50/60Hz Output: 6 VDC, 3 A maximum LPS
Display	3.2 inch TFT LCD, 320 x 240
Software upgrades	Upgrades can be installed from a USB drive
Input	USB 2.0, Type A
Dimensions	5.5 in x 3.2 in x 1.5 in (14.0 cm x 8.0 cm x 3.9 cm)
Weight	9.7 oz (275 g)
* Tested using Gold Peak GH230AAHC batteries. Use only NiMH batteries. Do not use other types of batteries.	

Probe

Camera type	5 Megapixel 1/4-inch CMOS sensor
Field of view	610 µm x 460 µm
Resolution	1 µm
Light source	LED, >100,000 hr life
Endface illumination	Coaxial blue LED
Port illumination	2 white LEDs
Power	Supplied through the USB interface
Output	Video output through USB 2.0 interface
Dimensions	4.6 in x 2 in x 0.95 in (117 mm x 51 mm x 23 mm) (length depends on adapter tip)
Weight	4.4 oz (125 g) (with no adapter tip)

LIMITED WARRANTY AND LIMITATION OF LIABILITY

Each Fluke Networks product is warranted to be free from defects in material and workmanship under normal use and service unless stated otherwise herein. The warranty period for the mainframe is one year and begins on the date of purchase. Parts, accessories, product repairs and services are warranted for 90 days, unless otherwise stated. Ni-Cad, Ni-MH and Li-Ion batteries, cables or other peripherals are all considered parts or accessories. The warranty extends only to the original buyer or end user customer of a Fluke Networks authorized reseller, and does not apply to any product which, in Fluke Networks' opinion, has been misused, abused, altered, neglected, contaminated, or damaged by accident or abnormal conditions of operation or handling. Fluke Networks warrants that software will operate substantially in accordance with its functional specifications for 90 days and that it has been properly recorded on non-defective media. Fluke Networks does not warrant that software will be error free or operate without interruption.

Fluke Networks authorized resellers shall extend this warranty on new and unused products to end-user customers only but have no authority to extend a greater or different warranty on behalf of Fluke Networks. Warranty support is available only if product is purchased through a Fluke Networks authorized sales outlet or Buyer has paid the applicable international price. To the extent permitted by law, Fluke Networks reserves the right to invoice Buyer for repair/replacement when a product purchased in one country is submitted for repair in another country.

For a list of authorized resellers, visit www.flukenetworks.com/wheretobuy.

Fluke Networks warranty obligation is limited, at Fluke Networks option, to refund of the purchase price, free of charge repair, or replacement of a defective product which is returned to a Fluke Networks authorized service center within the warranty period.

To obtain warranty service, contact your nearest Fluke Networks authorized service center to obtain return authorization information, then send the product to that service center, with a description of the difficulty, postage and insurance prepaid (FOB destination). Fluke Networks assumes no risk for damage in transit. Following warranty repair, the product will be returned to Buyer, transportation prepaid (FOB destination). If Fluke Networks determines that failure was caused by neglect, misuse, contamination, alteration, accident or abnormal condition of operation or handling, or normal wear and tear of mechanical components, Fluke Networks will provide an estimate of repair costs and obtain authorization before commencing the work. Following repair, the product will be returned to the Buyer transportation prepaid and the Buyer will be billed for the repair and return transportation charges (FOB Shipping point).

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Since some countries or states do not allow limitation of the term of an implied warranty, or exclusion or limitation of incidental or consequential damages, the limitations and exclusions of this warranty may not apply to every buyer. If any provision of this Warranty is held invalid or unenforceable by a court or other decision-maker of competent jurisdiction, such holding will not affect the validity or enforceability of any other provision.

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