Mentor
Visual iQ VideoProbe
User's Manual

GE imagination at work

05/13/2015

Table of Contents

Introduction

About this Manual

This manual and the related equipment is intended for visual inspection technicians with a basic understanding of inspection principles and practices, and who are familiar with basic computer operations, but who may not have experience with a video borescope system.

The manual contains safety, compliance, and basic operating and maintenance instructions for the Visual iQ VideoProbe™ system.

To ensure operator safety, please read and understand this manual prior to using the system.

Getting Help

For additional assistance, go to **www.ge-mcs.com** for a complete listing of contact information. Technical Support contact information follows:

Global Phone: 1-866-243-2638
Email: ITTechSupport@GE.com
Website: http://www.geittechsupport.com

System Overview

The rugged and dependable Mentor Visual iQ® system is an advanced flexible video borescope used for remote visual inspection.

Working through access passages, the Visual iQ system delivers high-resolution images of internal details of turbine engines, airframes, automotive engines, piping, vessels, wind-turbine gear boxes, underwater structures, etc.

The probe's fiberoptic bundle illuminates the inspection area with light generated by an advanced Light Engine in the probe. At the end of the probe, a miniature camera assembly converts the image into an electronic image, and sends it back through the probe. The system displays the image on the handset. No focusing is required, because the Visual iQ system contains a fixed-focus optical system with a large depth of field.

Measurement capabilities (standard with the Visual iQ Analyze configuration) allow your system to analyze and measure indications and features.

The Visual iQ system is compatible with USB thumb drives, USB keyboards, USB portable drives, and most other USB-based storage devices.

With our QuickChange™ interchangeable probes, you can quickly reconfigure the system for maximum productivity. This feature is available with either the Visual iQ Touch or Analyze configuration.

Available in three versions (identified as the **Inspect, Touch,** and **Analyze** configurations) to meet diverse inspection needs across industries. Refer to the guide on the following page to determine the right one for your application.

Standard Equipment

Visual iQ
2-hour Li-Ion Battery
Visual iQ Storage Case

AC Adapter/Battery Charger
Optical Tip Storage Case
USB Thumbdrive Containing Documentation, including User's Manual

Safety and Essential Use Hard Copy
Quickstart Card

Optional Features

Display Port Video Cable
Insertion Tube Gripper
Insertion Tube Rigidizer
Handset Holder
Headset (wired or wireless)
Cables
Belt Clip

Keyboard (wired or wireless)
Optical Tips
Measuring Optical Tips
Mini-Magic Arm Clamp Kit
Magic Arm Kit
External Monitor
Large Visual iQ Case

Software: **Inspection Manager** (Re-measurement PC Application) Upgrade either **Visual iQ Touch** or **Analyze** configurations with the purchase of *3DPM or 3D Stereo measurement, STEREO measurement,* or *Probability of Detection* capabilities. Features included in the *Probability of Detection* upgrade includes HDR (High-Dynamic Range), ANR (Adaptive Noise Reduction), Distortion Correction, and Preset Image Transformation Settings. **InspectionWorks Connect,** internet-based video collaboration capability.

Mentor Visual iQ – Available in Three Configurations

Mentor Visual iQ Inspect*	Mentor Visual iQ Touch*	Mentor Visual iQ Analyze**
Excellent image quality and connectivity in a value-priced package. **Upgradable to Touch or Analyze configurations.**	Adds the versatility of interchangeable probes and productivity enhancements. **Upgradable to Analyze configuration.**	Sets the industry standard with powerful measurement and analysis software combined with extreme image quality and greater probability of detection.
■ Value priced option ■ Choose from 7 probe length and diameter configurations ■ Compare to: XL Go+ (with expanded features and capabilities)	All the features of Mentor Visual iQ Inspect, plus… ■ Interchangeable probes ■ Touchscreen interface ■ Menu-Directed-Inspection software ■ 16GB internal memory ■ Compare to: XLG3 (with expanded features & capabilities)	All the features of Mentor Visual iQ Touch, plus… ■ 3D Phase Measurement ■ 3D Stereo Measurement ■ *Probability of Detection* upgrade, which includes High-Dynamic Range, Adaptive Noise Reduction, Distortion Correction, and Preset Image Transformations

Purchase 3DPM measurement, 3D Stereo measurement, Stereo measurement, or Probability of Detection upgrades

**Purchase Stereo measurement as an option*

Safety Information

Note: Before using or servicing the system, read and understand the following safety information.

Symbols and Terms

The following symbols appear on the product: ⚠, ⚡. See accompanying documentation.

General Warnings

The following warning statements apply to use of the system in general. Warning statements that apply specifically to particular procedures appear in the corresponding sections of the manual.

⚡ Do not allow the conductive insertion tube, system or its working tools to come in direct contact with any voltage or current source. Prevent all contact with live electrical conductors or terminals. Damage to the equipment and/or electrical shock to the operator may result.

⚠ Do not use this system in explosive environments.

⚠ USE PROPERLY. Using any piece of this equipment in a manner not specified by the manufacturer may impair the product's ability to protect the user from harm.

⚠ General Cautions

The following caution statements apply to use of the Visual iQ device in general. Caution statements that apply specifically to particular procedures appear in the corresponding sections of the manual.

Before using the camera system, install an optical tip or the head guard, which prevents damage to the tip-attachment mechanism. Keep the head guard on whenever no optical tip is in place.

Handle the Probe Carefully: Keep the insertion tube away from sharp objects that might penetrate its outer sheath. Keep the whole insertion tube as straight as possible during operation; loops or bends anywhere in the tube decrease its ability to steer the probe tip. Avoid bending the insertion tube sharply.

Note: Always use the Home function to straighten the bending neck before withdrawing insertion tube from an inspection area or putting probe away. Never pull, twist, or straighten the bending neck by hand; internal damage may result. At the first sign of damage, return the probe for repair.

Certain substances may damage the probe. For a list of substances that are safe for the probe, see "Chemical Compatibility" in the Appendix.

Battery Warnings

Only use the battery and power supply specified for use with the system. Before use, thoroughly review the instructions in this manual for the battery and battery charger to fully understand the information contained in them, and observe the instructions during use.

⚠️ **WARNING**

- Do not place the battery in fire or exceed the battery operating temperature.

- Do not pierce the battery with nails, strike the battery with a hammer, step on the battery, or otherwise subject it to strong impacts or shocks.

- Do not expose the battery to water or salt water, or allow the battery to get wet (IP65 – Disassembled, IP67 – Assembled).

- Do not disassemble or modify the battery.

- The instrument contains a Lithium Ion battery and magnesium in its case. Should the instrument be involved in a fire, use an extinguisher approved for use on electrical and flammable metal fires. Water must not be used.

🔋 **Battery Communication Error:** Exists when the Visual iQ shows this message on the display. If the problem persists, please contact your nearest customer support center.

Using the battery outside its recommended operating range will result in degradation of the performance and service life. When storing the battery, be sure to remove it from the handset.

Recommended ambient temperature range for Li-ion battery operation:

Discharge (when using the instrument): -20°C to 46°C

Recharging: 0°C to 40°C

Storage: -25°C to +60°C

Informations sur la sécurité

Remarque: avant l'utilisation ou l'entretien du système, vous devez lire et comprendre les informations de sécurité qui suivent.

Symboles et termes employés

Les symboles suivants sont apposés *sur le produit:* ⚠️, ⚡. Voir la documentation jointe.

Avertissements généraux

Les avertissements suivants s'appliquent à l'utilisation du système en général. Les avertissements qui s'appliquent spécifi quement à des procédures particulières sont indiqués dans les sections correspondantes de ce manuel.

⚡ Le système Visual iQ et les outils de travail qui l'accompagnent ne doivent jamais entrer en contact direct avec une source de tension ou de courant. Évitez tout contact avec des conducteurs ou des bornes électriques sous tension. L'équipement risquerait d'être endommagé, ou l'opérateur de subir un choc électrique.

⚠️ N'utilisez pas ce système dans un environnement à risque d'explosion.

⚠️ UTILISER CORRECTEMENT. Si un élément de cet équipement est utilisé d'une manière non indiquée par le fabricant, l'utilisateur peut ne plus être protégé des risques de blessure.

⚠️ Mentions générales « Attention »

Les mentions « Attention » qui suivent s'appliquent à l'utilisation de l'appareil Visual iQ en général. Les mentions « Attention » qui s'appliquent spécifi quement à des procédures particulières sont indiquées dans les sections correspondantes du manuel.

MANIPULER LA SONDE AVEC PRÉCAUTION. Maintenez la gaine de la sonde à l'écart d'objets pointus ou tranchants qui risqueraient de traverser son fourreau. Maintenez toute la gaine aussi droite que possible pendant l'utilisation : en cas de boucle ou de courbure, il est plus diffi cile de piloter le bout de la sonde. Évitez de trop courber la gaine.

Remarque : utilisez toujours le bouton de rangement pour redresser le béquillage avant de rétracter la gaine de la zone d'inspection ou de ranger la sonde. Ne manipulez jamais le béquillage à la main pour le tirer, le courber ou le redresser : vous risqueriez de l'endommager à l'intérieur. Envoyez la sonde en réparation au premier signe d'endommagement.

Certaines substances risquent d'endommager la sonde. Pour consulterla liste des substances sans danger pour la sonde, voir Compatibilité Chimique en annexe.

L'appareil comporte une batterie lithium ion et du magnésium à l'intérieur de son boîtier. En cas d'incendie de l'appareil, servez-vous d'un extincteur agréé pour une utilisation sur les incendies électriques et les métaux inflammables. En aucun cas, n'utilisez de l'eau.

Avertissements liés à la batterie

Utilisez uniquement la batterie et l'alimentation spécifi ées pour être utilisées avec le système Visual iQ. Avant utilisation, lisez attentivement les instructions contenues dans ce manuel relatives à la batterie et au chargeur de batterie pour bien les comprendre, et respectez ces instructions pendant l'utilisation de l'appareil.

⚠ **AVERTISSEMENT**

• Ne jetez pas la batterie au feu et ne dépassez pas sa temperature de fonctionnement.

• Ne percez pas la batterie avec des clous, ne la frappez pas avec un marteau, ne marchez pas dessus et ne la soumettez pas à des impacts ou des chocs violents.

• N'exposez pas la batterie à l'eau douce ou salée, et évitez de la mouiller.

• Ne désassemblez pas la batterie et ne la modifi ez pas.

Erreur de communication de la batterie. Veuillez contacter le Service clientèle au numéro +1 315 554 2000.

L'utilisation de la batterie en dehors de la plage de fonctionnement recommandée entraînerait une dégradation de ses performances et de sa longévité. Lorsque vous stockez la batterie, veillez à la retirer de sa base.

Plage de température recommandée pour le fonctionnement de la batterie Lithium-Ion.

Décharge (à l'utilisation de l'appareil) : -20°C à +46°C Recharge , 0°C à +40°C Stockage, -25°C à +60°C

Start Up

Component Identification
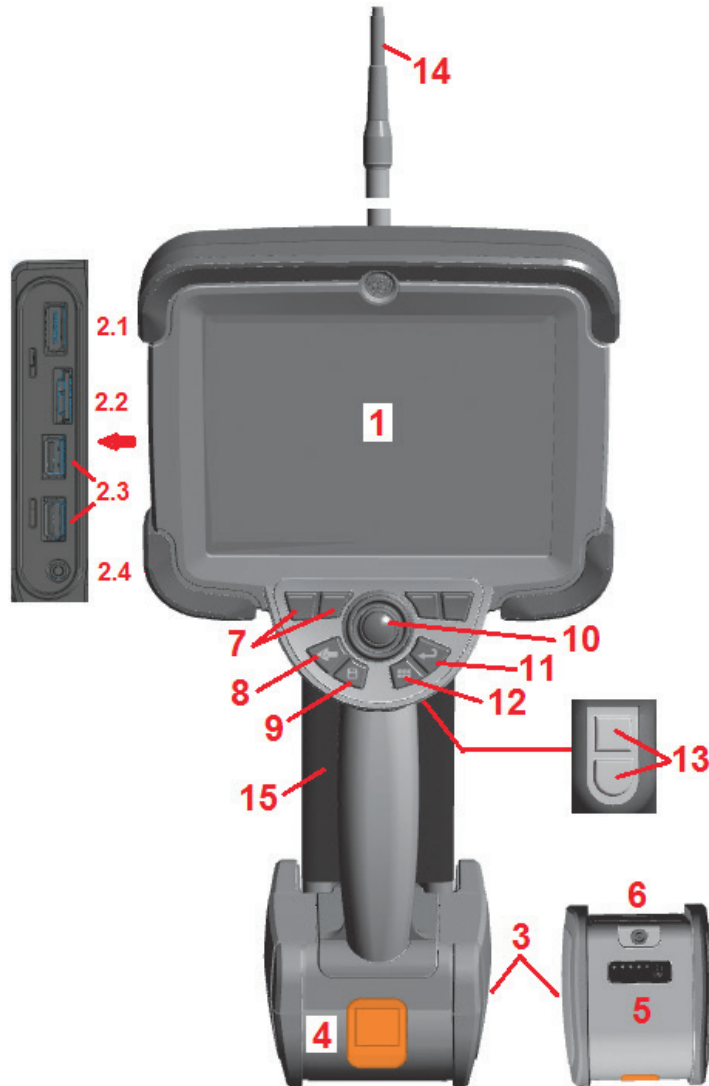
1 – LCD Touchscreen

2 – DisplayPort Output **(2.1)**, USB 3.0 Client Micro B Port **(2.2)**, Two USB 3.0 Host Type A Ports **(2.3)**, 3.5 mm Headset/Microphone Jack **(2.4)**.

3 – Two-hour Lithium Ion Battery

4 – Battery Release Button

5 – Battery Charge Indicator

6 – AC Adaptor Input

7 – Function (or Soft) Keys (four total)

8 – Back Button: short press moves back one screen, long press moves to live screen. This also serves as the **POWER ON** button.

9 – Save Button: short press launches a **Quick Save**, long press opens or closes the **Save Options Menu.**

10 – Joystick Controls Articulation and Menu Navigation (push the joystick left/right/up/down to navigate menus and sub-menus).

11 – Enter Button: short press toggles between frozen and live frames and selects **Done / Accept,** a long press performs a **3DPM Capture.**

12 – Menu Button: short press opens or closes the Global Menu, long press toggles between first and second level soft button rows.

Note: Follow the selection sequence shown here to navigate the Global Menu and select the Operating Language.

13 – Trigger Button 1 (Upper): provides the same function as the Enter Button. Trigger Button 2 (Lower): short press toggles articulation mode between steer-and-stay and steering modes. When in steer-and-stay mode, a Lock icon appears. Long press returns the articulation system to the neutral (home) position.

14 – Insertion Tube/Camera assembly

15 – Interchangeable VideoProbe (**Note:** Includes Insertion Tube/Camera assembly)
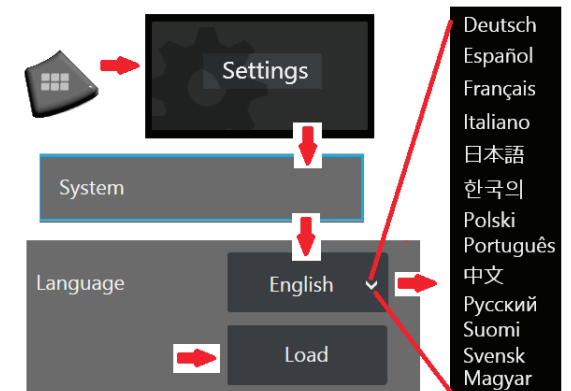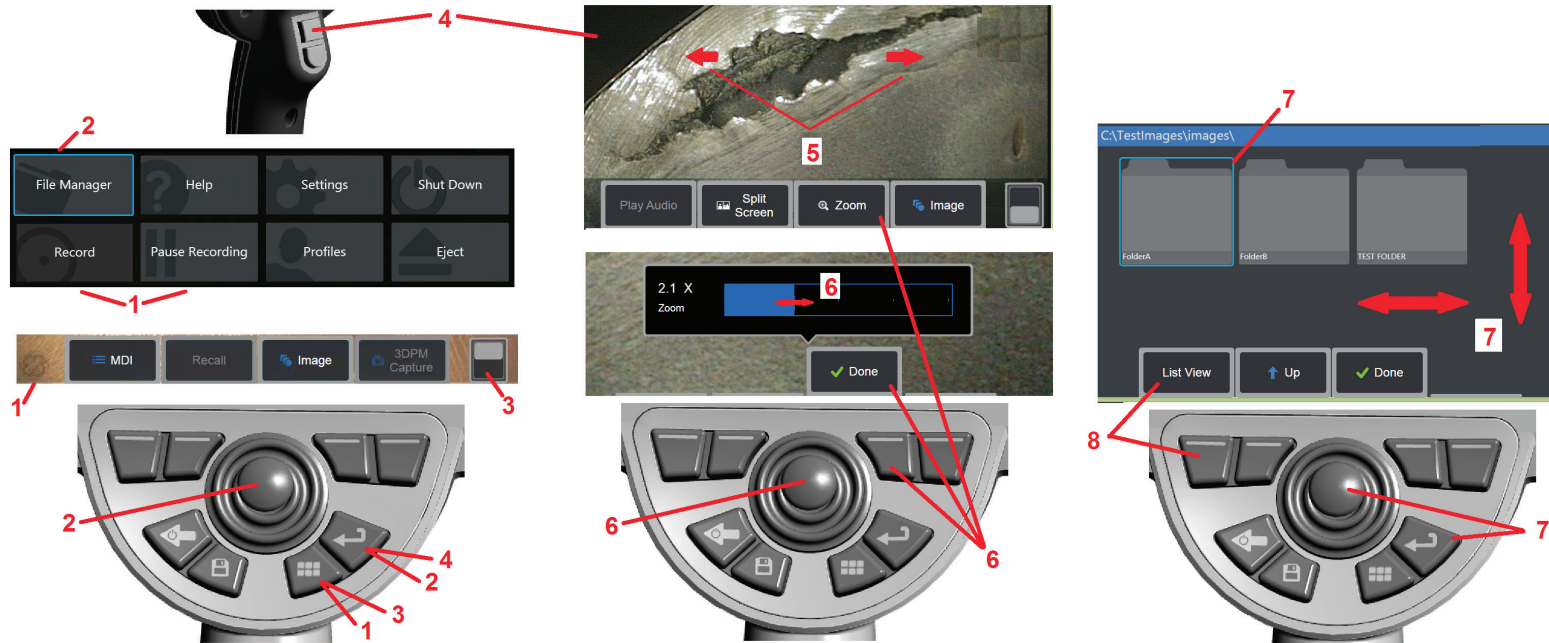
Touchscreen and Keys – Dual Control Systems

Most functions can be accomplished using the touchscreen or with a combination of key presses and joystick movements. The following examples illustrate various control techniques that can be used on most Visual iQ display screens.

1 – Touch the lower left corner of the display screen (typically contains the **GE Logo**) or short-press the **Menu key** to open the **Global Menu**.

2 – The selected item in any menu or list is identified by this **blue outline.** Tap the display screen to select another item or to launch the selected item. Alternatively, use the **joystick** to select another item by moving the blue cursor, then short-press the **Enter key** to launch. *Note that a short press of the Enter key accepts or launches most selected choices or actions.*

3 – Tap the display to toggle between the upper and lower softkey bar (double-tap to hide or show the softkey and status bars). Alternatively, long-press the **Menu key** to switch between the upper and lower softkey bars.

4 – Tap anywhere on a displayed **Live Image** to freeze and unfreeze it. Alternatively, short-press either the **Enter key** or the **Upper Trigger key** to freeze and unfreeze a live display. *Note that the Upper Trigger key performs the identical functions as the Enter key.*

5 – Position two fingers on the display screen and move them apart to zoom in on a feature of the display (perform the opposite action to zoom out). Once zoomed (in a frozen image), you can drag with your finger to change the displayed view.

6 – Select the **Zoom** function using either soft keys or the touch screen (all displayed soft-key bar items can be selected either with the corresponding soft key or by tapping the touch screen). Use the **joystick** to change the **zoom magnification bar** (this and other blue bars can also be adjusted by dragging them using the touch screen), then select **Done**. Once zoomed, you can use the **joystick** to move the displayed view.

7 – When the **File Manager** screen appears, the selected file or folder is identified by this **blue outline**. Tap the display screen to select another item or to launch the selected file or open the selected folder. *Note that you can also display additional items (or directly access additional stored images) by simply swiping the display screen in any of the directions shown.* Alternatively, use the **joystick** to select another item by moving the **blue cursor**, then short-press the **Enter key** to launch the file or open the folder.

8 – Select any feature in the **Soft Key Bar** by either touching that feature on the display screen (in this case, touching the box containing the words **List View**) or pressing the corresponding **soft key**.

Unpacking, Assembling, and Powering the Visual iQ
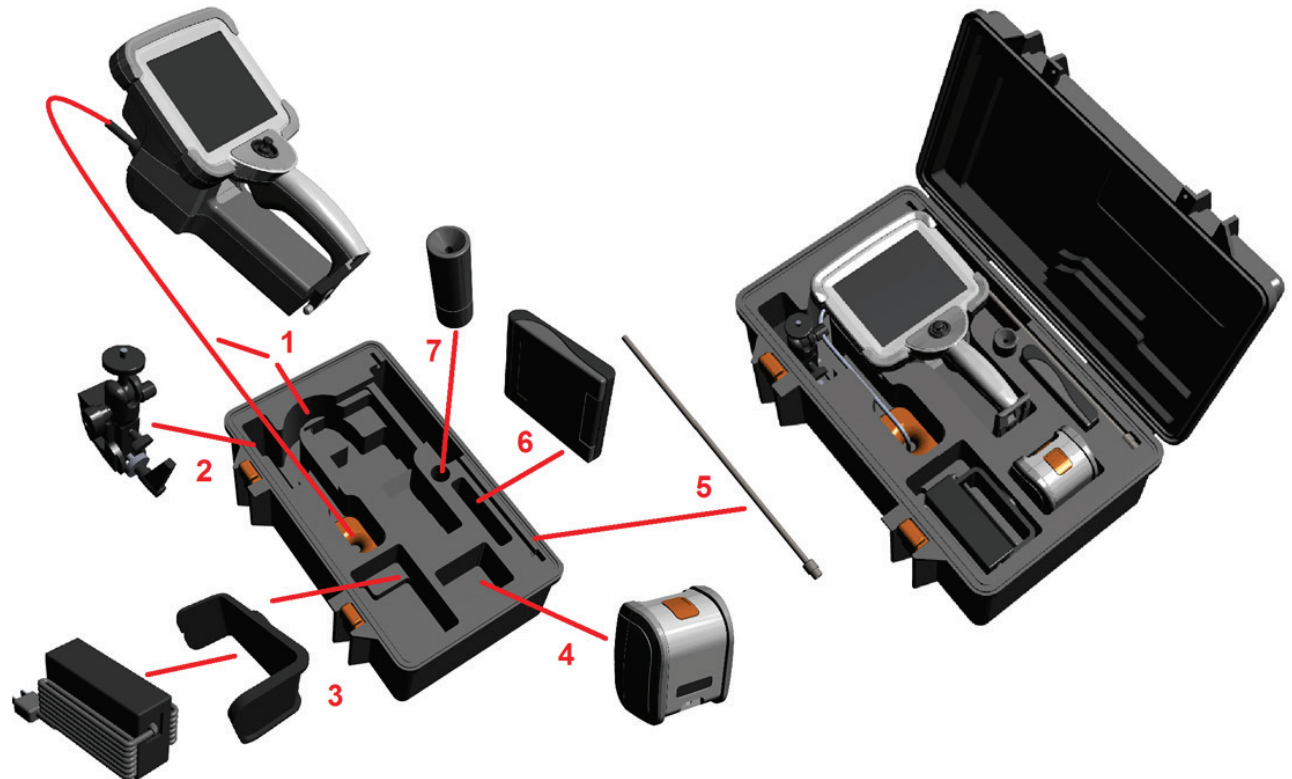
Unpacking and Putting Away the System (Small Case)

⚠️ *Caution: If you do not pack the system carefully, as described here, damage might occur.*

1 – The insertion tube (**shown in red for clarity**) is held in the case's internal storage reel, which is accessed through the orange funnel shown here. Install the insertion tube before installing the probe-and-handset assembly and remove it after removing the probe-and-handset assembly. Be sure to straighten any loops or twists in the insertion tube before feeding it into the funnel. Note that the insertion tube's rubber Torsional Strain Relief base should be routed through the case's curved passage shown here.

⚠️ *Caution: Before using the camera system, install an optical tip or the head guard, which prevents damage to the tip-attachment mechanism. Keep the head guard on whenever no optical tip is in place.*

2 – Install clamp in the orientation shown here (clamp and mounting bracket assembly appears at left)

3 – Power supply / Battery Charger and Mounting Bracket are oriented and installed in this slot

4 – Battery must be removed prior to installing the iQ in the case.

5 – Rigidizer

**6** – A case holding tips (or cleaning kit) fits in this slot.

7 – Gripper may be used alone, or with Rigidizer, to aid in orienting camera.

Unpacking and Putting Away the System (Large Case)

⚠ *Caution: If you do not pack the system carefully, as described here, damage might occur.*

1 – Remove tray to access additional storage space.

2 – The insertion tube (**shown in red for clarity**) is held in the case's internal storage reel, which is accessed through the orange funnel shown here. Install the insertion tube before installing the probe-and-handset assembly and remove it after removing the probe-and-handset assembly. Be sure to straighten any loops or twists in the insertion tube before feeding it into the funnel.
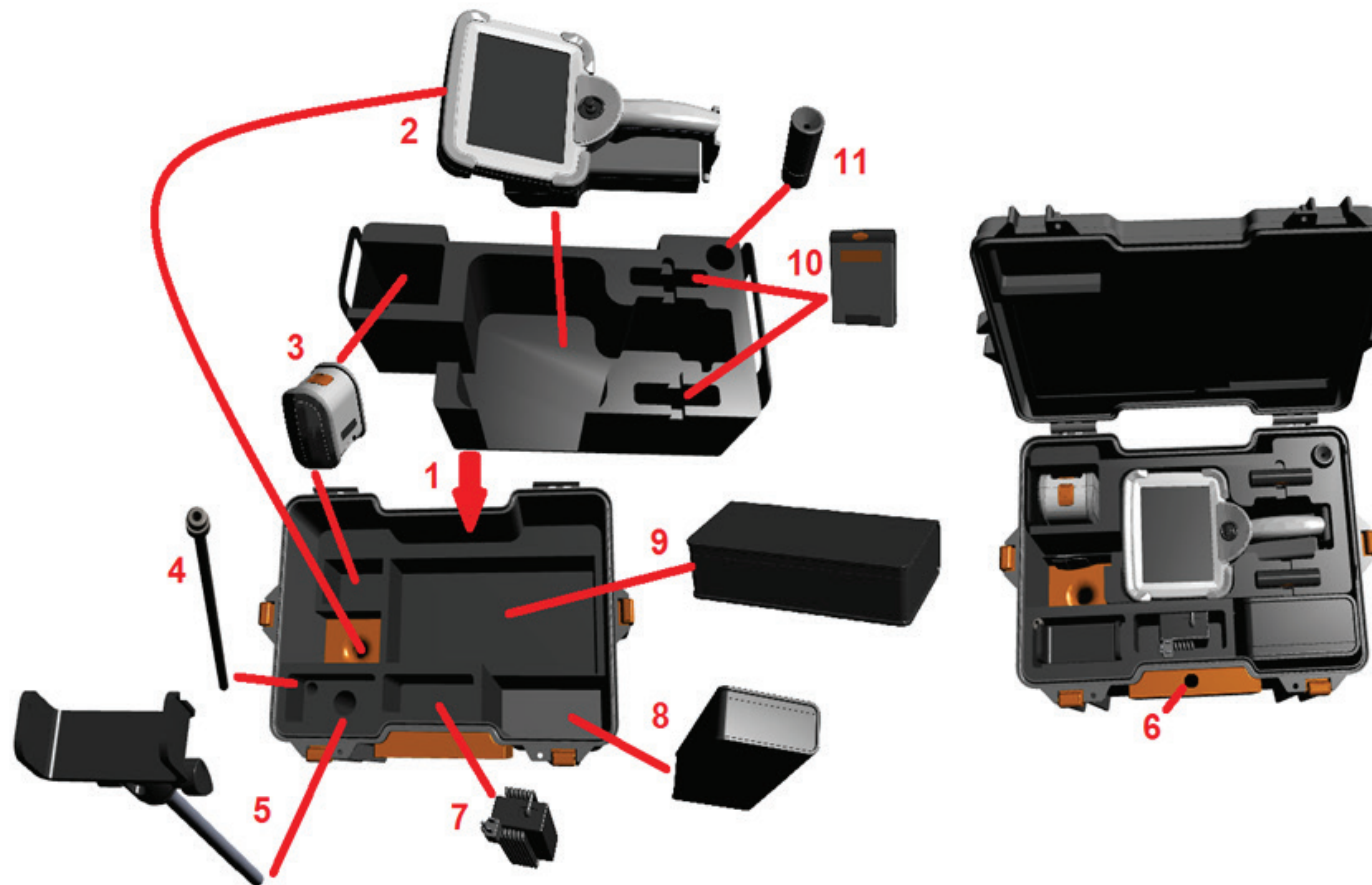
⚠ *Caution: Before storing the insertion tube, first remove the optical tip and install the head guard, which prevents damage to the tip attachment mechanism. Keep the head guard on whenever no optical tip is in place.*

3 – Storage locations for two batteries. Battery must be removed prior to installing the iQ in the case.

4 – Rigidizer

5 – Mounting bracket and post

6 – Mounting bracket post fits in this hole

7 – Power supply / Battery Charger installed in this slot

8 – Extra Pod in case

9 – Extra VideoProbe in case

10 – Two cases holding tips and a cleaning kit fit in these slots.

11 – Gripper may be used alone, or with Rigidizer, to aid in orienting camera.

About the Battery

The Visual iQ is powered by a 10.8 V (nominal), 73 Wh, 6.8 Ah Lithium Ion battery.

Installing the Battery

Insert the battery into the handset. The battery is installed properly when the latching mechanism is engaged.

⚠️ Caution—Do not force the battery (**1**) into the handset (**2**), as damage may occur. The battery is keyed and may only be installed in the proper orientation.

Removing the Battery

Press battery release button (**3**) to release the battery.

⚠️ Caution—Do not remove the battery while the system is operating.

Battery Charge Level

Check the battery charge by pressing the battery symbol (**4**) on the front of the battery. Each light (**5**) represents approximately 20% of the battery charge capacity.
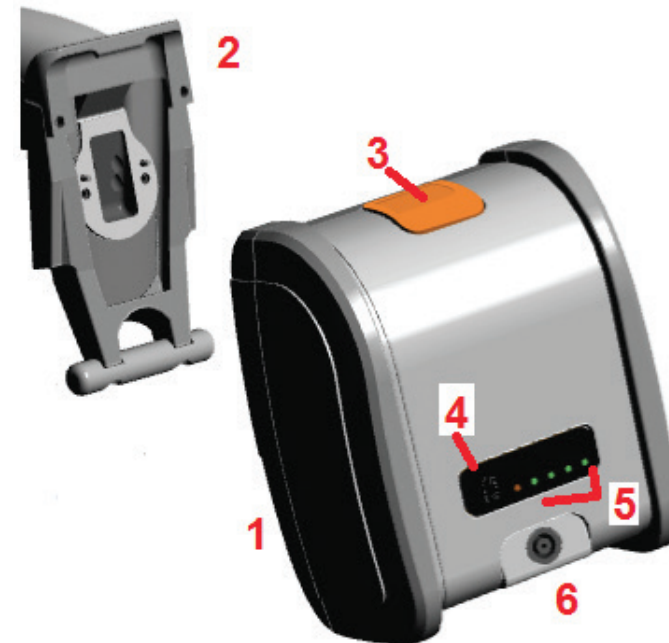
Charging the Battery

Connect the DC output of the battery charger into the Visual iQ battery (**6**) and then plug the included AC to DC power adaptor into a suitable AC power source. The LED battery lights will illuminate according to the amount of charge attained. The system may operate while charging.

Note: The battery may be charged while connected to an operating Visual iQ or while disconnected from the iQ.

Note: When the battery is fully charged, the LED battery lights will turn off.

Note: Battery run time approximately equals battery charge time; therefore, a two hour battery will take approximately two hours to charge. Charging time will be longer if the battery is connected to an operating Visual iQ system while charging.

Note: All batteries are shipped with a partial charge. Batteries should be fully charged prior to use.

Supplying Power to the Visual iQ

The Visual iQ is powered by a 10.8 V (nominal), 73 Wh, 6.8 Ah Lithium Ion battery.

The battery is charged by connecting the power adaptor to the battery, then connecting the supplied AC-to-DC power adaptor to a suitable (100-240 VAC, 50-60 Hz, <1.5 A rms) AC power source. The power adaptor delivers to the battery 18 Volts at 3.34 Amps.

Note: When powering a system with an AC power source, connect the power plug to a properly grounded source for reliable touchscreen operation.

Powering the Visual iQ On and Off

System Power On

Press and hold ![button] until the unit turns on. The buttons and Liquid Crystal Display (LCD) will light and begin the power-up sequence. After approximately 35 seconds, the system screen will display live video and on-screen controls. The system is now ready for use.

Note: All batteries are shipped with a partial charge. Batteries should be fully charged prior to use.

System Power Off

Touch the lower left corner of the display screen (which typically contains the on-screen

GE Logo (**1**) or the ![hardkey] hard key at any time to open or close the **Global Menu**, which provides access to several features including **Shut Down** (**2**). Select **Shut Down** to power off the Visual iQ.

⚠️ **Caution**—Do not power off the Visual iQ by removing its battery. Only remove battery after powering off as described above.
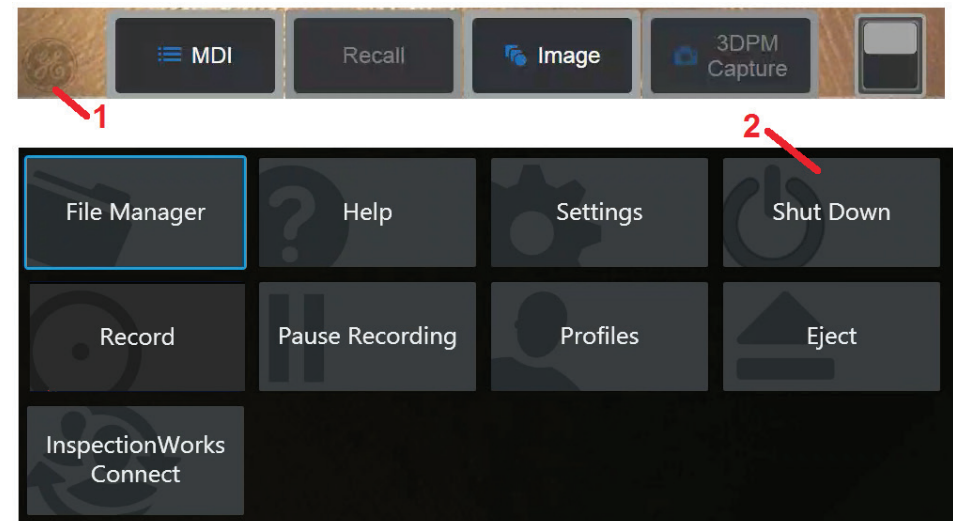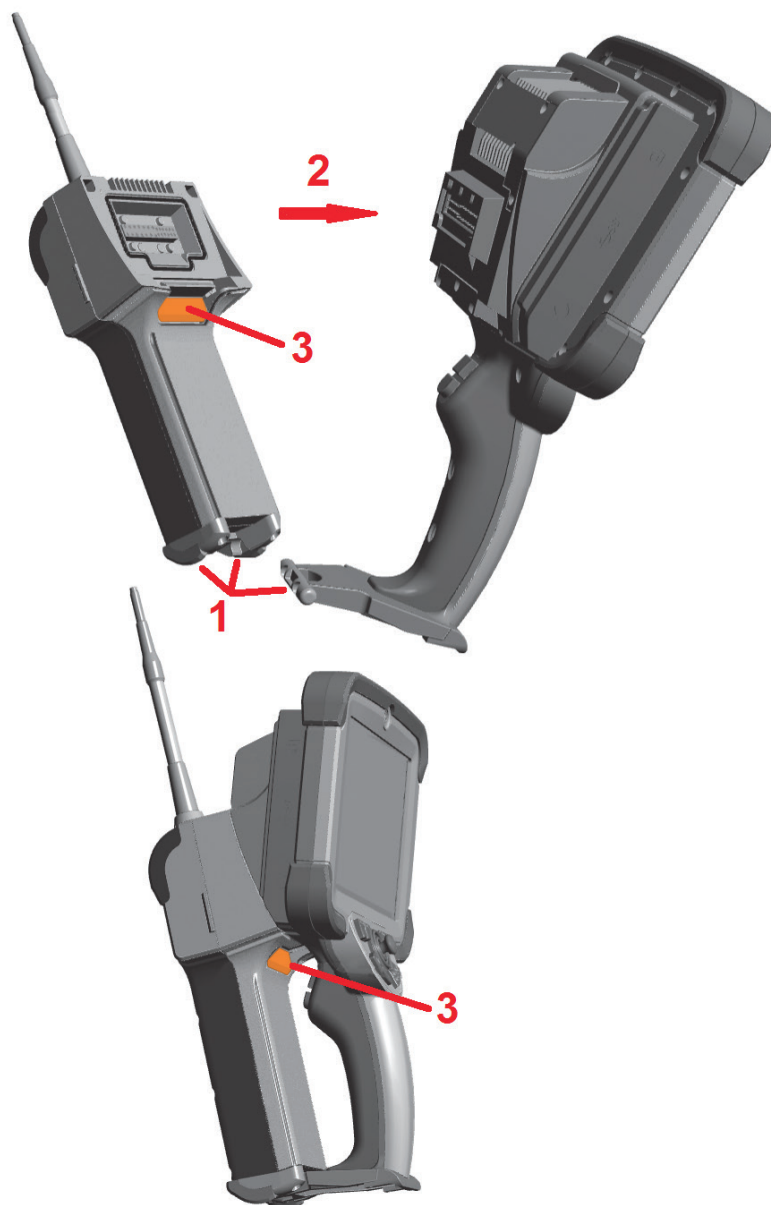
Changing Probes and Optical Tips

Attaching and Removing the Probe
To attach the probe to the handset:

1 – Insert the pin at the base of the handset into the mating groove at the bottom of the probe.

2 – Rotate the probe towards the back of the handset, applying enough pressure for the latching mechanism to "click."

To remove the probe from the handset:

3 – Press this latching-mechanic's release button to separate the probe and handset.

Changing the Optical Tip

Optical tips are threaded onto the probe with a double set of threads to prevent them from falling into the inspection area. Each optical tip provides a unique depth of field, field of view, and direction of view. For a list of available tips, see **Appendix B – Optical Tip Table**.

⚠️ **Caution**—Use only finger pressure to remove or attach tips. Using force (including pliers or other tools) might damage the bending neck. Take care not to cross the threads. To reduce cross-threading risk: When installing a tip by hand (6.1mm & 8.4mm) or with an installation tool (4mm), rotate the tip counter clockwise to *level* the threads before rotating clockwise to thread the tip on the camera. Reverse the leveling process when removing tips.

To Remove an Optical Tip: Support the bending neck and head of the probe with one hand, and with the other gently turn the optical tip counterclockwise (be sure to use a tip tool when removing 4.0 mm tips), Turn until the tip spins freely, indicating that it has cleared the first set of threads. Gently pull the tip away from probe and continue turning counterclockwise, engaging the second set of threads. Turn until you can remove it.
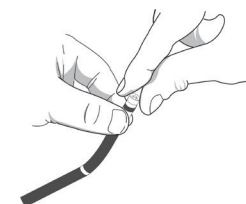
To Attach an Optical Tip: Verify that the optical tip and camera head threads are clean, then grasp the head of the probe with one hand, and with the other gently turn the tip clockwise. Turn until it spins freely, indicating that it has cleared the first set of threads. Gently push the tip in, then turn clockwise again, engaging the second set of threads. Turn until finger tight.

⚠️ **Caution**—Do not over-tighten tips. Pull on the tip gently to verify that it is securely attached. If the second set of threads does not engage, turn the tip slightly in a counterclockwise direction to allow the threads to levelize.

Note: Measurement tips must be tightened firmly to ensure accuracy.

Setting Up the Visual iQ Operating System

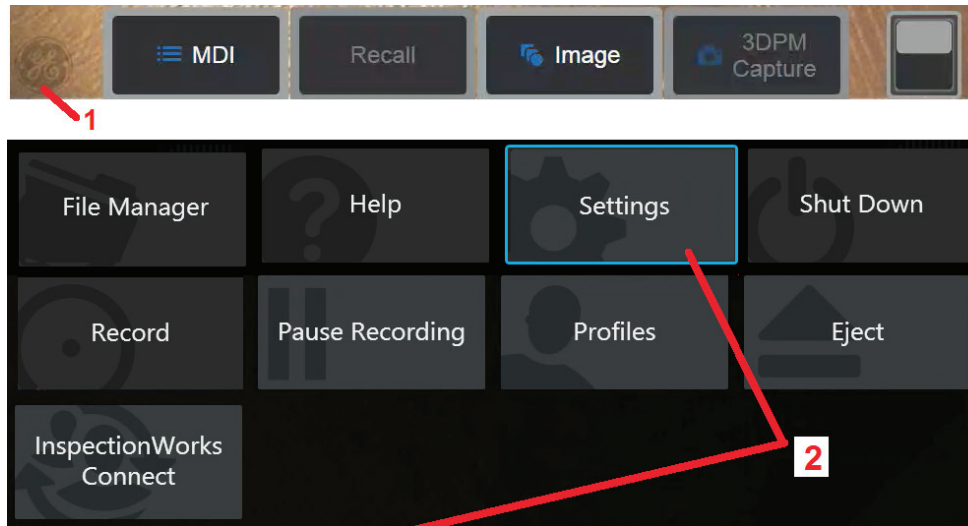**1** – Select the lower left corner of the display (which typically contains the on-screen **GE Logo**) or the [icon] hard key at any time to open or close the **Global Menu**, which provides access to several features including the **Settings Menu**.

2 – Tap to open the **Settings Menu.**

3 – Lists the device's serial number, software version and describes the configuration of its available features.

4 – Access to set a Password, Restore Defaults, adjust Date, Time, and operating Language, and alter various other system settings. Click here to learn more about the System Menu.

5 – Control automatic software update capability and manually update through web connection or connected USB drive.

6 – Allows the user to turn various on-screen indicators on and off as well as adjust display brightness. Click here to learn more about Display Setup.

7 – Allows the user to turn Wi-Fi and Bluetooth connections on and off as well as work with networks and identify folders for file sharing. Click here to learn more about Connectivity Settings.

8 – Allows the user to specify the default directories into which image files and videos are stored. Also used to select image file type, video format, and sound-related settings. Controls MDI Annotation and imports Distortion Correction Tables. Click here to learn more about Image and Video Settings.

9 – Allows the user to set their preferred measurement units (inches vs. mm), manage and verify measurement tips, and import and export preset annotations.

10 – Settings related to optional internet service that enables video collaboration between inspectors and remotely located experts.

11 – Generates a Troubleshooting Log to be emailed to and evaluated by GE Technical Support. If log generation is required, GE Technical Support will guide the user through the process.

Working with Profiles

A Profile defines several parameter settings. As long as more than one profile is available, (the Visual iQ is delivered with only a **Default Profile**), the operator is asked to select a **Profile** every time the system is powered on. Follow these instructions to create a new profile or select an existing one.

1 – To create a **New Profile**, touch the lower left corner of the display (or press the hard key) to open the **Global Menu**, then select **Profiles**.

2 – In this case, the **Default Profile** is active and it is the only one defined. Select **New** to create a new profile.

3 – The **Virtual Keyboard** opens. Enter a **Name** for the new profile.

4 – After entering a name and clicking **Done**, the new profile is added to the list of available profiles. This profile includes the settings in place, at the time of its creation, for each of the parameters listed below. Anytime the profile is reactivated, the system will apply the settings associated with the activated profile. The parameters affected include:

System Settings Including:
  Watermark Logo ON/OFF
  Time Format
  Date Format
  Language
  Power Management
  USB Slave Mode
  Steering Sensitivity

Screen & Display Settings – *All Parameters*

Connectivity Settings Including:
  Wi-Fi on/off
  Bluetooth on/off

Image & Video Settings – *All parameters except Distortion Correction Table*

Measurement & Annotation Including:
  Presets
  Zoom Window
  3DPM Mask
  3DPM Save Format
  Stereo Index
  Stereo Index Minimum
  Units
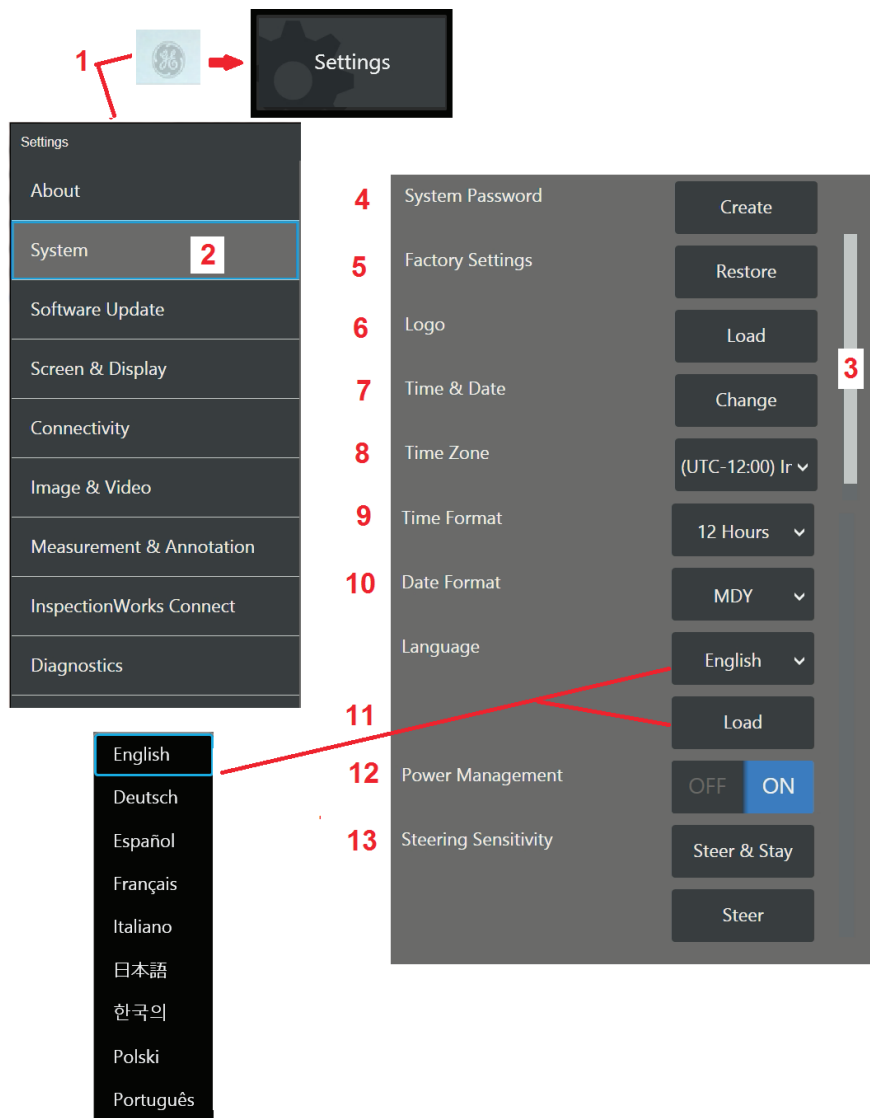
5 – Each time the Visual iQ is powered on, you'll be asked to select from the list of available profiles. Selecting the Default Profile returns the settings for all profile-controlled parameters to those specified by the default profile.

18
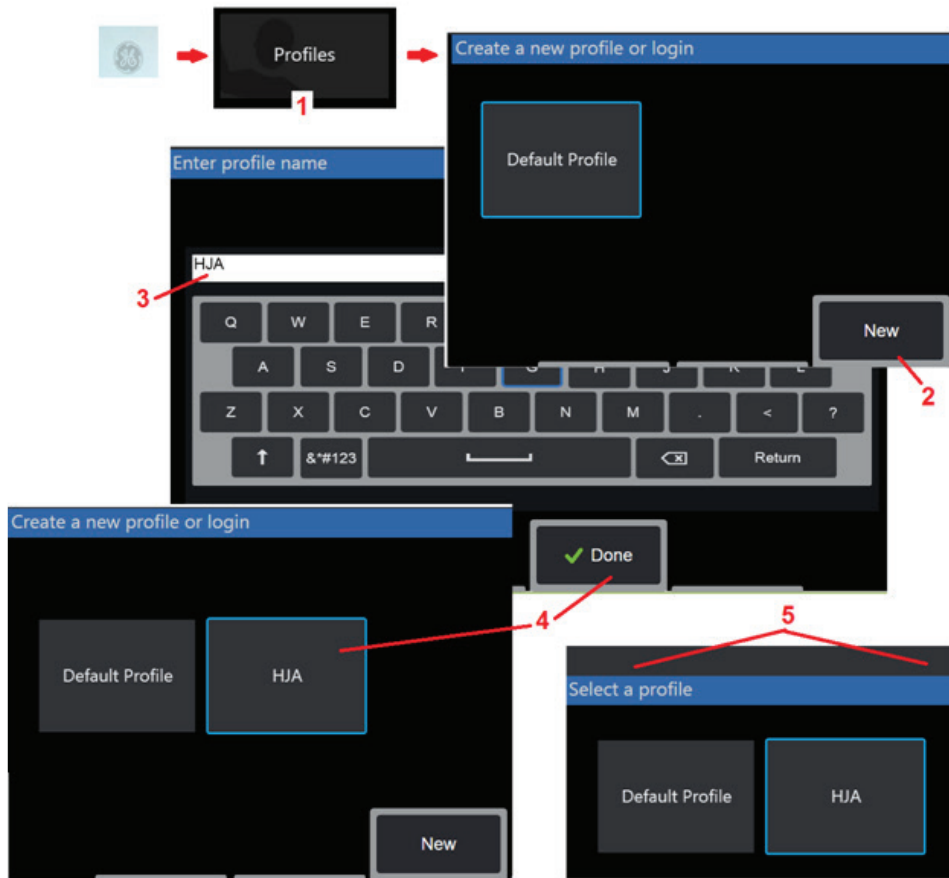
System Setup

1 – Tap the on-screen **GE Logo** (or press the [hard key icon] hard key) to open the **Global Menu**, then open the **Settings Menu**.

2 – Select to alter the system-specific settings shown here.

3 – Drag your finger up or down the screen. This bar will move to show the current position among the list of system-specific settings.

4 – Tap to open the virtual keyboard and create or change a **System Password**. Once created, accessing the iQ's operating sceens requires first entering the password. This password is for the entire system and is not associated with the active profile.

Note: Entering a password requires the **Default Profile** be active.

5 – Select and follow the on-screen prompts to restore the active **Profile** to the **Factory Default Settings**.

Loading a Logo

A logo can be loaded onto the display screen provided it is PNG file type (with dimensions smaller than 140 x 140).

6 – Select **Load**, then navigate the instrument or an external drive to select any PNG file type as the on-screen logo. **Click here for more information on creating and loading a personalized logo file.**

Setting Date and Time

7 – Adjust **Time** and **Date** settings.

8 – Select the **Time Zone** in which you are operating.

9 – Specify 12 or 24 hour **Time Format**.

10 – Specify **DMY, YMD,** or **MDY** as the **Date Format**.

Loading and Selecting the Operating Language

**11** – Choose from the operating **Languages** currently available for use. Selecting **Load** allows you to upload a new version of any of the existing translations available in the iQ. Once selected, the File Manager screen allows you to navigate to the modified translation file.

Other System Settings

12 – Setting **Power Management** to **ON** conserves battery power by putting the Visual iQ into sleep mode after 10 minutes of inactivity. When in sleep mode, in which only the hard keys remain lit, touching any key or the joystick returns the iQ to a fully powered state.

Steering Sensitivity Settings

13 – The user can select from two probe steering modes: **Steer** or **Steer and Stay™**. In either mode, the bending neck articulates to follow the joystick motion. The modes differ in how they behave after the bending neck is positioned (click here to learn about the differences between these modes). Select either button shown here then drag the setting bar to set the sensitivity of either **Steer** or **Steer and Stay** mode. The higher the setting, the more the bending neck will articulate with a change in joystick position. For instance, increasing the setting from 2.0 to 4.0 means that a similar joystick movement will produce a greater amount of bending neck articulation.
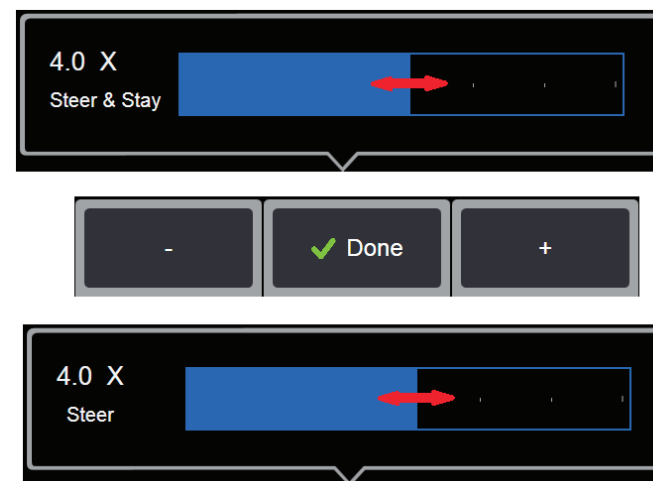
Screen & Display Setup
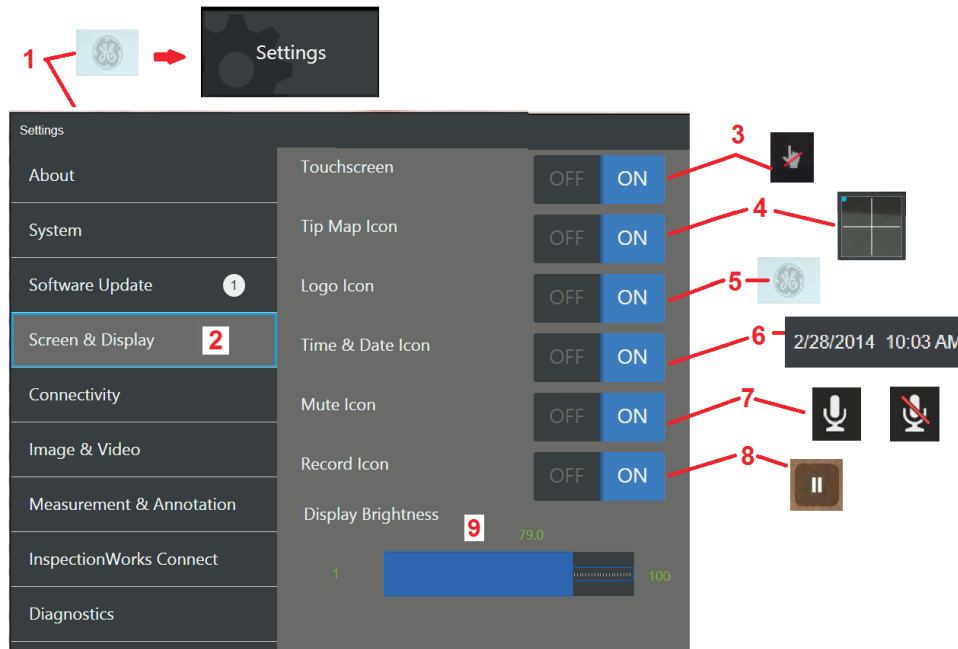
1 – Tap the on-screen **GE Logo** (or press the [⊞] hard key) to open the **Global Menu,** then open the **Settings Menu**.

2 – Select to alter the display-screen appearance and operation.

3 – Turn the display screen's touch-sensitive control **ON** or **OFF**. Once turned **OFF**, the icon shown here appears at the top of the display screen. Once disabled, use a combination of joystick and hard key press to re-enable the touchscreen.

4 – The **Tip Map** (shown here) graphically represents the extent to which the optical tip is articulated by positioning a bright dot at some distance from the crosshairs. The closer the dot appears to the center of the crosshairs, the straighter the tip's position.

5 – The customizable watermark shown here appears in the bottom left corner of the display screen. Tapping this location opens the **Global Menu.** Turning this icon **OFF** causes it to disappear while tapping in its former location still opens the menu.

6 – Turn the displayed date and time, which appears on the status bar at the display's upper right corner, **ON** or **OFF**.

7 – Select to turn the **Sound Recording** and/or **Sound Recording Muted** icons (shown here) **ON** or **OFF**. These icons appear in the display's bottom right corner when recording video with an audio stream. Note that when these icons are visible (turned **ON**), selecting the onscreen icon mutes or unmutes the sound recording.

8 – Display or hide touch-screen pause and play controls during video recording.

9 – Control the display's brightness by using your finger to drag this bar right or left (or

select with the joystick, press [↵] and then position with the joystick).
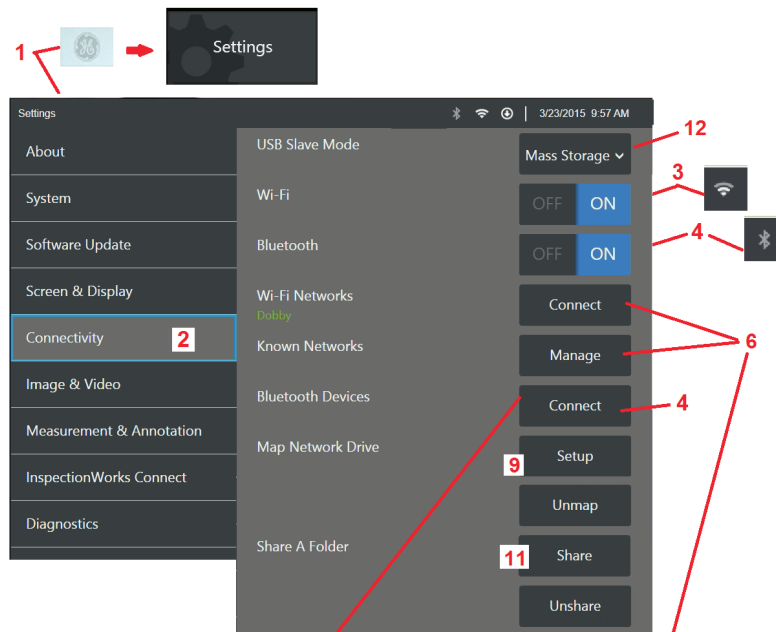
Connectivity Setup

1 – Tap the on-screen **GE Logo** (or press the ⊞ hard key) to open the **Global Menu**, then open the **Settings Menu**.

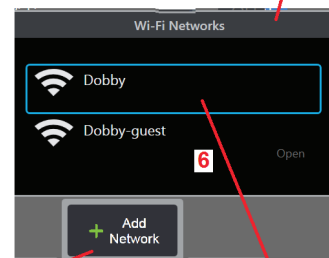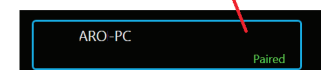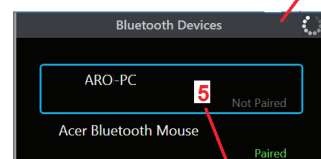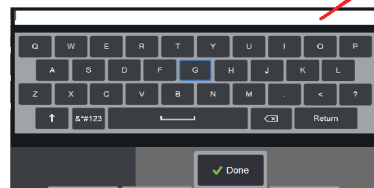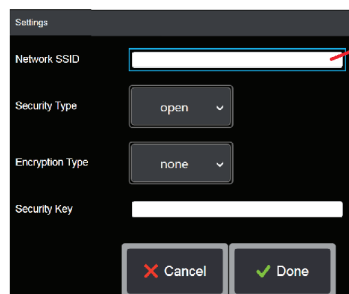**2** – Select to work with settings that control the connection of the Visual iQ to WiFi networks and Bluetooth devices.

3 – Turn the WiFi connection **ON** or **OFF**. Once turned **ON**, the icon shown here appears at the top of the display screen.

Making Bluetooth Connections

4 – Turn the **Bluetooth** connection **ON** or **OFF**. Once turned **ON**, the icon shown here appears at the top of the display screen. The icon is gray if Bluetooth is **ON** or white if Bluetooth is **ON** *and* **paired** with a device. Then, select **Connect** to display a list of available **Bluetooth Devices** to which the iQ can connect.

5 – Available **Bluetooth Devices** that appear on this list can be paired with by simply tapping the on-screen listing. Note that pairing a keyboard may require inputting a PIN. When the device status switches from **Not Paired** to **Paired**, it is in Bluetooth communication with the Visual iQ.

Working with WiFi

6 – Select **Connect** to display a list of available **WiFi** networks to which the iQ can connect. Tap the screen to select an already known network from this list. (Select **Manage Known Networks** at any time to review the list of already-recognized networks and/or **Edit** the list by removing networks to which you no longer wish to automatically connect). Once **Edit List** is selected, tap the blue corner of any network to delete it from the list.

7 – If prompted by the onscreen instructions, use the **Virtual Keyboard** to enter the network's password.

8 – Selecting **Add Network** allows you to enter the SSID and security information for a hidden network not shown above.
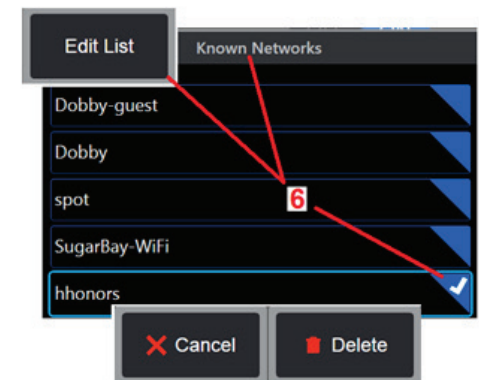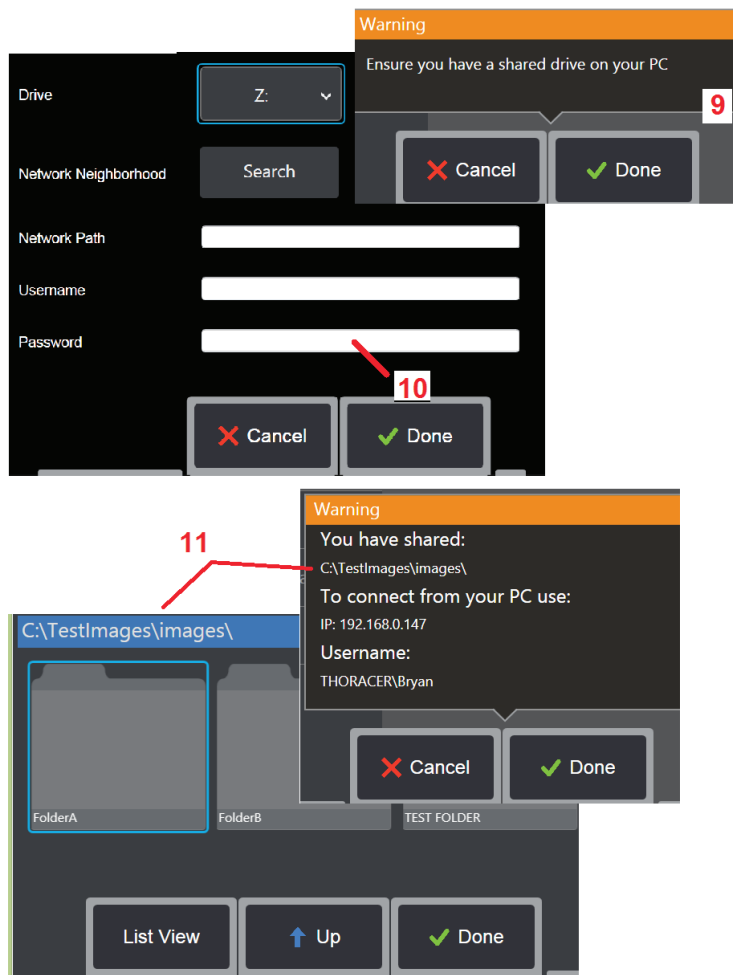
Mapping the Network Drive and Sharing Folders

9 – If you choose to give the Visual iQ's **File Manager** access to a folder on a network-connected computer, click on **Setup** (see above) to open the network-mapping process shown here. Next, select **Done** to confirm that the network connected PC has at least one folder identified for sharing.

10 – Enter the *drive letter you wish to assign (in the Visual iQ's File Manager) to the shared folder,* then input the complete path to the folder on the network-connected PC. Following is an example of a complete path to insert in the Folder line: **\\Device Name\TestShare Folder**. When the folder path and username/password (assuming it is a password protected network) have been entered, click **Done**.

11 – To share one of the Visual iQ's folders with a network-connected computer, click on **Setup** (see above) to open the file-selecting process. The path in the blue bar shown here identifies the folder that will be shared. Next, select **Done** to display the Warning statement listing the folder that will be shared, and select **Done** again to confirm that the identified folder is the one you wish to share with a network-connected PC.

12 – Set the **USB Slave Mode** to **Mass Storage** or **Disable**. When set to **Mass Storage**, a connected computer can work directly with files stored on the Visual iQ's hard drive for file management purposes. In this state, the iQ will not perform inspection functions. When file management functions are complete, change setting to **Disable** to return inspection functionality.
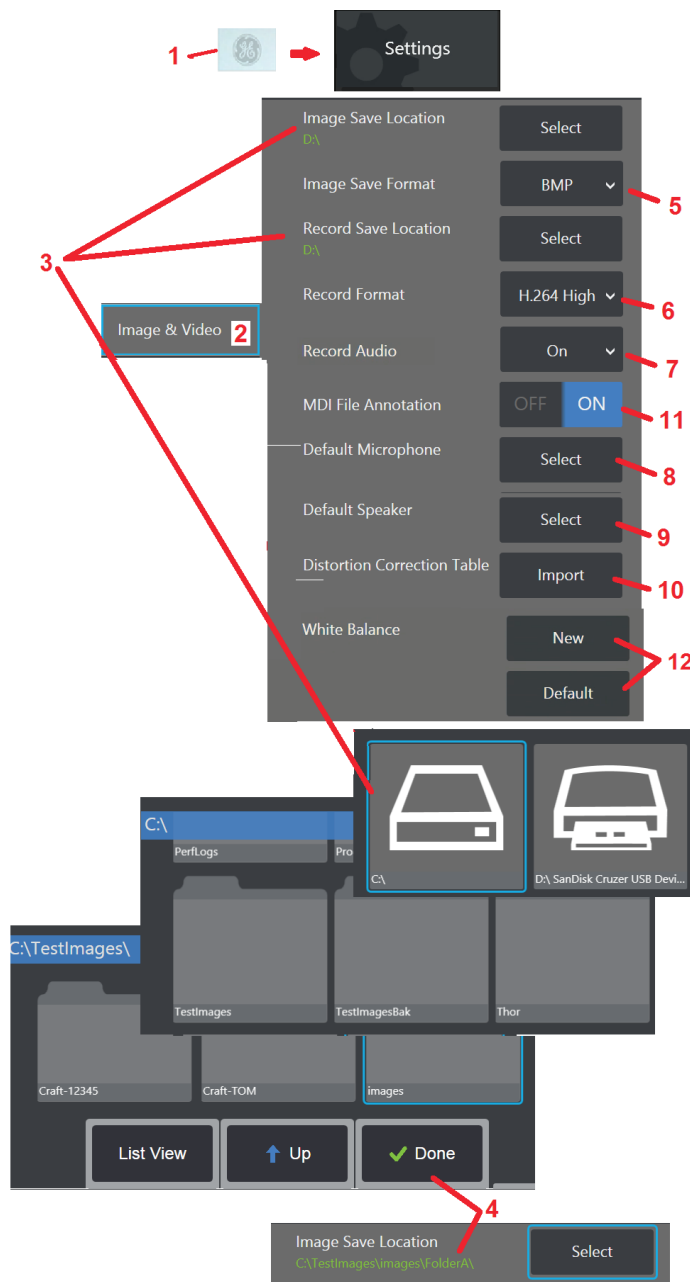
Image & Video Setup

1 – Tap the on-screen **GE Logo** (or press the ⊞ hard key) to open the **Global Menu**, then open the **Settings Menu**.

2 – Select to **Image** and **Video** related settings and defaults.

3 – Follow the procedure shown here to change either the **Image Save Location** or **Video Save Location**. These represent the two locations where quick-save images or videos are automatically stored. In the example shown here, these locations are both initially set to the **D:** drive. Press the **Select** soft key and then choose the desired directory path. When the desired storage location is opened, select the **Done** soft key to complete the process.

4 – Using the process outlined above, the default **Image Save Location** is changed to C:\TestImages\Images\FolderA\. This is the location into which quick-saved images will be stored **(Click here to learn more about Saving Images).**

5 – Choose either **BMP** or **JPEG** as the default image file type.

6 – Set the video recording format to either **H.264 High** or **H.264 Low. (Click here to learn more about Working with Video).**

7 – Determines if the microphone icon (at right) appears in the display's bottom right corner during video recording. When displayed, tap the icon to mute or unmute the recording of sound along with video. **Click here to learn more about muting or turning sound ON when recording live video.**

8 – When set to **Default**, the system will normally recognize the connected **Microphone**. Alternatively, choose a microphone from those available (choices are only those devices already connected to the Visual iQ or paired via Bluetooth).
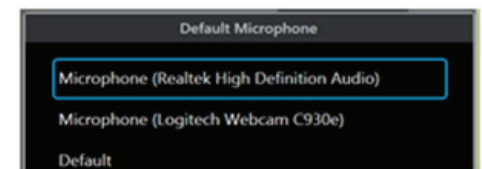
9 – When set to **Default**, the system will normally recognize the connected **Speaker**. Alternatively, choose a speaker from those available (choices are only those devices that are already connected to the Visual iQ or paired via Bluetooth).

10 – Should a not-yet-defined tip configuration require an alternative **Distortion Correction Table**, Contact GE Technical Support. A table supplied by GE Technical Support will include instructions on how to **Import** the file.

11 – When set to **OFF**, the menu-directed inspection stage name is not saved in the image but will still appear during the MDI process.

Executing a White Balance

A white balance corrects the color so that white appears white despite any slight hues that may exist under the lighting conditions present when performed.

12 – Select New and follow the prompts to point probe at a white target or select Default to restore factory color settings.
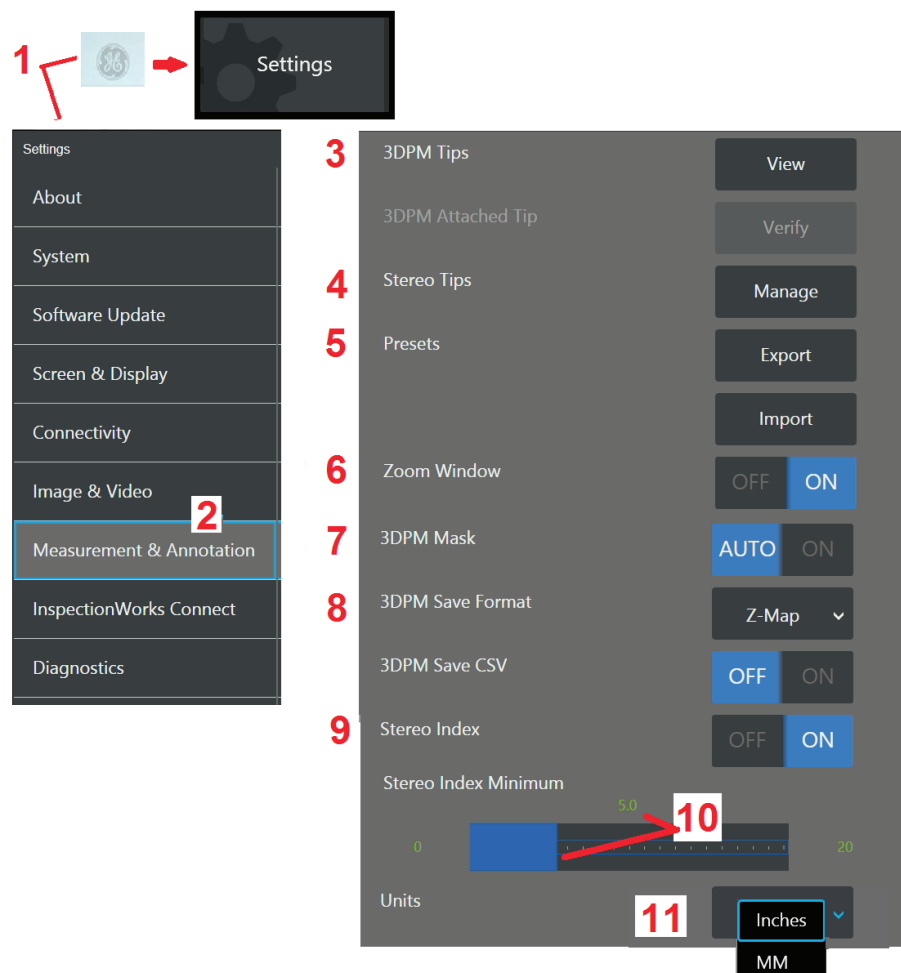
Measurement & Annotation Setup

1 – Tap the lower-left corner of the display (typically contains a **GE Logo**) or (or press the [image] hard key) at any time to open the **Global Menu**, which provides access to the **Settings Menu**.

2 – Select to alter the **Measurement and Annotation**-specific settings shown here.

3 – View the list of 3DPM Tips already calibrated for use with the attached probe.

4 – Select to view a list of Stereo Tips already-calibrated for use with the attached probe. The **Add Tip** and **Edit List** options are not intended for general use. Deleting a tip through the **Edit List** option will permanently remove that tip's calibration data requiring the probe and tip to be returned to an authorized GE Inspection Technologies service center for re-calibration.

5 – Save **Preset** Annotation (notes) to an external storage device or **Import** preset notes to the instrument from an external device.

6 – Displays or removes the Zoom Window (used for detailed cursor placement during measurement).

7 – Select **AUTO** to show the 3DPM red/yellow un-measurable pixel mask only when a cursor is placed on a red/yellow pixel. Select **ON** to always show the pixel mask when measuring.

8 – Select **Z-Map** for most usage. **P-Map** images contain additional data and may be requested by GE Technical Support to aid in troubleshooting.

9 – Controls the display of the Stereo Index, which appears during Stereo Measurement. **Click here for more about Stereo Index.**

10 – Sets a threshold value for the Stereo Index below which the index flashes during Stereo Measurement. This may be used to warn the user of low-index measurements where the accuracy may be reduced.

11 – Specify the unit of measurement as **Inches** or **Millimeters**.
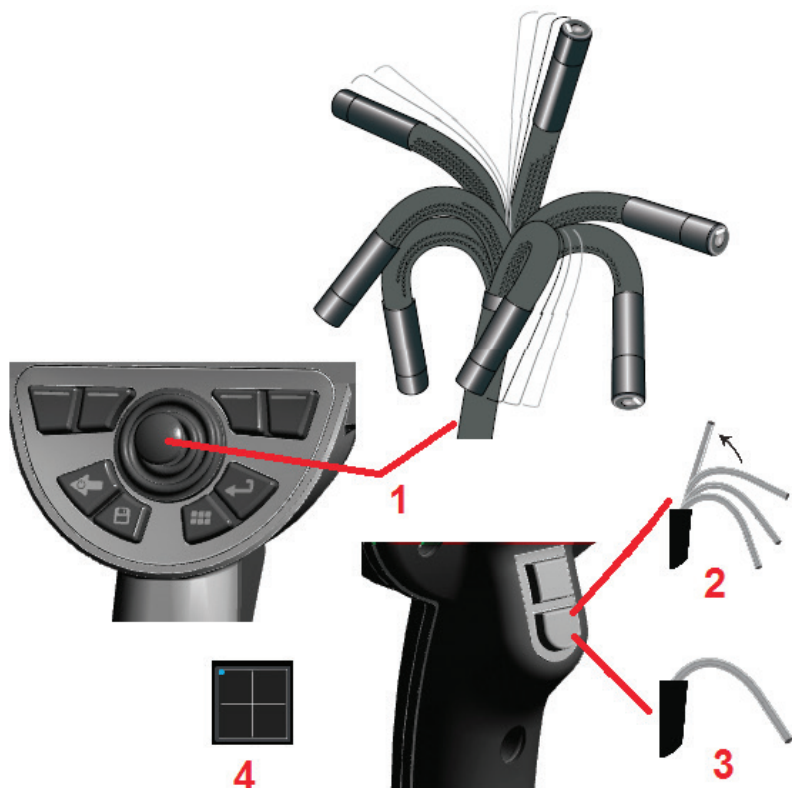
Capturing and Adjusting Images

Steering the Probe

When you are viewing a live image, you can aim the probe's camera by controlling its bending neck.

1 – **Steering the Bending Neck:** While viewing a live image, move the joystick toward the feature you want to see. The bending neck articulates so that the probe tip moves in that same direction.

2 – **Straightening the Bending Neck:** Long press this button to HOME or straighten the bending neck for safe withdrawal and storage of the insertion tube.

3 – **Setting the Steering Mode:** Short press this button to choose between **Steer** or **Steer and Stay** mode. In either mode, the bending neck articulates to follow the joystick motion. They differ in how they behave after the joystick is released **(click here to learn how to setup the sensitivity of either mode).** **Steer** mode allows the bending neck to

drift towards a straight position when the joystick is released. Steer and Stay mode **holds** the bending neck in its articulated position when the joystick is released. If you move the joystick while in Steer-and-Stay mode, the bending neck articulates. When you stop moving the joystick, the bending neck stays in the new position. This 🔒 icon appears when in Steer and Stay mode.

4 – **Tip Map.** This on-screen icon indicates the relative positions of the steering motors. When the illuminated dot appears in the center of the crosshairs, the motors are centered. The bending neck position generally follows the motor positions but is affected by the shape of the insertion tube and other mechanical effects. The further the dot appears from the center of the icon, the more the bending neck is articulated. Depending on the rotation of the insertion tube and camera, the viewing area may or may not align with the direction indicated on the **Tip Map.**

Guiding the Insertion Tube Into the Inspection Area

With the desired optical tip installed, guide the insertion tube into the inspection area. Use your hands to push the tube until it reaches an area you want to inspect. Twist the insertion tube gently to bring the desired scene into view. Accessories are available to make it easier to maneuver the tube:

- Rigidizers: Rigid or semi-flexible guide tubes (available in different lengths) keep the tube supported as you insert it or allows the tube to span a recess.
- Grippers: Cylindrical handles that slide over the insertion tube to make it easier to control. Grippers are threaded to connect to rigidizers and to access port couplers.

Temperature Sensor Warnings

When excessive temperature is detected, the applicable icon displays in the status bar, and one of the warning messages listed below appears across the top of the display screen:

- **Probe tip temperature has entered the WARNING Zone**—this message displays in an orange banner when tip temperature exceeds approximately 95°C and 🌡 appears in the status bar.
- **Probe tip temperature has entered the CRITICAL Zone**—this message displays in a red banner when tip temperature exceeds approximately 115°C and 🌡 appears in the status bar.
- **System is overheated, system shut down initiated**—this message displays in a red banner when internal temperatures exceed limits. Shutdown automatically initiates and 🌡 appears in the status bar.

When either the CRITICAL Zone or System Overheat warning appears, take immediate action to lower the temperature to which the indicated component is exposed.
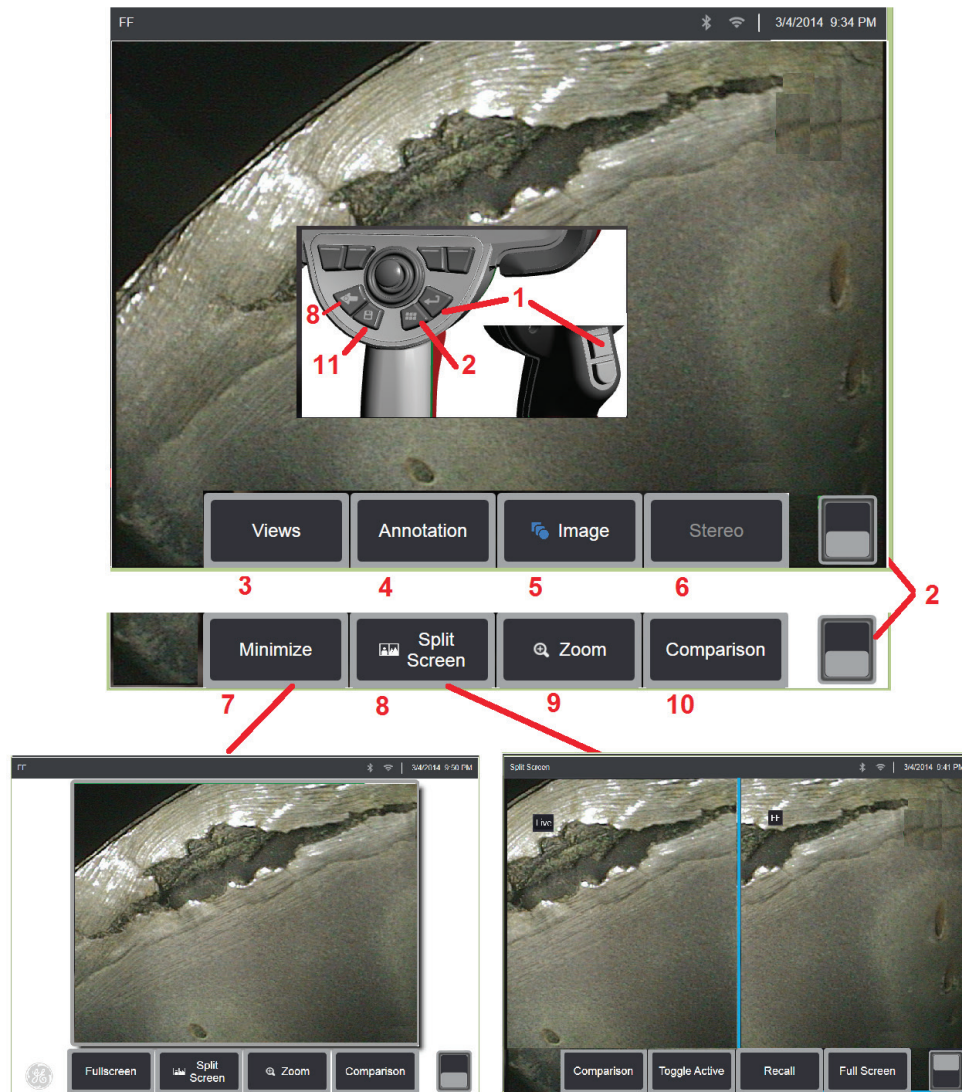
Freezing the Image

Freeze an image to temporarily capture it for review or adjustment. Moving the joystick in a frozen view does not articulate the probe tip.

1 – Briefly press either of these keys or tap anywhere on a live on-screen image to freeze the display. The [FF] icon appears in the upper left corner of the display and the soft key menu opens, allowing for adjustment of the frozen image. Reverse this process (or press [icon]) to unfreeze the display.

2 – Tap (or press and hold the [icon] key) to toggle between the upper and lower soft key menus. Double tapping in this location hides or displays the soft keys and status bar.

3 – Select any one of up to four **Views** available when a 2D image is frozen or six **Views** when a 3DPM image is recalled (click here to learn more about each view).

4 – Add notes or arrows to the frozen image **(Click here to learn more about annotating images).**

5 – Select and adjust four image transformation settings including **Brightness, Distortion Correction, Invert,** and **Inverse+.** **(Click here to learn about image settings).**

6 – When a stereo tip is calibrated to the system, **Stereo** appears in white text. Press to perform stereo measurement. If no stereo tips are calibrated, **Stereo** appears in gray and may not be selected. **(click here to learn more about Stereo Measurements).**

7 – Minimize the image to view unobscured by soft keys and status bar.

8 – Opens a Split Screen showing both frozen and live images. Press **Full Screen** to return to single screen view. **(Click here to learn about working with Split Screens).**

9 – Zoom in or enlarge a portion of the frozen image **(Click here to learn about the Zoom feature).**

Note: If you zoom in on a frozen image and then move the joystick or drag the image with your finger, the image pans as the system electronically reviews the entire image.

10 – Measure features of the frozen image **(Click here to learn about Comparison measurements).**

11 – Press or press-and-hold to Save the frozen image **(Click here to learn about the Save feature).**
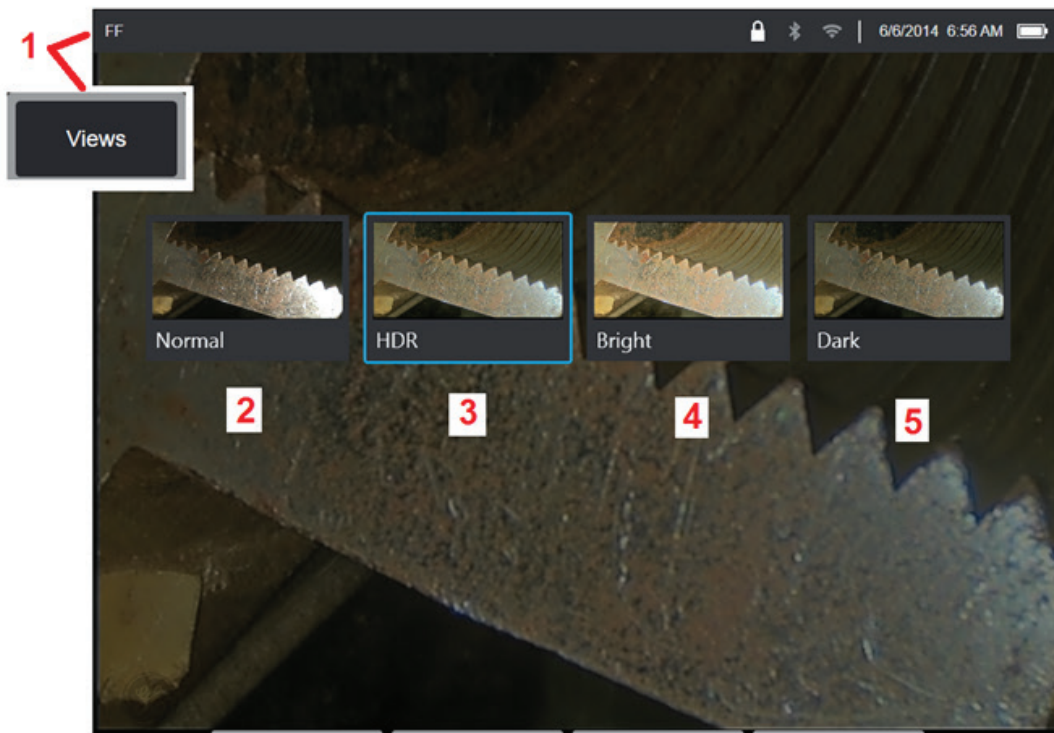
Selecting a View

When a 2D image is frozen (or a 3DPM image is recalled), the user can select from various Views as described below.

1 – Anytime an image is frozen, select to choose from all available **View** options.

2 – Displays a normal dynamic range image created by applying **Adaptive Noise Reduction (ANR)** processing to live video frames prior to the freeze request.

3 – **HDR** is a **high dynamic range** image generated by combining normal brightness ANR images captured before the freeze request with images of different brightness levels captured after the freeze request. This reduces the glare (number of saturated pixels) and increases brightness in dark areas.

4 – Displays a view similar to HDR but gives up some detail in bright areas to further brighten dark areas.

5 – Displays a view similar to HDR but gives up brightness in dark areas to show more detail in bright areas.

Note: To optimize the quality of all captured images, hold the probe tip still at the time of capture. Increasing the live image brightness prior to image capture will improve the quality of the "HDR" and "Bright" images in darker areas.

Note: Point Cloud and Depth Profile views are only available when working with 3DPM images. Click here to learn more about working with these views.

Note: Once an image is saved with any one of these View options active, only that option and Normal are available when the saved image is recalled.

Saved D:\Dev\M1403180004.JPG

2

1

Saving C:\Dev\M1403180005.JPG

Inch
A09
WHT

3

| Save | Select Save Folder | Rename Image | Add Audio |

4

12

D:\

| Dev | Release_Feb27_2014 | Windows | ExecUILog |
| TestImages | Program Files | TestImagesBak | WCL |

| Record Audio | ✕ Cancel | ✔ Done | Play Audio |

6

Trial 1

| List View | ↑ Up | ✔ Done |

q	w	e	r	t	y	u	i	o	p
a	s	d	f	g	h	j	k	l
z	x	c	v	b	n	m	.	,	/
↑	&*#123		⌫	Return

5

7

| ✔ Done |

8

10

Save

9

Saving D:\TestImages\Trial 1.JPG

11

Saved D:\TestImages\Trial 1.JPG

2 – At all times, the intended saving location (in this case the Dev directory located on the D drive) is listed here. After a file is stored, the status bar at the top of the screen indicates "**Saved**." The file name (described below) and format are also listed.

3 – While in the process of assigning an alternative name or destination for the image file, the status bar at the top of the screen indicates "**Saving**."

4 – Choose an alternative directory into which the file will be stored.

Note: Tap and open the target folder

5 – Tap to complete the target directory selection.

6 – Select to **Rename** the file prior to saving. The virtual keyboard opens.

7 – Select to choose from numeric characters or symbols.

8 – Tap after typing the desired name.

9 – The status bar now indicates the new target directory (in this case, *TestImages*) and the new file name (*Trial 1*).

10 – Tap to complete the saving process.

11 – The status bar now indicates that the file has been "**Saved**."

12 – Add audio comments to the file *before completing the saving process* (Click here to learn more about recording audio).

YYMMDDXXXX.FFF

Date
(year, month, day)

Unique
identifier

Format
(BMP or JPG)

Saving Image Files

Image files can be stored in the Visual iQ or a detachable device. The **Quick-Save** feature stores a file with a default name and file type in a default directory **(Click here to learn more about setting default file names, types, and directories).** Alternatively, use the **Save Options Menu**.

1 – Short press of this hard key to **Quick Save** the displayed image in the default directory. A long press of this key opens the **Save Options Menu**.

Working with a Recalled Image

Image and video files can be stored in the Visual iQ or a detachable device. The **Recall** feature allows these stored files to be displayed, measured, and annotated. Follow these steps to locate and **Recall** a stored file:

1 – **Recall** a stored image or video by tapping the on-screen **GE Logo** (or press the [icon] hard key) to open the **Global Menu**, then select **File Manager**.

Note: Selecting the **Recall** soft key (when enabled) automatically opens the last saved image (provided one has been saved since the iQ was last powered ON). Moving the joystick (or dragging the display with your finger) left or right recalls other images stored in the same folder as the originally recalled image.

2 – Controls the **File Manager's** appearance (both **Thumbnail** and **List Views** are shown here).

3 – Select to navigate to the next higher directory within the **File Manager**.

4 – Select to **Copy, Rename,** and otherwise **Edit** stored files **(Click here to learn more about the file Edit feature).**

5 – Choose which file types to display.

6 – Tap to switch between the **Soft Key Bar's** top and bottom row. Double tapping in this location hides or displays the soft keys and status bar.

7 – Determine the order in which folders or files are listed (by date or alphabetical order).

8 – Tap screen to select the folder to open.

9 – Tap screen to select the file to **Recall**.

10 – Once an image is recalled, various actions can be taken (see soft key menus below). Click on any of the following to learn more about the function:

-Select the displayed View
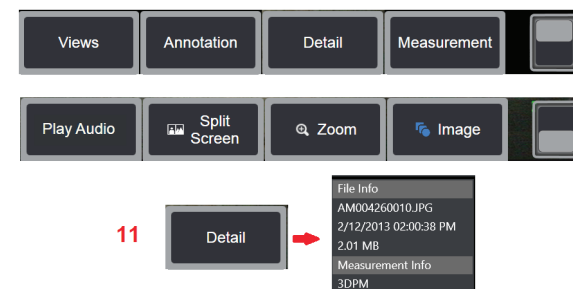-Annotate by adding text or arrows
-Measure image features
-Play recorded audio
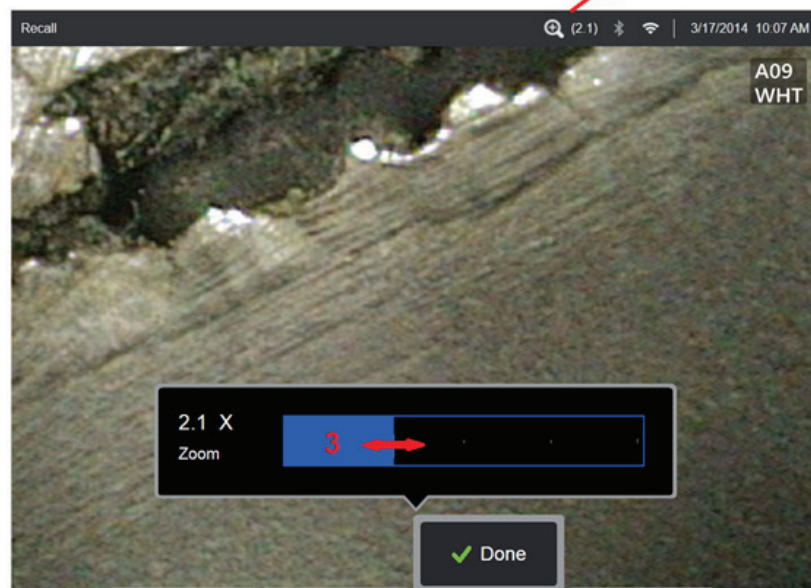-Open a Split Screen to display
  any two images (live, frozen, or
  recalled)
-Use Zoom to magnify
-Adjust the Image

11 – Press to open an onscreen list of the displayed file's **Detailed** properties.
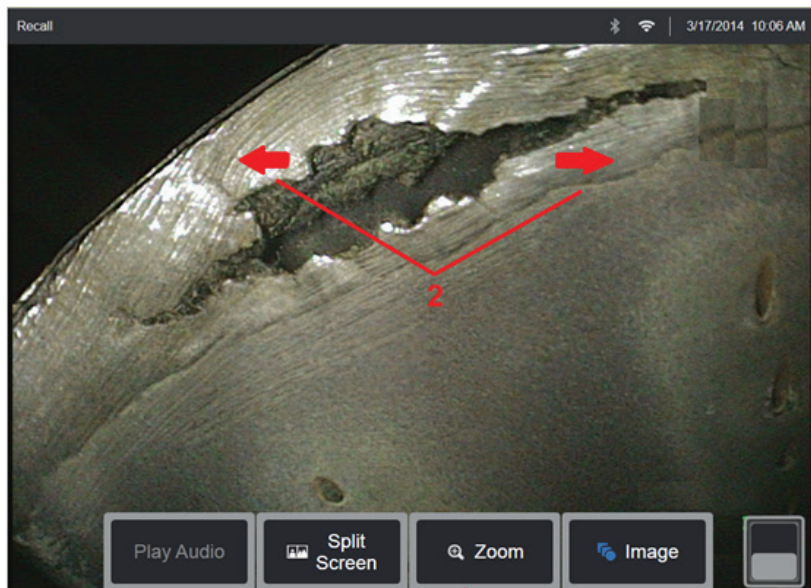
Zoom to Magnify

The Zoom feature magnifies the view of live, frozen, and recalled images. Because the zooming process is digital, pixilation increases as the image is magnified.

Note: The Visual iQ offers two equivalent zooming methods.

1 – Select this soft key to launch the Zoom control bar.

2 – Position one finger on either side of a feature, then slide fingers apart to increase magnification (Zooms IN). Moving fingers towards each other decreases magnification (Zooms OUT).

3 – Touch and slide this bar left or right (or move it with the Joystick) to decrease or increase the amount of image magnification. Repeat this process to return to a unmagnified image (Zoom value of 1X).

4 – Select when the image magnification process is complete.

5 – When the image is zoomed, the [icon] icon appears in the display's status bar along with a value representing the amount of image magnification (2.1 times is shown here).

Note: Whenever a frozen or recalled image is magnified with the Zoom feature, simply drag your finger across the display screen or use the Joystick to view off-screen portions of the magnified image.

Image Transformation Settings

These settings, accessed by selecting the **Image Menu**, alter the appearance of live images. (Some of these settings also affect frozen or recalled images.) At any time, the values assigned to these eight transformation settings can be saved as a user-named **Preset**. When recalled, all transformation settings will revert to these "preset" values. **(Click here to learn about working with Preset Image Transformation Settings)**
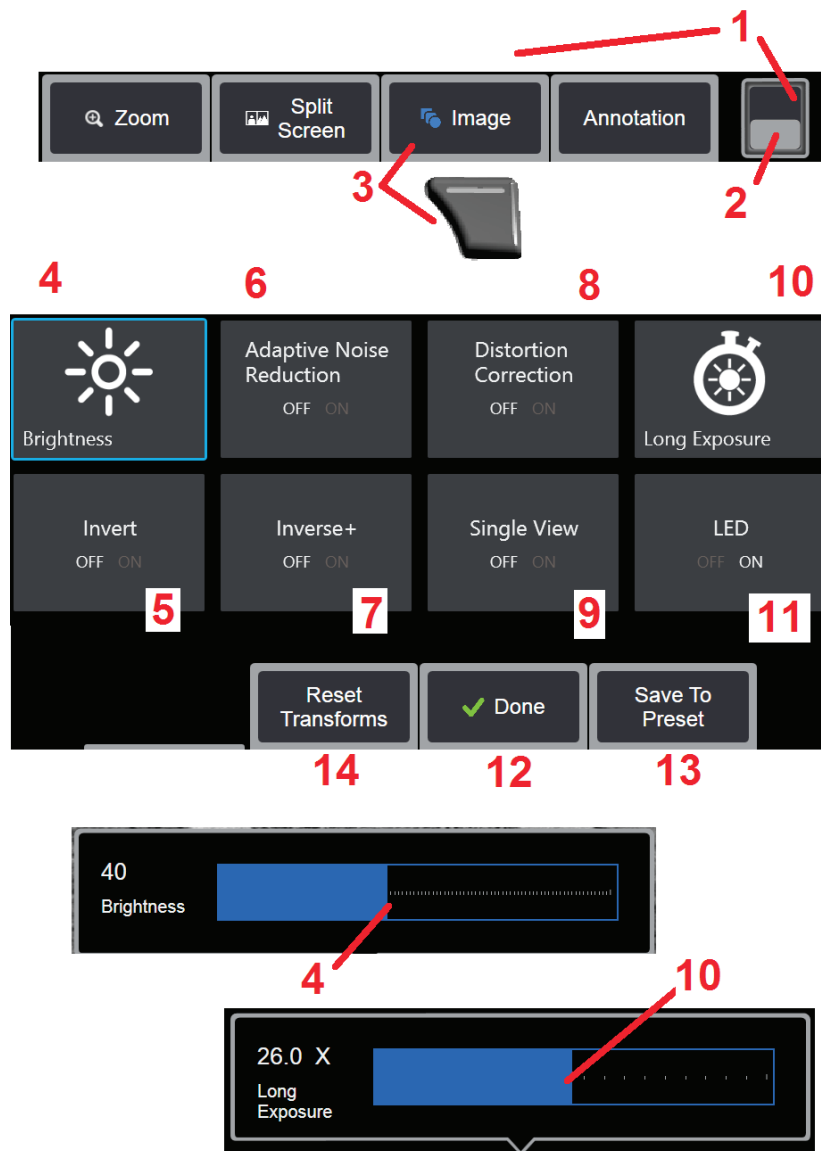
1 – Double tap this switch to hide or display the **Soft Key Bar.**

2 – Tap to switch between the **Soft Key Bar's** top and bottom row.

3 – Tap on-screen **Image** button or press the corresponding key to display the **Image Menu.**

4 – Tap the on-screen **Brightness** icon to adjust the displayed image. The adjustment bar shown will then appear – drag it to the left or right. You can adjust the brightness of live, frozen, and recalled images as well as recorded video. The brightness level selected when an image is saved will be maintained when the image is recalled.

Note: When viewing live images, adjusting the brightness means controlling exposure time and camera gain. When viewing still images or recorded video, adjusting the brightness means controlling digital gain.

5 – Tap on-screen **Invert** icon to turn **ON** or **OFF**. When turned ON, appears at the top of the display. This feature horizontally flips any image.

Note: This feature allows you to "correct" images when using a side-view optical tip, since the prism contained in these tips would otherwise show an inverted image.

6 – Tap to turn **Adaptive Noise Reduction (ANR) ON** or **OFF**. ANR works to reduce the amount of noise (which appears as a grainy image) visible when the probe is positioned in a dark area. The ANR setting (ON or OFF) applies only to live video. **ANR** is automatically applied to reduce noise in all frozen and saved images, even when the ANR setting is set to OFF. When turned ON, ▦ appears at the top of the display.

Note: Keep the probe still when capturing an image. Noise increases with probe movement.

7 – Tap to turn **Inverse+** either **ON** or **OFF**. When turned ON, ▨ appears at the top of the display. The Inverse+ function enhances image contrast – often making subtle details more visible in low light or poor contrast images. Turning **Inverse+** ON reverses the image's dark and light areas, much the same as a photographic negative.
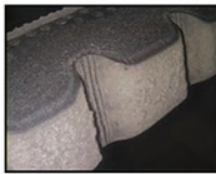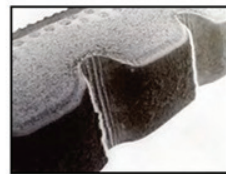
Inverse+ OFF   Inverse+ ON

8 – Tap to turn **Distortion Correction either ON** or **OFF**. The **Distortion Correction** function corrects the wide-angle edge distortion that occurs when using optical tips with various angle fields of view

Note: When saving a corrected image, the face of the image will be labeled 120 Deg.

Note: When viewing a corrected image, the selected tip field of view (FOV) angle is overlaid in the lower right corner.

Distortion Correction OFF   Distortion Correction ON

9 – Tap to turn the **Single View** feature **ON** or **OFF**. **Single View** is useful while positioning a stereo optical tip. This feature makes it easier to navigate the camera by temporarily eliminating the second image.

10 – Tap the on-screen **Long Exposure** icon to **brighten live images** by increasing the camera's maximum exposure time. **Exposure settings can vary from 1X to 600X.**

Note: The longer the exposure, the greater the risk of blurring the image. Keep the probe tip as still as possible when capturing an image with a long exposure.

11 – Tap to turn the illumination LED ON or OFF

12 – Tap on-screen DONE button or press the corresponding key to close the Image Menu and return to the Soft Key Bar. Any changes to image transformation settings will remain until manually modified or otherwise altered by recalling a stored Preset.

Pressing   while viewing live video turns off all transforms.

Note: Any changes made to image transformation settings are lost during power down.

13 – Tap on-screen Preset button or press the corresponding key to create and name a Preset containing the values currently assigned to each of the eight Image Transformation settings. Recalling the Preset later allows you to automatically change all Image Transformation settings to the stored values. **(Click here to learn about Working with Preset Image Transformation Settings).**

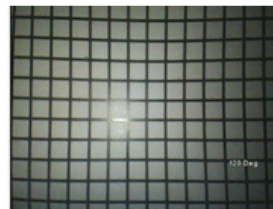**14** – Tap on-screen **Reset Transforms** to restore the factory default values for each of these eight settings.

Working with Preset Image Transformation Settings

Values assigned to the image transformation settings can be saved as a user-named **Preset**. When recalled, all transformation settings will revert to the values assigned when the **Preset** was created. Each user-named **Preset** appears as a soft key in the **Image Menu**. To load a **Preset**, simply select its soft key or press the corresponding button.

1 – Tap the on-screen **Image** button or press the corresponding key to display the **Image Menu**, which contains the eight image transformation settings. Adjust settings as needed.

2 – To save the image transformation settings in a user-named **Preset**, select **Save to Preset**. The **Preset List** will open.

3 – Tap to select any one of the five **Presets**. The **virtual keyboard** will open, allowing you to name the **Preset**.

4 – After entering a name for the **Preset**, select **Done**.

5 – The user-named **Presets** appear as soft keys in the **Image Menu**. Select any of these to load the settings stored in the corresponding **Preset**.

6 – Tap here to toggle between the upper and lower **Soft Key Bars**.

Note: Presets are stored only for the profile that is logged in at the time they are created.
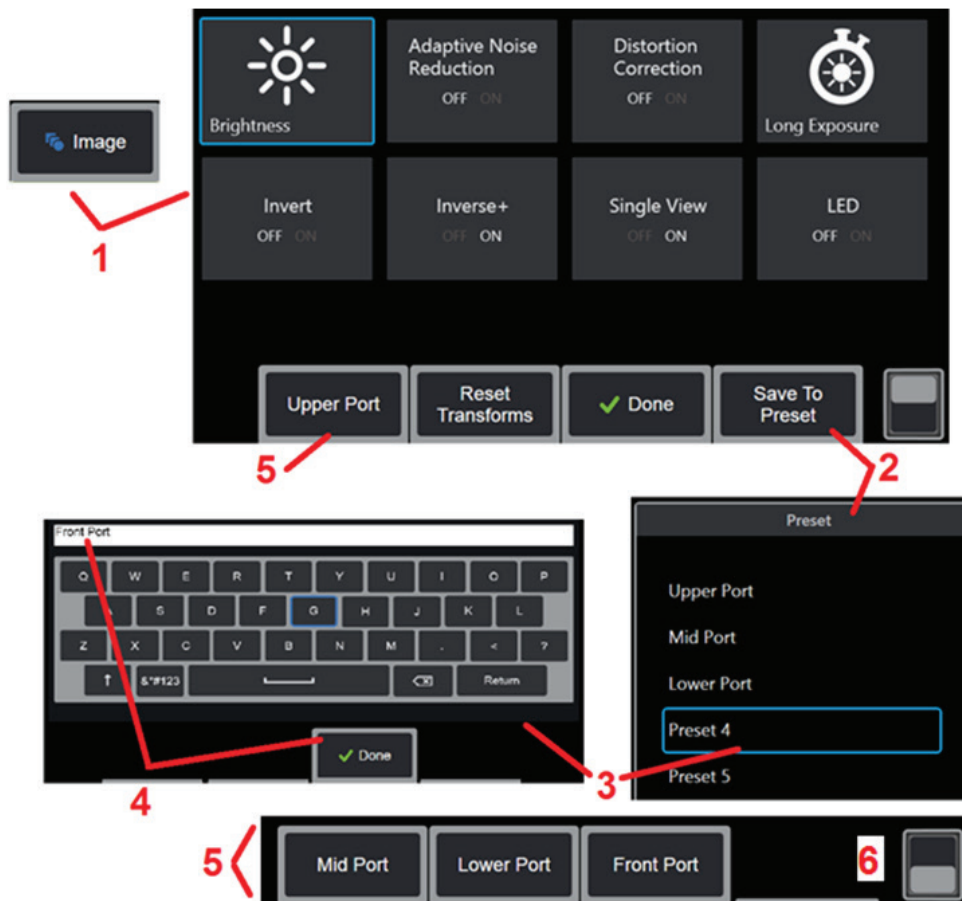
Working with a Split Screen

A split screen displays two images side-by-side in any combination of live, frozen, or recalled. Since half-screen still images are cropped, dragging a finger across the display or moving the joystick allows you to pan side-to-side within the image.

1 – Press at any time to launch the Split Screen feature. One half of the screen will initially show a live image, the other shows a frozen version of the image that appeared when **Split Screen** was selected.

Note: To exit Split Screen mode, press   until a full-screen reappears.

2 – Each displayed image will be identified as either **Live, Frozen (FF),** or **Recalled**.

3 – Select which image is active by touching either side of the split screen, or by selecting this soft key, or moving the joystick left or right. Only one image is active at a time, as indicated by the blue outline around the active image.

4 – Change the magnification of the active image by zooming IN or OUT **(Click here to learn more about the Zoom feature).**

5 – Select to **Recall** a stored image into whichever side of the display is currently active **(Click here to work with Recalled images).**

6 – Temporarily displays the active image as a full screen. This action **DOES NOT** cause the display to exit **Split Screen** mode.

7 – Measurement mode available for still images. This soft key is labeled with the most advanced measurement mode (3DPM, Stereo, or Comparison) available for the active still image. It allows measurement to be entered with the active image. Exiting from measurement will return to the current Split Screen view. **(Click here to learn more about Comparison measurement mode).**
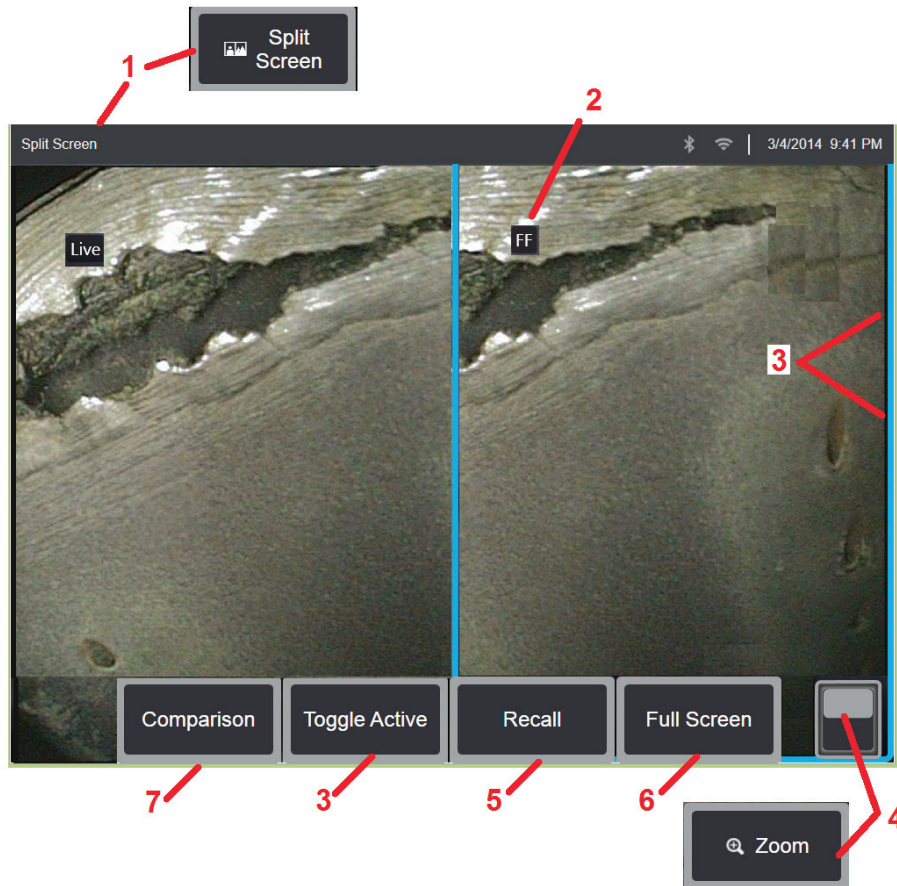
Annotating with Text and Arrows

Annotating an image means adding text or arrows to point out areas of interest: cracks, indications, etc. You can annotate live, frozen, and recalled images.

1 – Select to launch the **Annotation** feature.

2 – Tap to switch between the **Soft Key Bar's** top and bottom row. Double tapping in this location hides or displays the soft keys and status bar.

3 – Adding annotation begins by selecting **Text** or **Arrow**.

4 – Selecting **Text** opens the **Virtual Keyboard**. Enter the desired note.

5 – Select to add the entered note to a list of up to 100 **Preset** notes, which can be repeatedly used without typing.

6 – Select **Done** when finished typing the note, which will appear on the image surrounded by a blue box indicating it is selected. While in this selected state, the note can be moved (by dragging with your finger or using the joystick), **Edited**, or **Deleted**. Select **Done** again to de-select the note.

7 – A selected **Arrow** (added in the same way as a note) appears with a ball at one end. Move the arrow around the display by dragging with your finger (near the arrowhead) or using the joystick. The arrow may also be rotated by moving the ball with your finger or with the **Rotate** soft key.

8 – Select **Done** to de-select the arrow.

Note: Any note or arrow can be selected by simply tapping its position on the display.

9 – Opens the list of user-created **Preset** notes (annotation). **Recents** shows all recently typed notes, including presets.

10 – Once open, select and **Add** a **Preset** note or select it for **Editing**.

11 – Tap in this corner (white check appears) to identify a note for deletion.
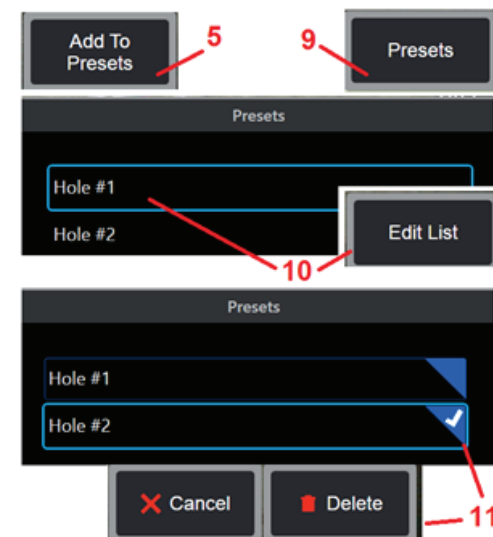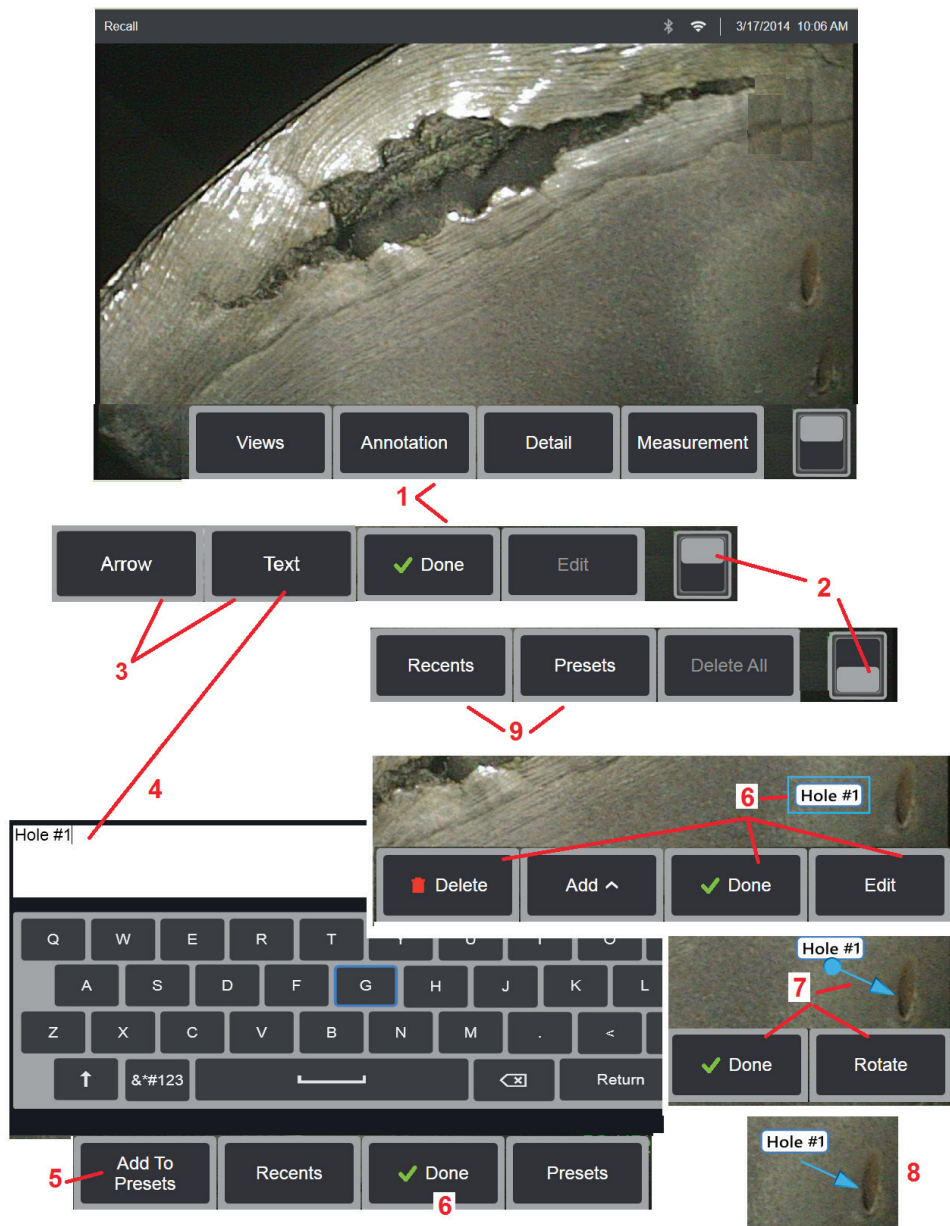
Adding Audio Notes to an Image

During the process of saving an image, audio notes can be added provided a microphone is first attached to the Visual iQ.

1 – Long press the **Save** hard key to begin the image saving process.

2 – Select **Add Audio** to begin the audio recording process. Be sure to have first connected a microphone (click here to specify the microphone attached and other Image and Video settings).

3 – Select either control to momentarily **Stop** or permanently **Cancel** the audio recording process.

4 – Select to complete the audio recording process. The audio notes are now part of the stored image file. You can now play or re-record the audio notes.

5 – After recalling a stored image, the recorded audio notes can be played at any time (**Note:** when an image is recalled, the **Play Audio** soft key may be located in the lower soft key row).
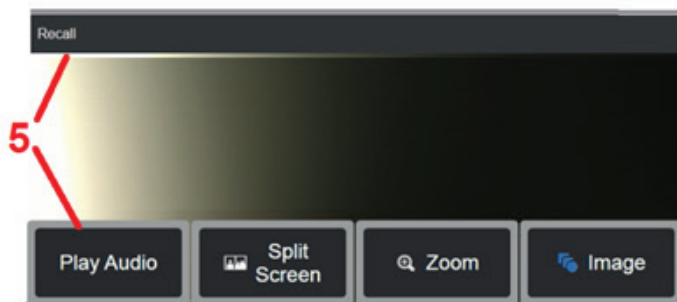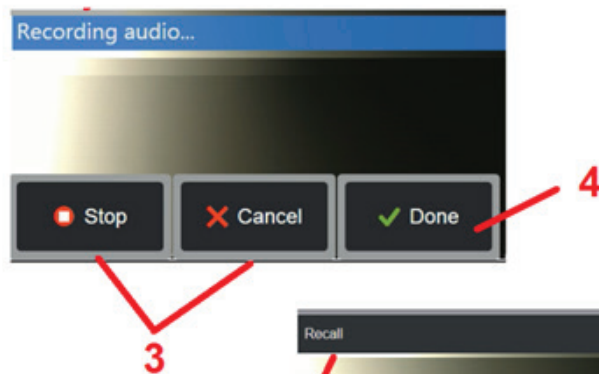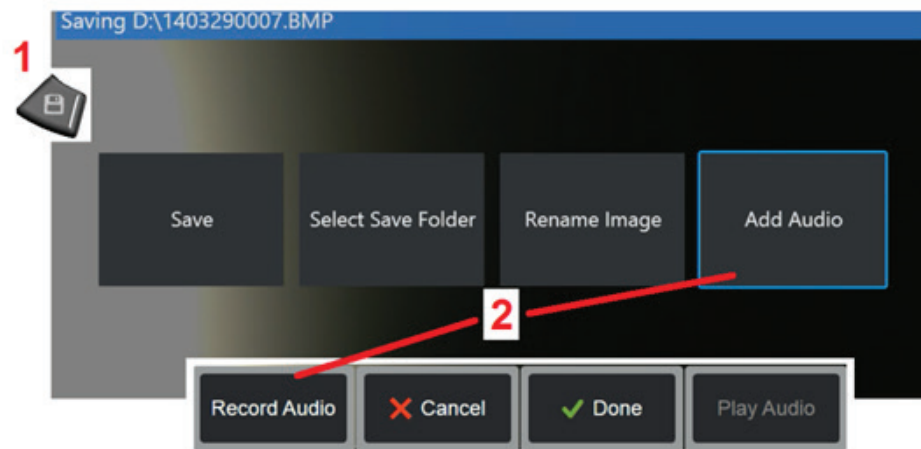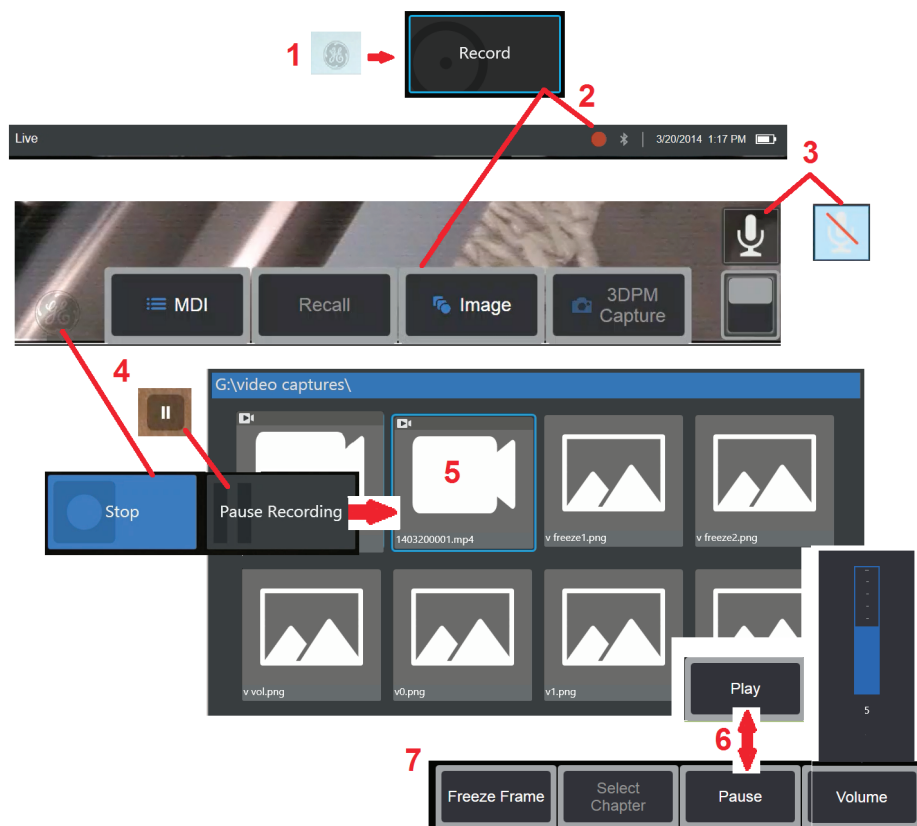
Recording Live Video

1 – Tap the lower-left corner of the display (typically contains a **GE Logo**) at any time to open the **Global Menu**, which provides access to the video **Record** button.

2 – Select to begin recording video in the user-selected format (click here to learn about configuring Video Settings). A red circle flashes at the top of the screen throughout the video recording process. Note that the soft keys shown here (and all other on-screen features) will appear in the video recording. Double-tap the soft key bar's toggle switch to move these buttons off the screen if you do not wish to include them in the recorded video.

3 – Tap to mute or turn on sound recording. Sound recording will only occur (**and this icon will only appear**) if a microphone is attached to the Visual iQ and the system is properly configured. Click here to learn more about configuring Video Settings.

4 – Tap the lower-left corner of the display and select either the video **Pause** or **Stop** buttons. Selecting **Pause** (or tapping the on-screen pause control) allows you to restart the same recording. Selecting **Stop** automatically saves the video file with a default name (see description) in the user-defined default folder. Once tapped, the on-screen pause control becomes a play control, which can be tapped to continue recording. Press-and-hold either the pause or play on-screen to stop the recording process. Click here to learn Video Settings, including selecting the default file-saving location.

Working with Video

Any time during your inspection you can record video "in the background" while doing other tasks, such as comparing images on a split screen, taking measurements, or managing files and folders. When you record video, the system saves everything that appears on the display, as well as background sounds and comments made near the microphone (unless you turn off the audio). You can record video onto the internal drive or any other removable storage device.

Working with a Recalled Video

5 – To recall a saved video file, navigate to the saved file via the **File Manager** (click here to recall and rename saved files). Select the video (which will have an **mp4** file extension). The video will automatically replay.

6 – These soft keys control the video while it is playing. Use the joystick to rewind or fast-forward the video.

Capturing a Still Image from Video

7 – Click here to freeze the video action at any time. Once frozen, the screen image can be saved. Click here to learn about Saving Images.

Measuring Features and Indications

About Measuring

The Visual iQ allows you to measure features or indications either before or after saving an image. You can save up to five measurements per image. In order to perform 3D Phase Measurements (3DPM) or stereo measurements, the image must be captured using a 3DPM, or stereo tip. All saved measurement images can be re-measured on a PC using software from GE's Inspection Technologies. For details, call your local sales representative.

You can save measurement images as JPEGs or bitmaps. You can view these files, including the measurement results, in most .BMP or .JPG viewing applications, such as Windows Paint (click here to learn about image-saving settings).

Notes:

-Measurement results are valid only when taken in air. To measure through liquid, contact GE Inspection Technologies.

-GE Inspection Technologies cannot guarantee the accuracy of measurements calculated by the Visual iQ system. Accuracy varies with the application and the operator's ability.

-The Visual iQ system can display measurement images that were captured on the Everest XLG3™ and XLGo VideoProbe systems, including their previously captured measurements. However, we do not support re-measurement of images captured with systems other than the Visual iQ.
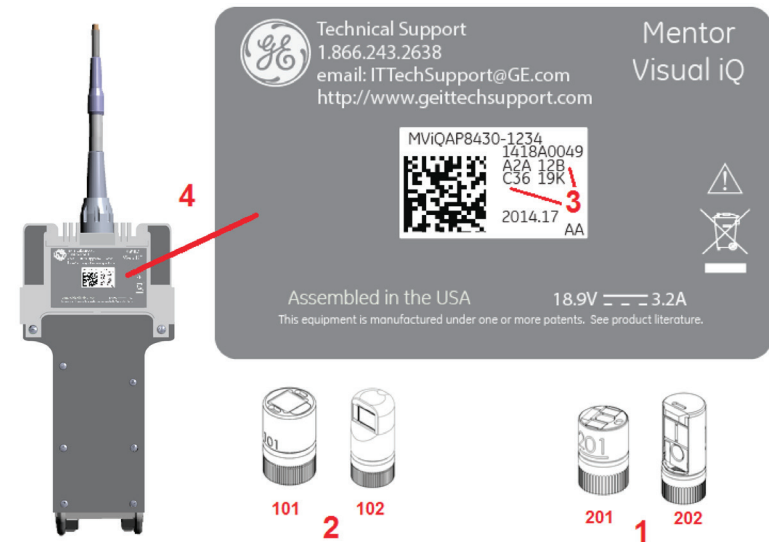
Measurement Types

The Visual iQ system supports four types of measurement: 3D Phase, stereo, and comparison.

Type	Advantages	Considerations
3D Phase	*Over stereo or comparison measurements:* • Optical tip used to view and measure. • Range Finder Bar indicates suitability of image for measurement • Full screen view. • More accurate depth measurements. • Cross-section profile view and measure • Does not require surface detail • The surface need not be perpendicular to the tip. • 3D point cloud view	• The system cannot measure moving parts. • Must measure highly reflective surfaces at an angle. • Only available on 6.1 mm probes
3D Stereo	*Over stereo* • Split screen 2D + 3D point cloud view for simpler assessment of measurement quality. • Reduced measurement variation. • Supports Depth Profile measurements. *Over 3D Phase* • Less sensitive to probe movement during capture. • May perform better on shiny or concave surfaces. • Available on all probe diameters.	• Same split live image as stereo. • Requires surface detail to generate 3D data. • May not perform as well as stereo on highly irregular discontinuous surfaces.
Stereo	*Over comparison measurements:* • More accurate. • No known reference is needed. • Can measure depth. • The surface does not need to be perpendicular to the probe view.	The system may be unable to position the matching cursors accurately with any of these conditions in the measurement area: insufficient detail, repeating patterns, glare, or smooth, straight lines to measure along. In some cases, you can eliminate the problem by repositioning the probe tip and adjusting the brightness.
Comparison	*Over stereo measurements:* • Use the probe headguard or any other tip optic. • Measure with probe tip farther away. • Measure large objects. • Check approximate size of many items quickly.	• Less accurate than stereo measurements. • Known references may not be present and may be difficult to deliver to the measurement site. • Measurement surface must be nearly perpendicular to the probe view for an accurate measurement.

Measurement Tips

Note: 3DPM tips are automatically identified by the system. Stereo tips must be manually selected each time a stereo measurement is performed. Although 3D Stereo and stereo use the same stereo tips, they require different factory calibration processes and calibration data. They also utilize different processing to determine 3D coordinates for measurement.

Unlike standard optical tips, 3D PhaseProbe® (**1**) and StereoProbe® (**2**) measurement tips are factory-calibrated for use with specific probes and will not measure accurately with other probes. These tips are matched to probes by the serial numbers (**3**) identified on each optical tip and each probe label (**4**). Calibration data is stored in memory in the probe, allowing the probe to be used with different handsets.

Notes:

-To ensure measurement accuracy, verify the tip's accuracy each time it is installed. Refer to Appendix E for verification procedures.

-The installed tip must be identified before making Stereo measurements. **Click here to view stereo tip identification procedure**.

To ensure that no mechanical damage has degraded their accuracy, verify measurement tips each time you use them. See **Verifying Measurement Tips** in **Appendix E.** To learn which tips are available for each measurement technique, see the **Optical Tip Table** in **Appendix B.**

3D Phase Measurements (3DPM)
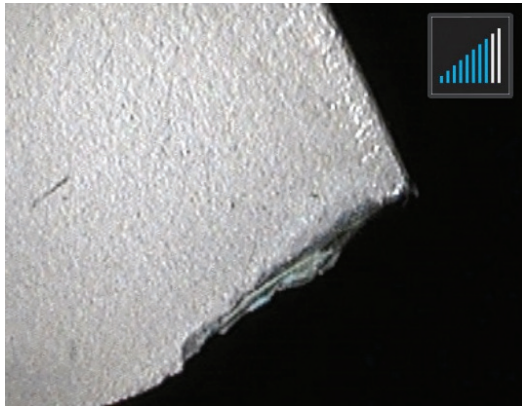
3D Phase Measurement optical tips include an LED based structured light projection system that allows the Visual iQ to produce a three-dimensional surface scan of the object. Measurements are then made directly on the surface and displayed on the image. Preliminary steps of matching cursors or marking shadow lines are not necessary.

Maximum Target Distance - MTD Number

The 3D Phase Measurement system will display a number on-screen after a measurement is complete. While taking the measurement, an MTD number will appear (see the upper left corner of the figure below). MTD stands for Maximum Target Distance and is the distance from the 3D Phase Measurement tip to the cursor that is furthest from the tip. Small measurements, especially depth or depth profile (~0.020" or smaller) types, require low MTDs (< 0.5") for good accuracy. Large length measurements can be accurately made with larger MTDs. The viewing perspective and surface finish both significantly influence the level of noise in the 3D data and therefore the accuracy. The Point Cloud feature should be used to verify that the level of noise present is small relative to the size of the defect being measured. Unlike stereo measurements, 3D Phase Measurements do not use Accuracy Index.

Taking 3D Phase Measurements

As with other measurement types, Phase Measurement accuracy improves as tip-to-target distance is reduced. The range finder bar icon can be used to gauge the suitability of the current tip-to-target distance for a given measurement. When the surface is too far for measurement, a single bar is shown, and measurement should not be attempted. As the tip is moved closer to the surface, more bars are illuminated. Large length measurements may be performed with few bars illuminated, while still achieving good accuracy. In general, the best accuracy is achieved by getting as close to the surface as possible.

Accuracy is generally best when viewing a surface from approximately a 45° angle, especially on surfaces that are shiny or have a speckled appearance.

When measuring surfaces with steps or long, deep features, a side view tip will give better results if the feature or step is horizontal. A front view tip will give better results if the feature or step is vertical (see image to the right). This is due to the LED orientations in the tips.

To Capture a 3D Phase Measurement Image:

Step 1 – Attach either a forward view or side view 3D Phase Measurement optical tip to the probe. Each measurement tip must be factory calibrated to a particular probe, and may be calibrated to more than one probe. To ensure measurement accuracy, verify the tip's accuracy each time it is installed. Refer to Appendix E for verification procedures.

Step 2 – Verify that the Visual iQ system has automatically identified the 3DPM optical tip. The range finder appears near the upper right corner of the live image.

Step 3 – Initiate the Image Capture sequence as described in the following section.
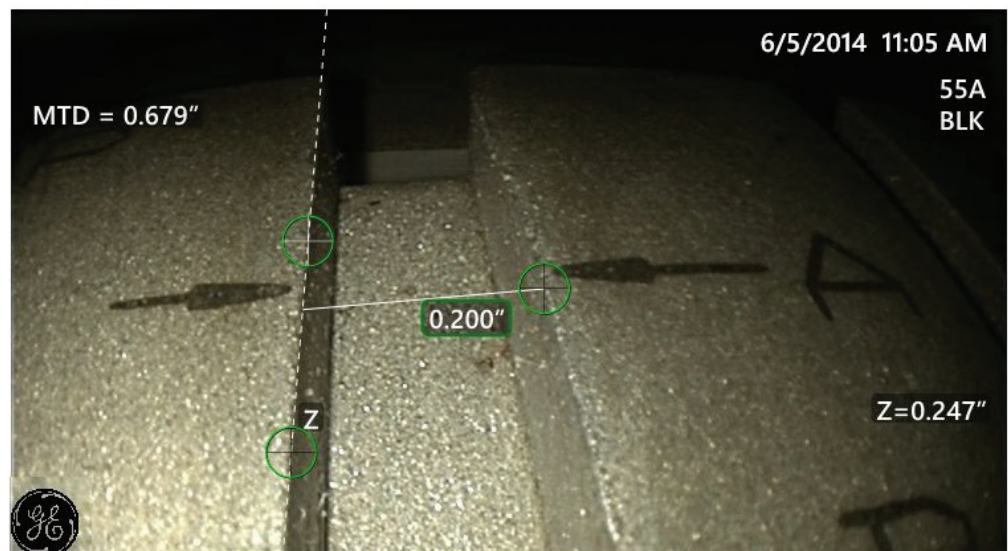
3D Phase Measurement Procedure

1 – When the target is in position, select this soft key (or long hold [↵]). The 3D Phase Measurement scan will begin.

Note: Hold the probe still for approximately one second during the surface scan. Multiple images are taken to complete the scan, and the probe must be held still during this sequence. Do not move the probe until the **Capturing images... keep probe still** caution disappears.

2 – Select to begin the measurement process.

3 – Choose the type of phase measurement.

4 – The **Patented Zoom Window** automatically opens allowing for precise positioning of the active cursor. Tap the window's edges (or tap on the cursor, then control with the joystick)to adjust the active cursor position. Click here to learn about turning the Zoom Window on or off.

5 – Place cursors on the desired feature. Up to five measurements may be placed on each image.

Note: The system will wait up to 1.5 seconds for movement to stop before starting a 3DPM capture. If movement does not stop, a message displays and the capture is not attempted. If movement begins during the capture, the system pauses the capturing process, waits for movement to stop, and attempts a second capture. If either attempt allows enough frames to be captured without movement to provide sufficient surface coverage, measurement is allowed. If neither attempt is completed without movement, a message indicating that the capture was affected by motion is displayed. This may result in more un-measurable (red) pixels or a slightly higher noise level than would be achieved with no movement. The system does not allow measurement if the movement was sufficient to substantially degrade 3D data quality.

Making 3DPM Measurements (Depth Profile Example)
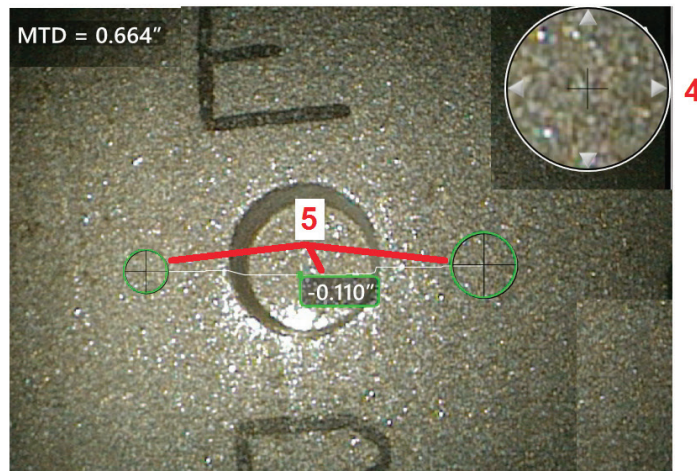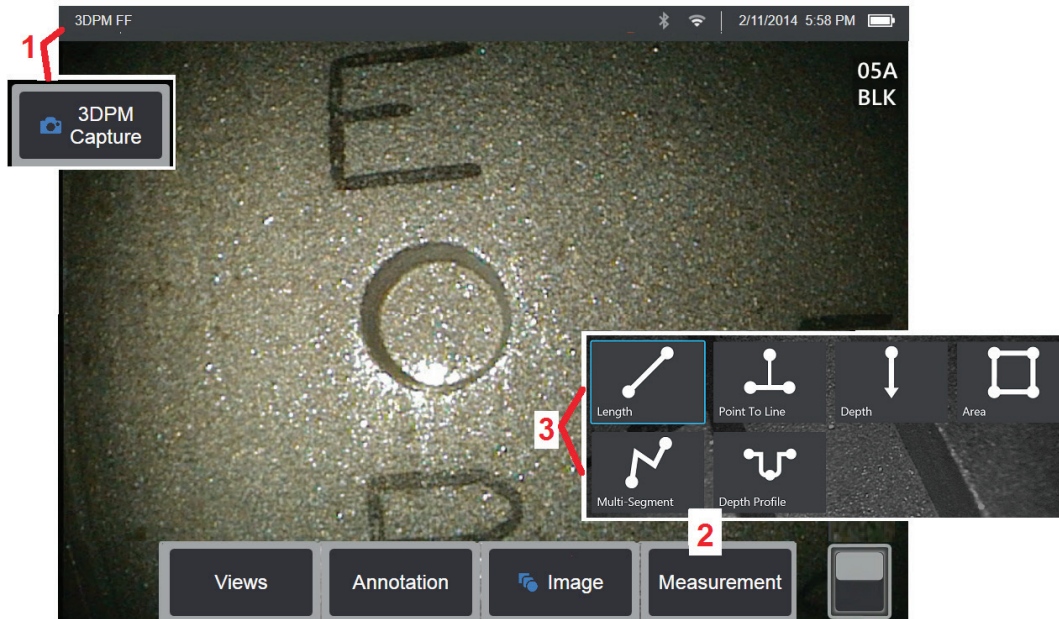
Note: While the following procedure applies specifically to a Depth Profile measurement, refer to this procedure and the information in the section titled Types of 3D Measurement to conduct any type of 3DPM.

6 – To create a **Depth Profile** measurement, place the first and second cursors on a flat surface on opposite sides of the area of interest. This procedure is described in a following section.

Note—Indication of Non-Measurable Area: When working with a 3D phase measurement image, certain parts of the image may not be measurable. These parts may be too far away, too dark, or obscured by light reflections if the surface is highly reflective. The 3D Phase Measurement system will display a red colored zone in those areas. The system will not compute a measurement result when a cursor is positioned in a red colored area. The 3D Phase Measurement system will display a yellow colored zone in areas where accuracy is likely reduced. Cursor placement in a yellow colored area should be avoided if possible.

7 – **Patented Zoom Window** allows for precision positioning of the active cursor. Tap the window's edges (or tap on the cursor, then control with the joystick) to adjust the active cursor position. Click here to learn about turning the Zoom window on or off.
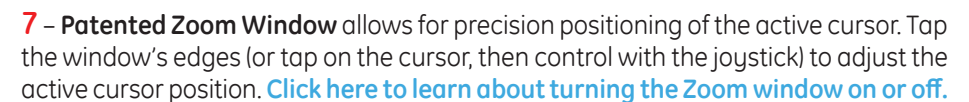
8 – Use to select from available **Views**. Click here to learn about available Views.

Note: Depth Profile view (described in a following section) is only available if the 3DPM image includes a Depth Profile measurement.

Note: Measurements can be performed with any of the Image Views selected.

9 – **Point Cloud** view, described below, allows the user to evaluate the level of noise relative to indication size while verifying proper cursor and profile position for the desired measurement. Choose between **Measurement** and **Full Image** to view only the area around the active measurement or the entire image. When a **Point Cloud** is displayed, turning on the **Depth Map** uses color to convey the approximate depth of an indication (see left-hand scale).

Note: When Full Image is selected, all measurements appear in the Point Cloud view and the Depth Map colors represent distances relative to the Tip-to-Target Distance. When Measurement Image is selected, only the active measurement appears and the Depth Map colors represent distances relative to the user-defined depth-measurement reference plane.

10 – The **Depth Profile** view is available only after a **Depth Profile** measurement has been made.

11 – The **Depth Profile** view provides a cross-section with the line connecting the two reference cursors serving as a sectioning line.

Types of 3D Measurements

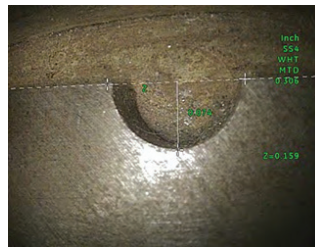This section specifically addresses cursor placement for each type of 3D Phase and 3D Stereo Measurement.

Description:

Linear (Point-to-Point) measurement

Cursor Placement:

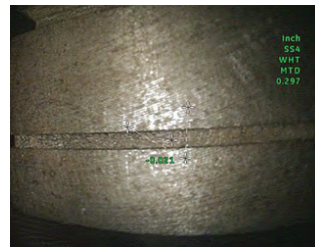Place both cursors at the desired locations.

Description:

The perpendicular distance from a point to a line.

Cursor Placement:

Place the first two cursors to define a reference line. Place the third cursor at the perpendicular distance you want to measure.
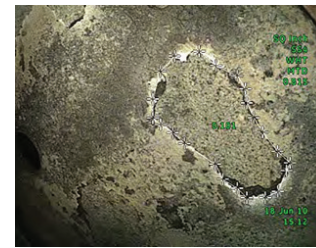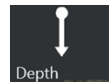

Description:

The perpendicular distance between a surface and a point above or below it. Used to evaluate changes due to wear, misalignment, and other causes.

Negative measurements indicate that the point lies below the plane. Positive measurements indicate that it lies above the plane.

Cursor Placement:

Place the first three cursors to define a reference plane. Place the fourth cursor at the perpendicular distance you want to measure.

Note: Depth measurements require the closest possible tip-to-target distance for the greatest accuracy.

Description:

The surface area contained within multiple cursors placed around a feature or defect.

Cursor Placement:

Place three or more cursors (up to 24) around the edge of the area you want to measure.

When finished, press

twice or select DONE. The area closes.

Note: Area measurements are computed assuming a relatively flat surface. Area measurements on highly curved or irregular surfaces are less accurate. The point cloud view shows the actual area being computed.
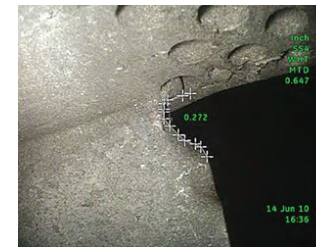
Description:

The length of a nonlinear feature or defect.

Cursor Placement:

Place two or more measurement cursors (up to 24) to create line segments along the feature.

When finished, press

twice or select DONE. The line is finalized.

Description:

A profile of the perpendicular distances from an area of interest to a specified surface.

Cursor Placement:

Place one measurement cursor on each side of the area of interest. Both cursors should be completely on flat regions, in the same plane, and should not overlap the indication being measured. The measurement reference plane is determined using all the pixels inside both cursors.

When finished, press and hold to display the depth profile view.

(See the following section for more detail)

Note: Depth Profile measurements require the closest possible tip-to-target distance for the greatest accuracy

Point Cloud View (3DPM)

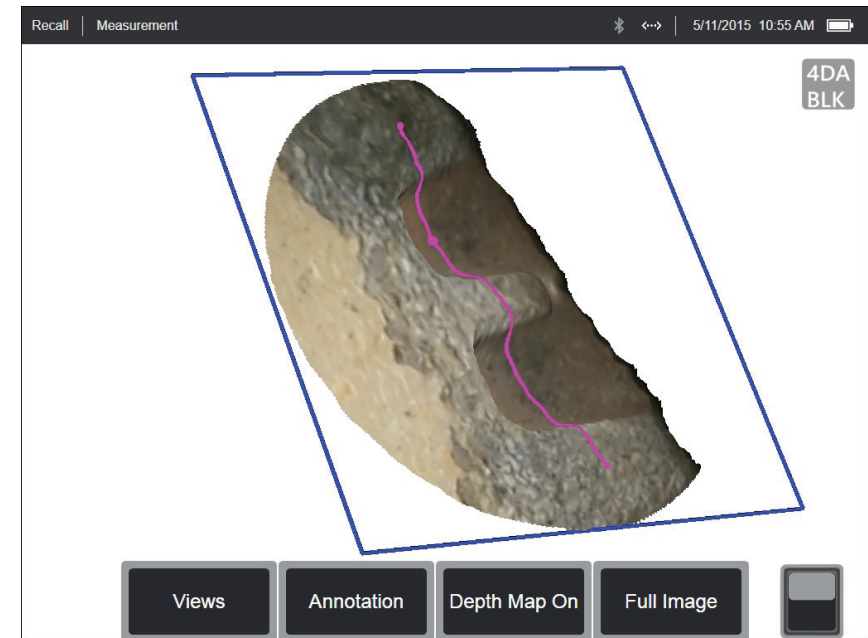*The point cloud view offers the following advantages:*

- Provides a rough idea of feature size.
- Helps the user visualize the measurement to ensure proper cursor placement and verify 3D data quality.
- Shows location of high and low points to help profile and depth measurement cursor positioning.
- Shows the level of noise relative to indication size. You can then move the probe closer if indication is hidden in surface noise bumps.
- Ripple or waves indicate dirt or oil on the gratings or reflections bouncing off one surface onto another.

The Visual iQ offers two different point cloud image options: **Full Image** and **Measurement Image**. **Full Image** shows the entire 3D data set and all measurements with the active measurement shown in bold. With **Full Image**, the colorized **Depth Map** indicates tip-to-target distance. With **Measurement Image**, the following apply:

- Only the area around the active measurement is shown.
- The cursor positions and the lines between the cursors are shown.
- For Depth Profile measurements, the profile slice along the surface is shown.
- For measurement types utilizing a reference plane, a square around the data indicates the reference plane position.
- With **Depth Map** on, a scale indicates the depth or height relative to the reference plane.

In both **Full Image** and **Measurement Image** modes, the following manipulations are available:

- Drag a single finger over the touchscreen (or use the joystick) to rotate the image in three dimensions.
- Use two fingers simultaneously to reposition or rotate the image within the plane in which it is viewed.
- Slide two fingers together or apart to increase or decrease the zoom level or select **Zoom**.
- Press **Reset** to return to the default view (second level soft key).

3D Stereo Measurements
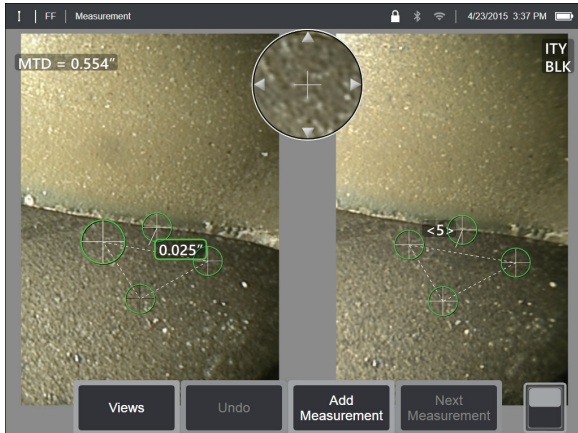
Stereo measurements require the use of StereoProbe measurement tips to capture stereoscopic images of a target. 3D Stereo and Stereo both utilize the same Stereo optical tips, which provide two images of the same scene from slightly different perspectives. They both rely on triangulation and the matching of surface points in both images to determine 3D coordinates used for measurement. But, the use model and processing are very different. With Stereo, the system performs matching and computes 3D coordinates only at the locations of measurement cursors. With 3D Stereo, more advanced calibration and processing algorithms are utilized to compute a full 3D point cloud prior to beginning the measurement making its use more like 3DPM than stereo. The advanced processing also includes more intelligent matching and data smoothing to greatly reduce measurement variation. As with 3DPM, the Visual iQ allows 3D visualization of the 3D Stereo point cloud (hence the name 3D Stereo) to improve understanding of the viewed surface and the measurement being performed.

Maximum Target Distance - MTD Number

As with other measurement types, 3D Stereo accuracy improves as tip-to-target distance is reduced. In general, the best accuracy is achieved by getting as close to the surface as possible while keeping the area of interest in sharp focus. Like 3DPM, 3D Stereo provides an MTD number for each measurement to help gauge the likely accuracy of that measurement (see the upper left corner of the figure below). MTD stands for Maximum Target Distance and is the distance from the stereo tip to the cursor that is furthest from the tip. Small measurements, especially depth or depth profile (~0.020" or smaller) types, require low MTDs (< 0.5") for good accuracy. Large length measurements can be accurately made with larger MTDs. The Point Cloud feature should be used to verify that the level of noise present is small relative to the size of the defect being measured. Unlike Stereo, 3D Stereo does not use Accuracy Index.

The 3D Stereo Measurement Process

You can take 3D Stereo measurements on a frozen image or on a recalled image, provided the recalled image was saved with 3D Stereo measurement data. The 3D Stereo Measurement process includes:

Step 1—Attaching a calibrated 3D Stereo Tip. Each measurement tip must be factory calibrated to a particular probe and may be calibrated to more than one probe. To ensure measurement accuracy, verify the tip's accuracy each time it is installed. Refer to **Appendix E** for verification procedures.

Step 2—Capturing an acceptable image. **(Click here to learn more about Images Suitable for Stereo Measurement)**

Step 3—Identifying the attached optical tip, selecting desired measurement type and placing measurement cursors.

Step 4—Use the Point Cloud view to confirm an acceptable level of noise for the image being measured.
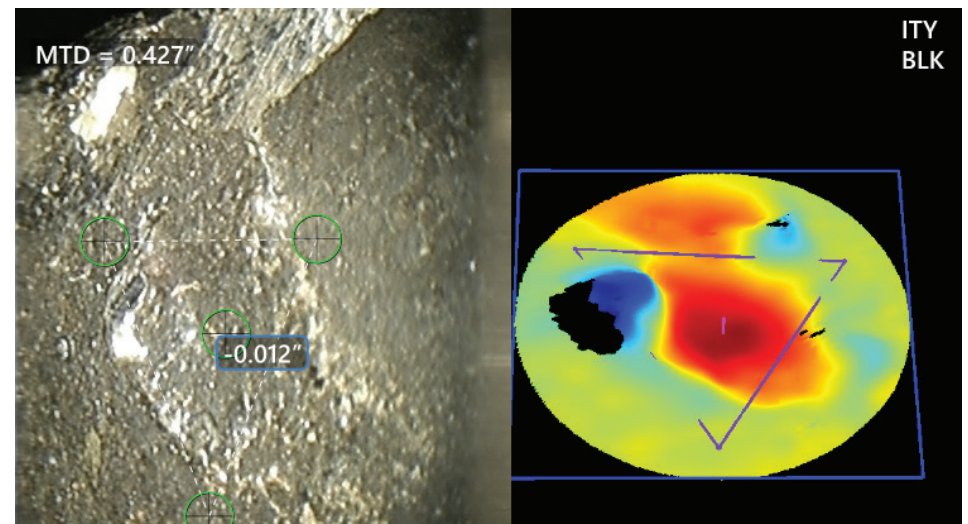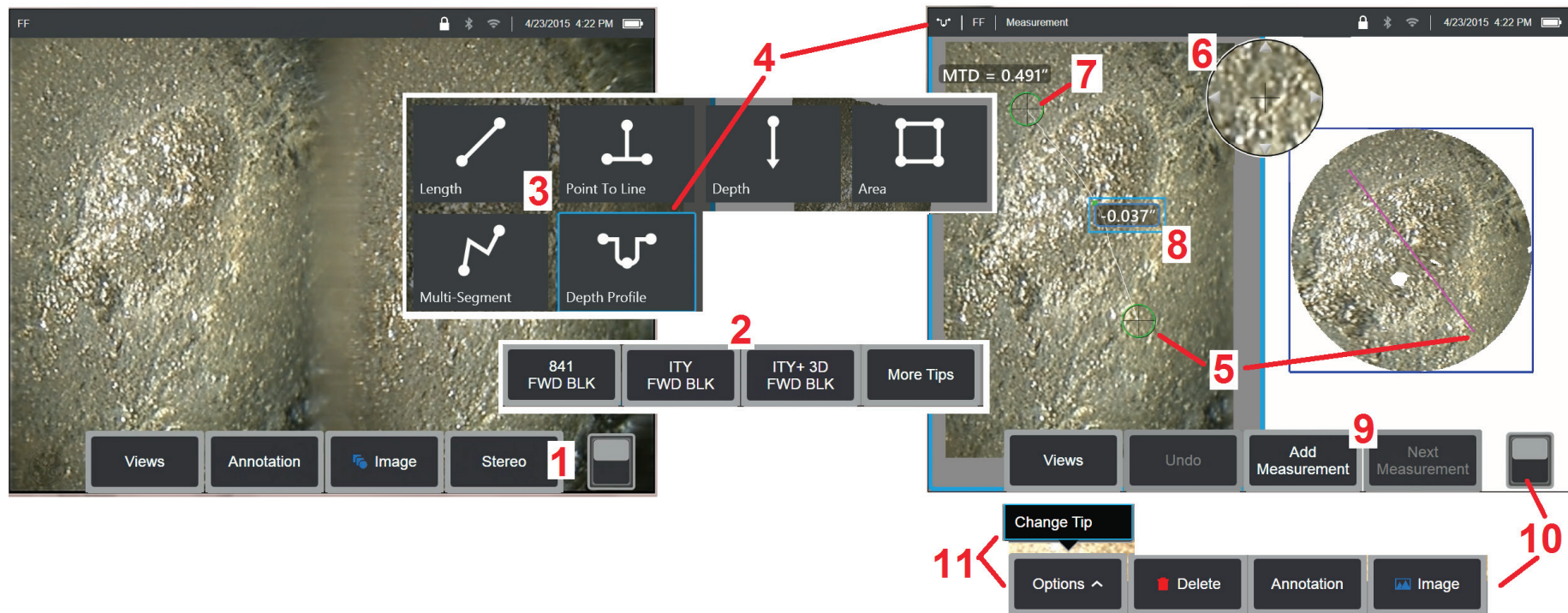
3D Stereo Measurement Procedure, Part 1

Prior to collecting 3D Stereo measurements, a calibrated 3D Stereo optical tip must be attached to your Visual iQ. Properly position the tip for measurement **(click here to see how to position the tip)**, which may be aided by temporarily displaying a single image by turning **Single View** mode **ON (click here to select Single View).** The image capture and cursor placement process is described elsewhere – become familiar with this information before making stereo measurements.

1 – Select the **Stereo** soft key (if working with a frozen image) or the **Measure** soft key (if working with a recalled image captured with a 3D Stereo optical tip). *Live stereo (and all other) images must be frozen prior to beginning the measurement process.*

2 – After selecting **Stereo**, soft keys on the iQ's display show the serial numbers for all 3D Stereo and stereo tips that have been calibrated to the installed probe. 3D Stereo tips include a *+ 3D* designation on the soft key. Be sure to select the serial number of the 3D Stereo tip currently installed. If, after collecting images for measurement, you determine that the wrong serial number was selected, refer to items 10 and 11.

3 – Begin the measurement process by choosing the type of measurement desired *(Click here for a description of each type of 3D Measurement)*

4 – When a measurement type is selected (in this case, a **Depth Profile** measurement), this icon describes the type chosen.

5 – First cursor appears on the left screen, where all user-placement of cursors will occur. Drag with your finger (or joystick) to position the active cursor to the desired location. This cursor can be reactivated (active cursor appears larger than other cursors) and moved at any time.

Note—Indication of Non-Measurable Area: When working with a 3D Stereo measurement image, certain parts of the image may not be measurable. If portions of the image are unsuitable for stereo measurement, the measurement system will display a red colored zone in those areas. The system will not compute a measurement result when a cursor is positioned in a red colored area.

3D Stereo Measurement Procedure, Part 2

6 – **Patented Zoom Window** allows for precise positioning of the active cursor. Tap the window's edges (or move the cursor with the joystick) to adjust the active cursor position. **(Click here to learn about turning the Zoom Window on or off and other Measurement Settings).**

7 – Tap the screen (or hit   ) to display the second cursor. Position it as described in items 5 and 6.

8 – The active dimension appears on the display screen (tapping the number turns its box blue and allows it to be repositioned).

Note: Verify correct cursor placement and 3D data quality using the Point Cloud view.

9 – Select to **Add** another measurement (up to five are allowed on any display). Once more than one measurement are displayed, select **Next Measurement** to change which measurement is active (or simply tap on any existing measurement cursor to make it active).

10 – Tap to access alternate rows of soft keys. Double tapping in this location hides or displays the soft keys and status bar.

11 – Select **Options**, then **Change Tip** to retain the image captured and measurement(s) performed while correcting for an incorrectly specified tip serial number. This process allows the correct calibration data to be applied and eliminates the need to collect additional images simply because the user initially identified the wrong tip serial number.

3D Stereo Measurement Types

Click here to learn more about each type of 3D measurement.
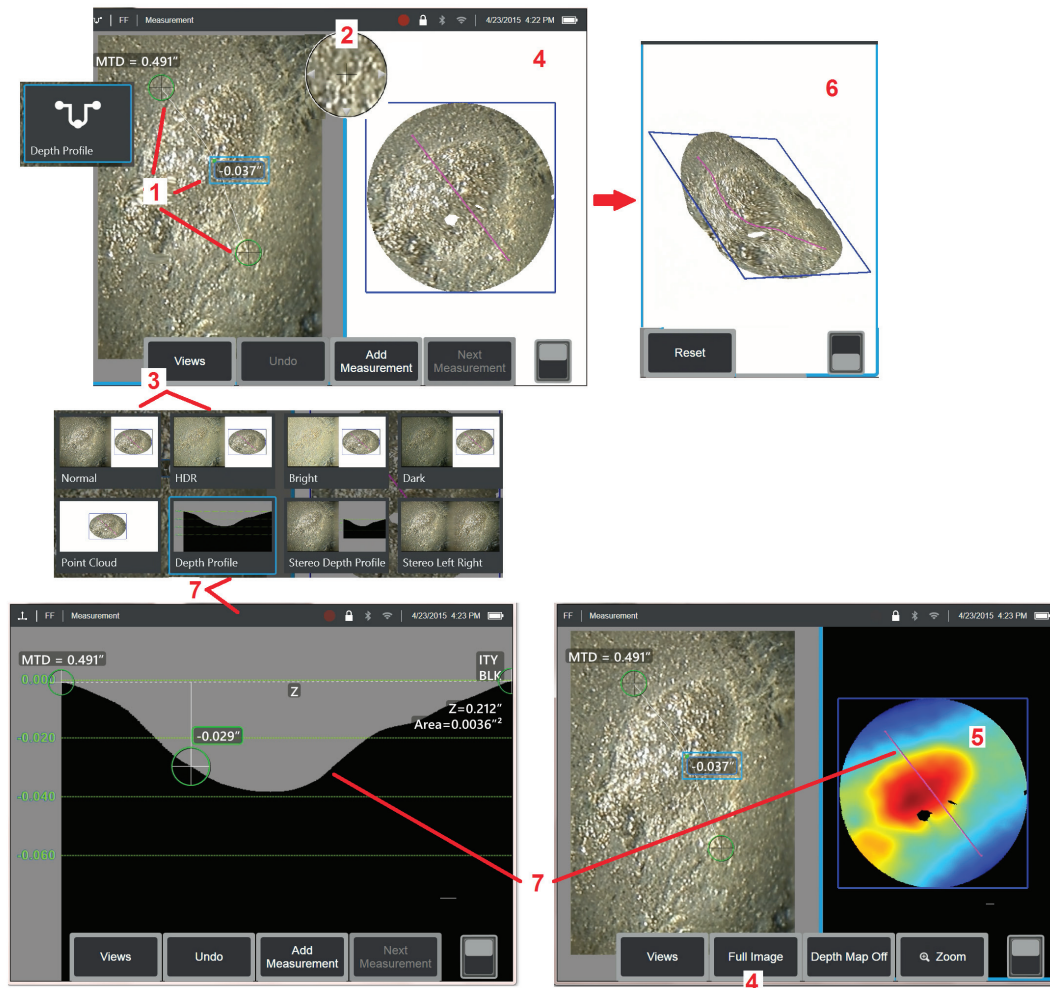
Making 3D Stereo Measurements (Depth Profile Example)

Note: While the following applies to a Depth Profile measurement, refer to this procedure and the section titled Types of 3D Measurement for other types.

1 – To create a **Depth Profile** measurement, place the first and second cursors on flat surfaces on the same plane on opposite sides of the area of interest.

2 – **Patented Zoom Window** allows for precision positioning of the active cursor. Tap the window's edges (or tap on the cursor, then control with the joystick) to adjust the active cursor position. Click here to learn about turning the Zoom window on or off.

3 – Use to select from available **Views**. Click here to learn about Views.

Note: Depth Profile view (described in a following section) is only available if the active measurement is a Depth Profile measurement.

Note: Measurements can be performed with any of the Image Views selected. However, the 3D coordinates used for measurement and shown in the point cloud views are always computed using the Normal image.

4 – **Point Cloud** view, described below, allows the user to evaluate the level of noise relative to indication size while verifying proper cursor and profile position for the desired measurement. Choose between **Measurement Image** and **Full Image** to view only the area around the active measurement or the entire image.

5 – When a **Point Cloud** is displayed and active, turning on the **Depth Map** uses color to convey the approximate depth of an indication.

Note: When Full Image is selected, all measurements appear in the Point Cloud view and the Depth Map colors represent the Tip-to-Target Distance. When Measurement Image is selected, only the active measurement appears and the Depth Map colors represent distances relative to the measurement reference plane.

6 – When a **Point Cloud** view is displayed, drag a single finger over the touchscreen (or use the joystick) to rotate the image in three dimensions. Alternatively, place two fingers on the display and move simultaneously to reposition or rotate the image within the plane in which it is viewed. Select **Reset** to return the repositioned point cloud view to its original position.

7 – The **Depth Profile** view is available only after a **Depth Profile** measurement has been made. This view provides a cross-section with the line connecting the two reference cursors serving as a sectioning line.

Point Cloud View (3D Stereo)

3D Stereo offers two point cloud view types. The **Point Cloud** view provides a full-screen point cloud. With the **Stereo Point Cloud** view, the point cloud is shown in place of the right stereo image and is updated as measurement cursors are moved. In this mode, the point cloud may be activated by tapping the right side of the screen or pressing and holding . Both the full screen and active right side point clouds can be manipulated using the touch screen or joystick and soft keys.

*The Point Cloud view offers the following benefits:*

- Provides a rough idea of feature size.
- Helps the user visualize the measurement to ensure proper cursor placement and verify 3D data quality.
- Shows location of high and low points to help profile and depth measurement cursor positioning.
- Shows the level of noise relative to indication size. You can then move the probe closer if indication is hidden in surface noise bumps.

The Visual iQ offers two different point cloud image options: **Full Image** and **Measurement Image. Full Image** shows the entire 3D data set and all measurements with the active measurement shown in bold. With **Full Image**, the colorized **Depth Map** indicates tip-to-target distance. With **Measurement Image**, the following apply:

- Only the area around the active measurement is shown.
- The cursor positions and the lines between the cursors are shown.
- For Depth Profile measurements, the profile slice along the surfaces are shown.
- For measurement types utilizing a reference plane, a square around the data indicates the reference plane position.
- With **Depth Map** on, a scale indicates the depth or height relative to the reference plane.

In both **Full Image** and **Measurement Image** modes, the following manipulations are available:

- Drag a single finger over the touchscreen (or use the joystick) to rotate the image in three dimensions.
- Use two fingers simultaneously to reposition or the rotate the image within the plane in which it is viewed.
- Slide two fingers together or apart to increase or decrease the zoom level or select **Zoom**.
- Press **Reset** to return to the default view (second level soft key).
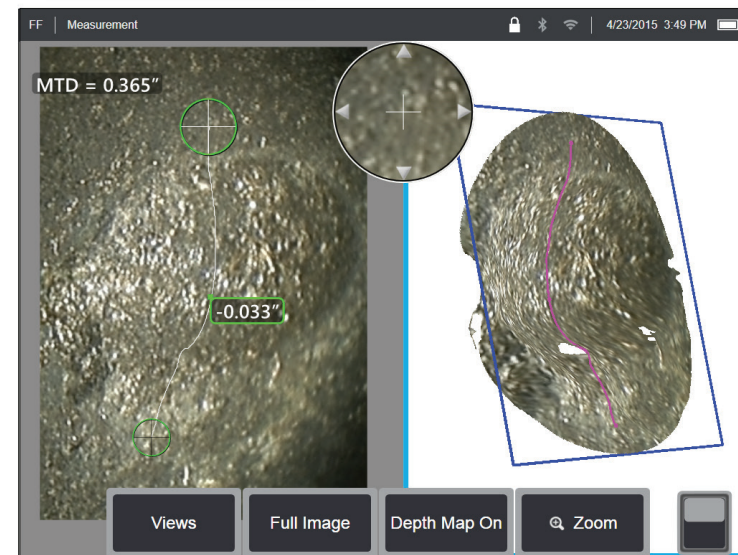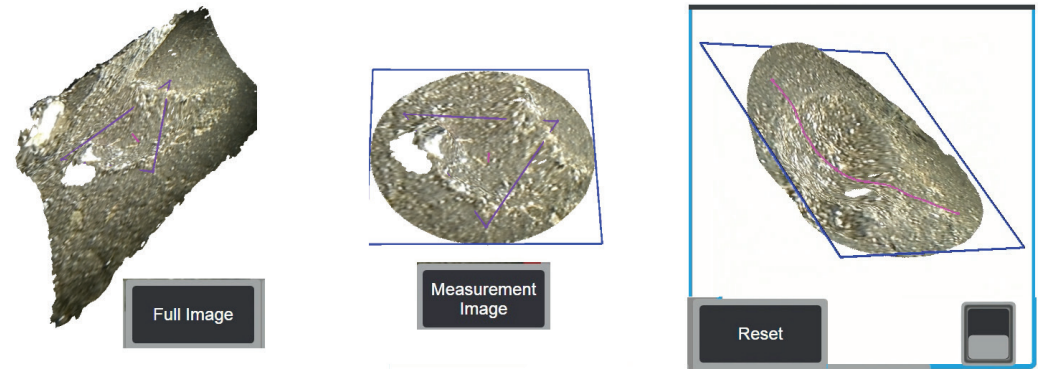
Stereo Measurements

Stereo measurements require the use of StereoProbe measurement tips to capture stereoscopic images of a target — two pictures of the same target from two different angles. To measure the target, the Visual iQ uses triangulation based on these two side-by-side images. You can take stereo measurements on a frozen image or on a recalled image, provided the recalled image was saved with Stereo measurement data. The Stereo Measurement process includes *(see following sections for details)*:

Step 1 – Attaching a calibrated **Stereo Tip**

Step 2 – Capturing an acceptable view with a suitable image as described below.

Step 3 – Identifying the attached optical tip, selecting desired measurement type and placing measurement cursors.

Step 4 – Properly positioning the **Matching Cursors,** if needed.

Achieving a Suitable Image for Making Stereo Measurements

For maximum accuracy in any type of stereo measurement, you must begin by positioning the stereo tip carefully. To position the probe tip (before freezing) for a Stereo Measurement Image:

**Visibility**—The feature must be fully visible on both sides of the screen.

Tip-to-target proximity—The tip must be as close as possible to the target while keeping it in focus.

Minimal glare—Minimize glare by adjusting the viewing angle and the image brightness in the areas where you will be placing cursors. Small glare speckles do not present a problem, but larger glare areas may appear in different positions on the two sides, causing false matches.

Vertical orientation—If measuring distance between lines or across a circle, the image is oriented so that you can place cursors at left and right edges of the item to be measured — not at top, bottom or diagonal points. The system needs differentiated details to the left and right of each cursor to accurately place the matching cursors in horizontal relationship to the left-side cursors.

Bad Example -- Object is:
Not fully visible on right side.
Not well lit (optical tip needs to move closer to surface)
Not oriented to allow placement of cursors at left and right edges of circle or gap
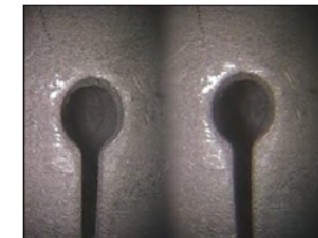
Good Example -- Object is:
Fully visible on both sides.
Well lit with minimal glare
Oriented to allow placement of cursors at left and right edges of circle or gap

The images above represent good and bad image capturing techniques when stereo measurements will be made. Both images were captured for length measurement across the slot.
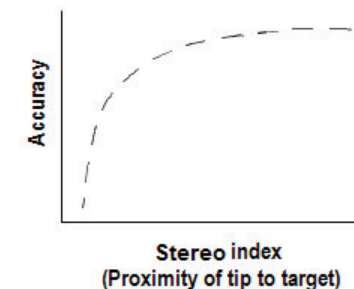
About the Stereo Index

The stereo index is a number that indicates the amount of magnification *during stereo measurements.* The higher the stereo index, the greater the magnification, the more accurately you can place the measurement cursors and the more accurate your results.

When taking stereo measurements, you magnify the image not by zooming but by moving the optical tip as close as you can to the target. The stereo index can be turned ON or OFF and the minimum value (below which it flashes) can be altered. **Click here to learn about adjusting the Stereo Index Limit and other Measurement Settings.**
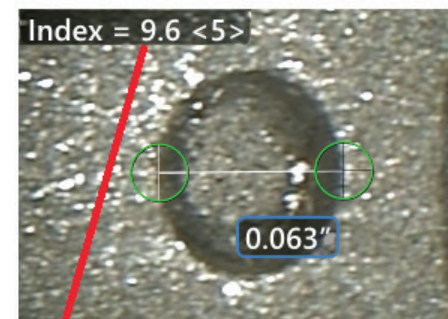
The stereo index can be displayed to indicate the amount of magnification you have achieved.

This distance must be accurate.
SQ Inch
027
BLK
Index
8.5 <0>

0.0088

Your cursors   Matching cursors
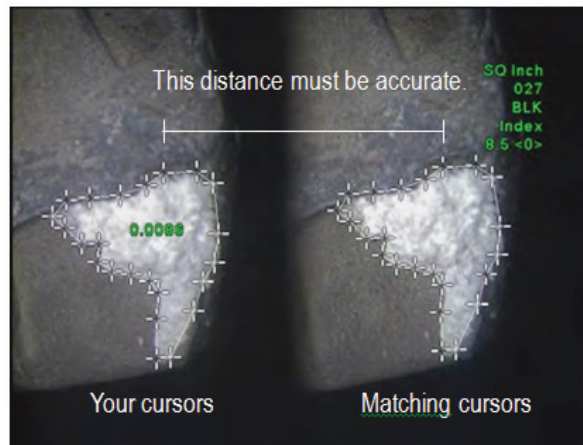
About the Matching Cursors

For each cursor you place on the left image during stereo measurement, the system places a matching cursor on the right image for use in triangulation.

You must place each left cursor on an image point (a pixel) that has sufficient surrounding detail to differentiate it from its neighboring pixels. If the neighboring pixels look the same as the point you choose — especially the pixels to the point's left and right, for example, pixels along a smooth horizontal line — the system cannot accurately place the matching cursor. When there is enough differentiating detail, the "match strength" is high *(meaning that the generated match point clearly matches better than its neighboring pixels — the system's confidence in the match is high).* But if there is not enough detail, the match strength is low (meaning that the generated point and its neighboring pixels match almost equally well — the match may be correct, but the system's confidence in the match is low).

For every matching cursor, the system calculates a match strength value between <0> (lowest confidence) and <5> (highest confidence). If too little detail is present, the system simply does not generate a matching cursor. Whenever possible, try to achieve a match strength of at least <3>. If you cannot achieve this level, try capturing another image with less glare or more image details. (Adjust the tip orientation or image brightness.)

Even when match strength is <5>, and especially when the match strength is lower, you need to verify that the matching cursor appears to be placed properly. A matching cursor that is off by just one pixel can significantly impact measurement accuracy.

Repositioning a Matching Cursor

Note: Misplaced matching cursors most likely occur when the measurement area contains a repeating pattern. Generally, the best results are achieved by leaving the matching cursors exactly where the system places them.

Move the matching cursor to the correct position.

When you stop moving the cursor, the system optimizes the match position. Each manually corrected matching cursor is indicated by the absence of a match strength number.
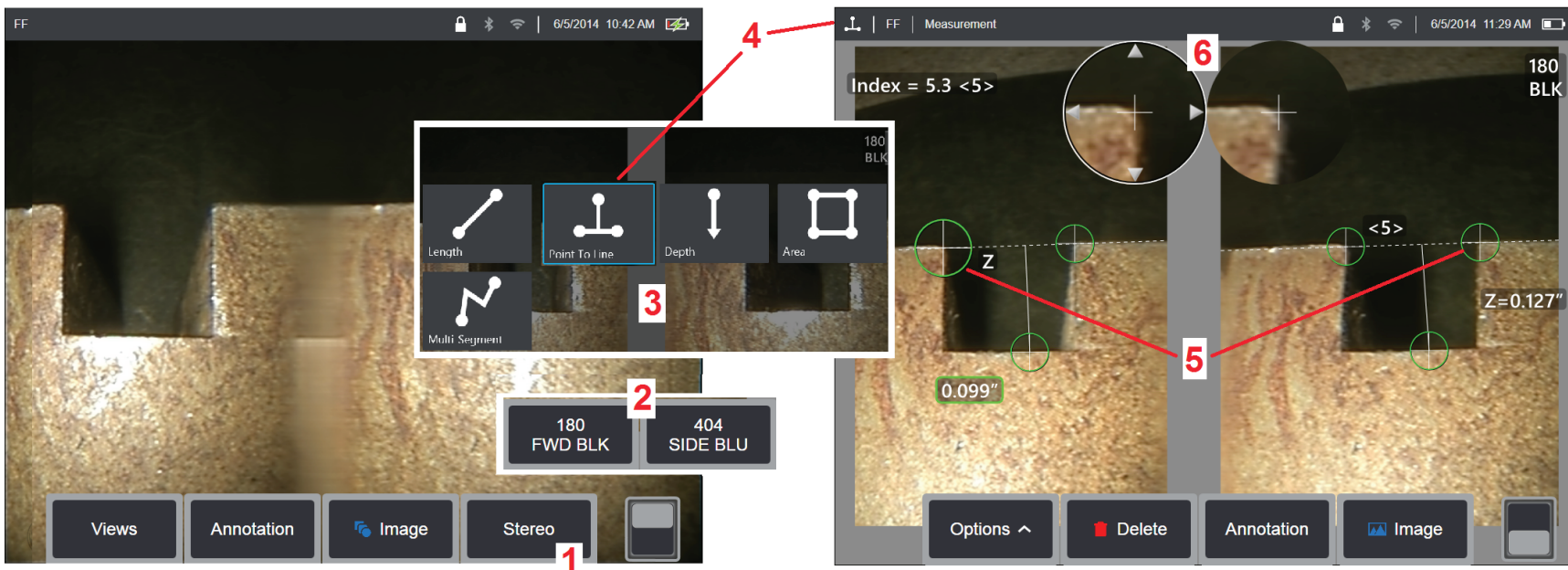
Stereo Mode Measurement Procedure, Part 1

Prior to collecting stereo measurements, a calibrated stereo optical tip must be attached to your Visual iQ. Properly position the tip for measurement **(click here to see how to position the tip)**, which may be aided by temporarily displaying a single image by turning **Single View** mode **ON** **(click here to select Single View and learn about other Image Transformation settings).** The image and cursor placement process is described in the sections above – you must become familiar with this information before conducting stereo measurements.

1 – Select the **Stereo** soft key (if working with a frozen image) or the **Measure** soft key (if working with a recalled image captured with a stereo optical tip). *Live stereo (and all other) images must be frozen prior to beginning the measurement process.* Be sure to select the soft key showing the serial number of the attached tip.

2 – After selecting **Stereo**, soft keys on the iQ's display show the serial numbers for all stereo tips that have been calibrated to the installed probe. Be sure to select the serial number of the tip currently installed. If, after collecting images for measurement, you determine that the wrong serial number was selected, refer to items 10 and 11 on the next page of this manual.

3 – Begin the measurement process by choosing the type of measurement desired *(see description of each type below)*

4 – When a measurement type is selected (in this case, a **Point-to-Line** measurement), this icon describes the type chosen.

5 – First cursor appears on the left screen, where all user-placement of cursors will occur (the matching cursors appearing in the right display are generated by the Visual iQ system – as the user moves each left-screen cursor, the matching cursor in the right half-screen moves accordingly – be sure to inspect each matching cursor as it appears). Drag with your finger (or joystick) to position the active cursor to the desired location. This cursor can be reactivated (active cursor appears larger than other cursors) and moved at any time *(see additional screen features described below).*

6 – **Patented Zoom Window** allows for precise positioning of the active cursor. Tap the window's edges (or move the cursor with the joystick) to adjust the active cursor position. **(Click here to learn about turning the Zoom Window on or off and other Measurement Settings).**
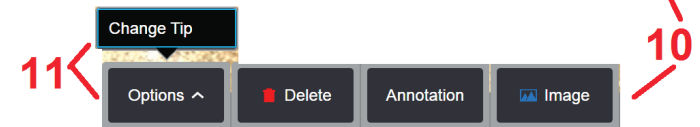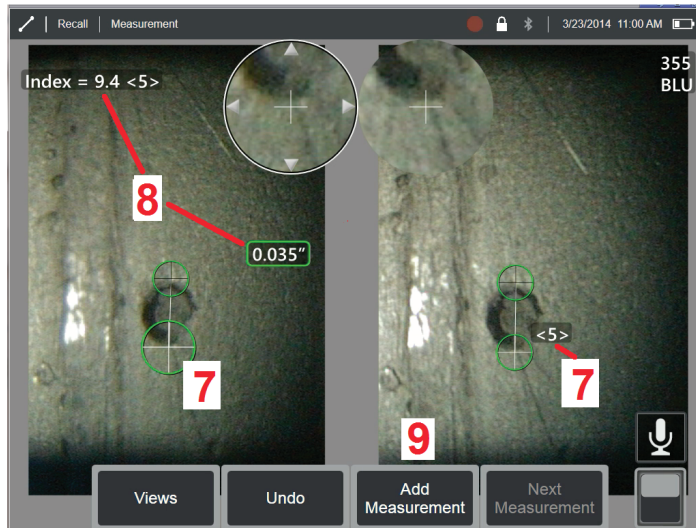
Stereo Mode Measurement Procedure, Part 2

7 – Tap the screen (or hit [↵]) to display the second cursor. Position it as described in items 5 and 6.

Note: Generally, you get the best results by leaving the matching cursors exactly where the system places them. However, under certain circumstances, such as when a repeating pattern exists, you may need to help the system find the correct match.

8 – The active dimension appears on the display screen (tapping the number turns its box blue and allows it to be repositioned) along with the **Stereo Index** and **Match Strength** associated with this measurement and cursor placement. See the immediately preceding manual sections for a description of these two concepts.

9 – Select to **Add** another measurement (up to five are allowed on any display). Once more than one measurement are displayed, select **Next Measurement** to change which measurement is active (or simply tap on any existing measurement cursor to make it active).

10 – Tap to access alternate rows of soft keys. Double tapping in this location hides or displays the soft keys and status bar.

11 – Select **Options**, then **Change Tip** to retain the image captured and measurement(s) performed while correcting for an incorrectly specified tip serial number. This process allows the correct calibration data to be applied and eliminates the need to collect additional images simply because the user initially identified the wrong tip serial number.

Note: The **Stereo Index** and **Match Strength** shown apply only to the active measurement.

Note: To verify your measurement accuracy, move each left-side cursor a few pixels. If the matching cursors move identically, and if the results change only a little, you have probably achieved accurate results. But if a matching cursor's movement is erratic, or if the results change significantly, your results are unreliable. capture a fresh image, following the guidelines above. This step is especially useful if you have to use a low Stereo Index (less than 5) or low confidence number (less than 3). For example, you might have to use a low Stereo Index if you are measuring a large object or if you have limited access and cannot bring the tip close to the target. You might have to accept a lower confidence number if the surface has few details.

Features of the Stereo Measurement Screen

1 – The currently active cursor appears larger than all others. Note that this cursor's position can be altered by the joystick or by dragging it across the screen.

2 – Tap any on-screen dimension to select it for repositioning (by dragging or with joystick)

3 – The highlighted Zoom Window allows for precise positioning of the active cursor. Select and drag it to change its location on the display screen.

4 – Tap on these arrowheads near the perimeter (or use the joystick) to move the cursor.

5 – Any cursor positioned where a lack of image detail prevents the system from finding a matching point changes color to red (and all dimension and index numbers revert to dashes).

6 – The type and serial number of optical tip currently selected **(click here to identify the stereo tip)**
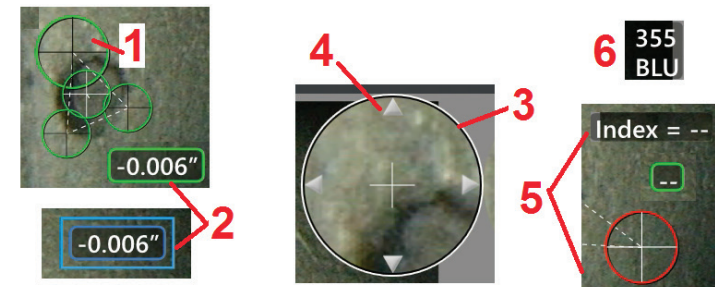
Stereo Measurement Types

This section specifically addresses cursor placement for each type of stereo measurement.
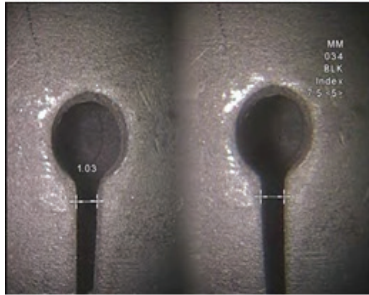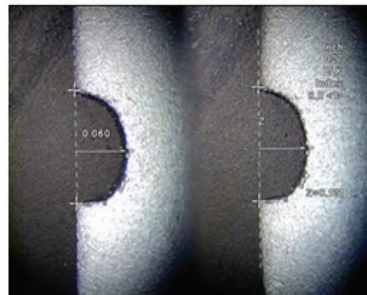

Description:

Linear (Point-to-Point)

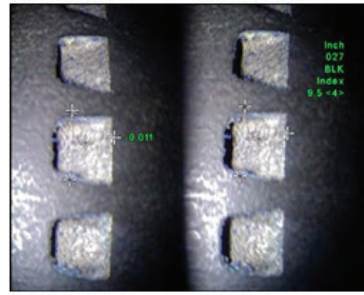**Cursor Placement:**

Place both cursors

Description:

The perpendicular distance from a point to a line

Cursor Placement:

Place the first two cursors to define a reference line. Place the third cursor at the perpendicular distance you want to measure

Description:

The perpendicular distance between a surface and a point above or below it.

Used to evaluate changes due to wear, misalignment, and other causes.

Negative measurements indicate that the point lies below the plane. Positive measurements indicate that it lies above

Cursor Placement:

Place the first three cursors to define a reference plane. Place the fourth cursor at the perpendicular distance you want to measure. Note: Depth measurements taken at a low accuracy index are particularly sensitive to the matching cursor's position. If the accuracy index is low, increase it by bringing the probe tip closer. If you cannot increase the accuracy index, place cursors so that they yield high match strengths, and verify your accuracy.

(Click here to learn more about the Stereo Mode Measurement Procedure).
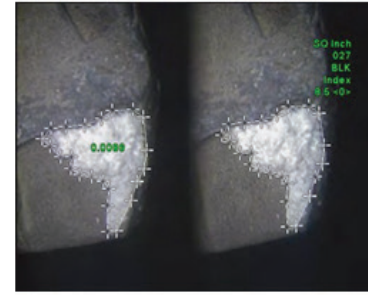
Description:

The surface area contained within multiple cursors placed around a feature or indication.

Cursor Placement:

Place three or more cursors (up to 24) around the edge of the area you want to measure.

When finished, select **Done** or press

twice. The area closes.

Description:

The length of a nonlinear feature or indication.

Cursor Placement:

Place two or more measurement cursors (up to 24) to create segments along the feature.

When finished, select **Done** or press

twice. The line is finalized.

Comparison Measurements

Comparison measurements rely on the known dimensions of an object that has been set in the field of view either by the manufacturer or by the probe or takes advantage of known dimensions within the frozen image. The Visual iQ processor uses these known dimensions as a reference scale for measuring an unknown target. You can take comparison measurements on a frozen (non-3DPM) image or on a recalled image that was saved in **Comparison** measurement mode.

Making a Comparison Measurement

Use the head guard or attach any standard forward-view or side-view tip to the probe. Select the **Field of View (FOV)** for your tip from the soft key or the touch screen. This allows the system to improve accuracy by compensating for the tip's optical distortion. If FOV is not known consult **Appendix B**. Position the probe tip for maximum accuracy, by making the surface to be measured appear perpendicular to the probe view. The target and known object should both be in the same plane at the same distance from the probe with the tip as close as possible while fitting them both fully into the image. If the object and reference are small on the screen, zoom in. Freeze the display before beginning the measurement process.

1 – Select to launch the **Comparison** measurement mode. Begin by selecting the measurement type. **Click here to view a description of each measurement type.**

2 – A reference of known length must next be input by placing two cursors and defining the reference length.

3 – The reference length cursors remain.

4 – Arrange measurement cursors to determine the unknown dimension. In this case, the system is performing a **Length** measurement.

5 – Select to input a **New Reference Dimension**, **Add** another measurement (up to 5), or change the active measurement (by selecting **Next Measurement**).

6 – Once a reference length is defined, a circle of known diameter can be displayed on the image by selecting this option. The circle gauge may be used as a "go/no-go" gauge when its diameter is set to a defect size limit.

Troubleshooting Measurements

## 3D Phase, 3D Stereo, or Stereo Measurements

- Move the probe tip as close as possible to the target, maximizing magnification.

- Verify that the optical tip is threaded on to the probe head securely.

- Measure the target contained in the verification block to ensure that no tip damage has occurred. **Click here to learn more about Verifying Measurement Tips.**

3D Phase Measurements

- Be sure to hold the probe still for approximately one second during the surface scan. Do not move the probe until after the **Capturing Images** message disappears.

- Reposition the probe tip until the range finder bar pattern on the Live screen shows the maximum possible number of blue bars. It is acceptable to be slightly out of focus for very small indications.

- Make sure all measurement-tip surfaces are clean. Wipe with a clean cloth and alcohol.

- After capturing an image, verify that the tip attached to the probe matches the tip that is selected in the software.

- Check point cloud view for excessive waviness or ripple, which would indicate dirt or oil contamination or tip damage.

- Try a non-perpendicular view, such as 30-45°. This often significantly decreases the noise level in the data, especially for surfaces that are shiny or have a speckled appearance.

3D Stereo and Stereo Measurements

- Avoid placing cursors in areas of significant glare. If necessary, adjust the brightness or reposition the probe tip to enhance details and reduce glare.

- Verify that the object to be measured is near the center of the screen.

- Activate the zoom window to most accurately place the measurement cursors.

- Review guidelines under **Achieving a Suitable Image for Making Stereo Measurements**

- Verify that the matching cursor is correct within 1 pixel (Stereo only). If you cannot clearly see where the match point should be, select a different point, or capture the image from a different angle that better reveals details to allow better matching.

- Verify that the serial number engraved on the tip matches the serial number selected in the software for measurement. *Note: The user-input tip serial number appears in the measurement screen's corner.*
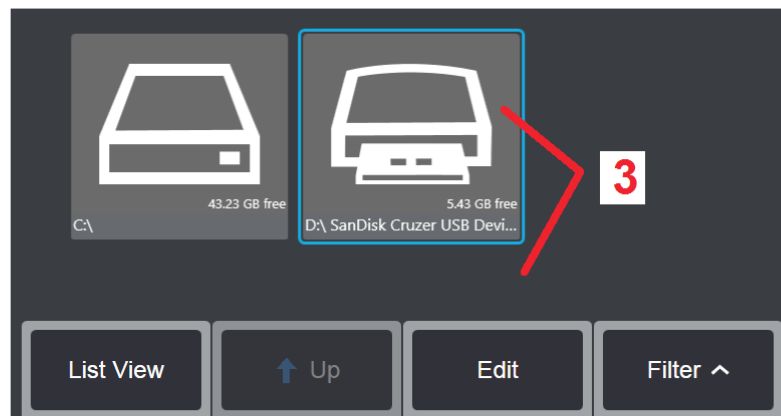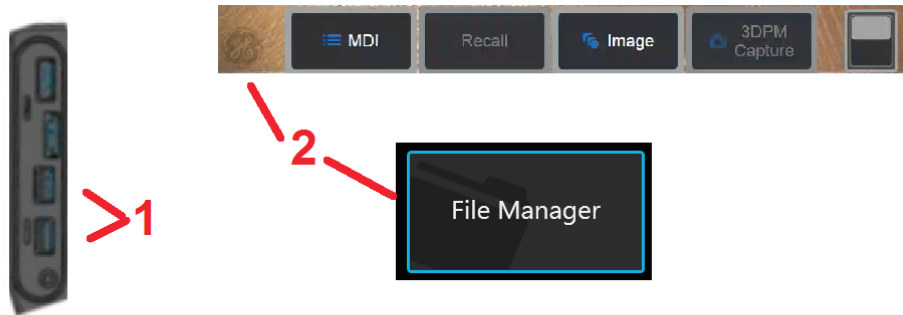
Managing Files

## Working with Removable Storage Devices

USB storage devices can be connected to the iQ, accessed through its File Manager, written to and copied from, and Ejected using the features described here.

1 – Insert the USB Storage Device into either of these ports.

2 –To access files or folders on the USB drive, tap the on-screen **GE Logo** (or press the

hard key) to open the **Global Menu**, then select **File Manager**.

3 –Select the USB device, then navigate, access files or folders, and write to or copy from the drive as you would work with he iQ's internal memory. **Click here to learn more about working with the File Manager.**

4 –*Before removing the USB drive,* tap the on-screen GE Logo (or press the hard key) to open the **Global Menu**, then select **Eject**. *It will be safe to remove the drive once this message appears on the display.*
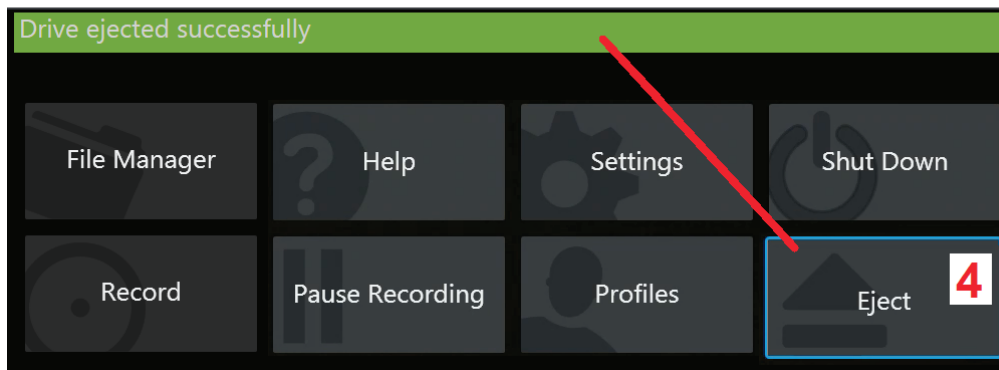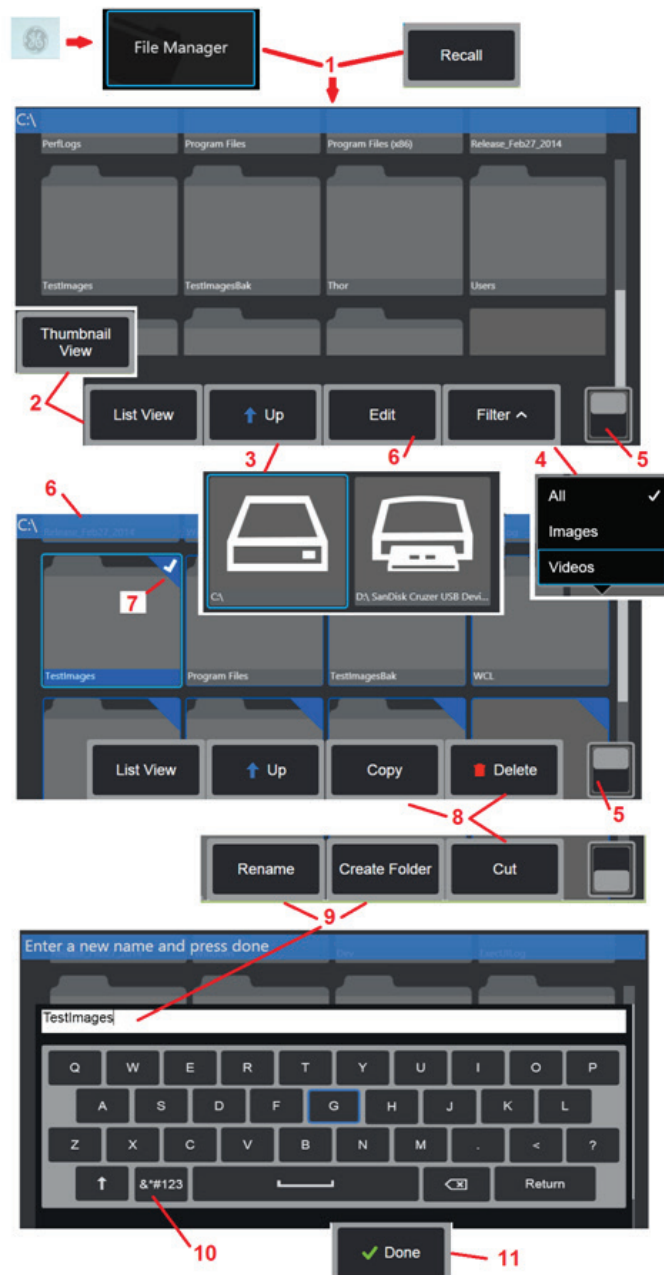
Editing Files and Folders/Creating Folders

Image and video files can be stored in the Visual iQ or a detachable device. The **File Manager** feature allows these stored files (or the folders in which they are stored) to be **Copied, Cut, Pasted, Deleted, Renamed,** or **Created** (in the case of folders). Follow these steps to **Edit** files or folders:

1 – To edit files or folders, tap the on-screen **GE Logo** (or press the   hard key) to open the **Global Menu,** then select **File Manager.** Alternatively, select the **Recall** soft key (when enabled), which allows you to recall a stored image or video and/or edit files and folders. To **Create a New Folder,** first access the **File Manager,** then navigate to the drive location where you want to create the new folder and proceed to Item 5 below for additional instructions.

2 – Controls the **File Manager's** appearance (**Thumbnail View** shown here).

3 – Select to navigate to the next higher directory within the **File Manager**.

4 – Choose which file types to display.

5 – Tap to switch between the **Soft Key Bar's** top and bottom row. To **Create a New Folder,** select **Create Folder** from the bottom row and proceed to Item 9 below for additional instructions. Double tapping in this location hides or displays the soft keys and status bar.

6 – Select to turn on the file Editor function, which allows you to **Copy, Rename,** and otherwise **Edit** stored folders (or files).

7 – Tap on a folder (or file) to select it for editing. The white check appears in the corner of all selected folders or files.

Note: The Edit function must be activated and the file (or folder) selected – so that a white check appears in its corner – before editing.

8 – Once selected for editing, the folder or file can be **Copied** (or **Cut**) and **Pasted** or **Deleted**.

9 – Once selected, a folder (or file) can be **Renamed**. When renaming (or creating a new folder), the virtual keyboard opens.

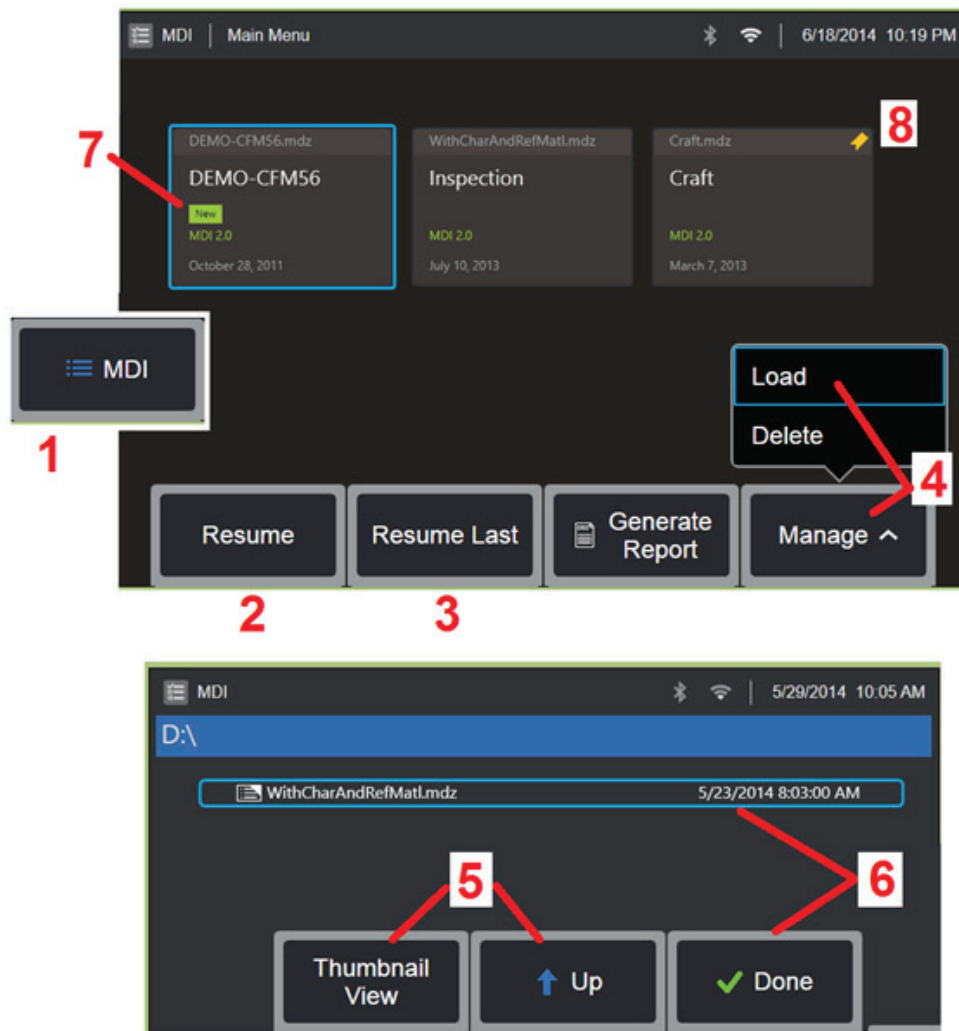**10** – Select to choose from numeric characters or symbols.

11 – Tap after typing the desired name.

MDI

Loading and Unloading Menu Directed Inspections

Follow this process to load or unload a Menu Directed Inspection.

Note: MDI inspection files have the file extension of .mdz. A maximum of fifty MDI inspection files may be loaded at any given time.

1 – Select to launch the **MDI** process.

2 – Select to browse for and **Resume** a previously active inspection.

3 – **Resume the Last** active inspection.

4 – **Load** a new inspection or **Delete** an existing one.

5 – Navigate the **File Manager** to select a file to **Load** or **Delete**.

6 – Select to **Complete** the loading process.

7 – Indicates a newly loaded inspection.

8 – Indicates the last active inspection.
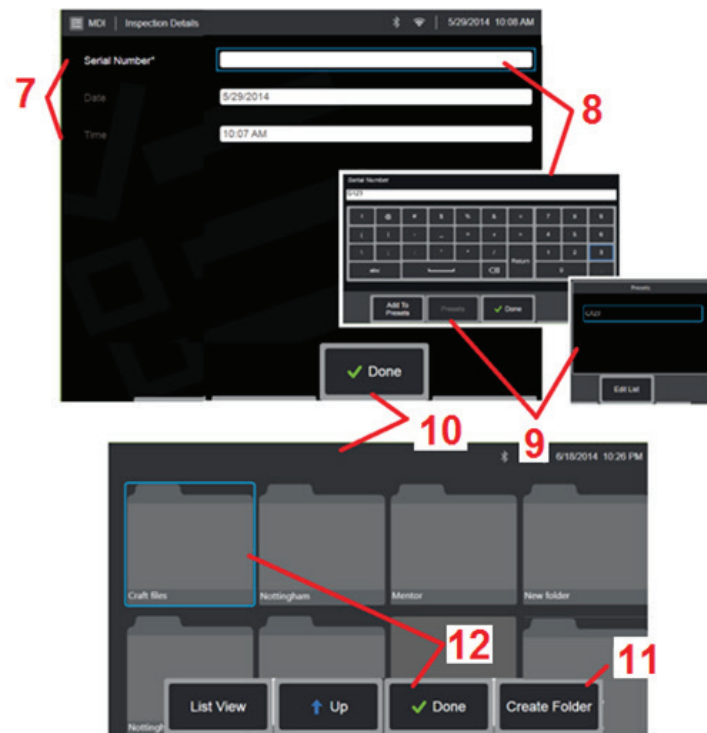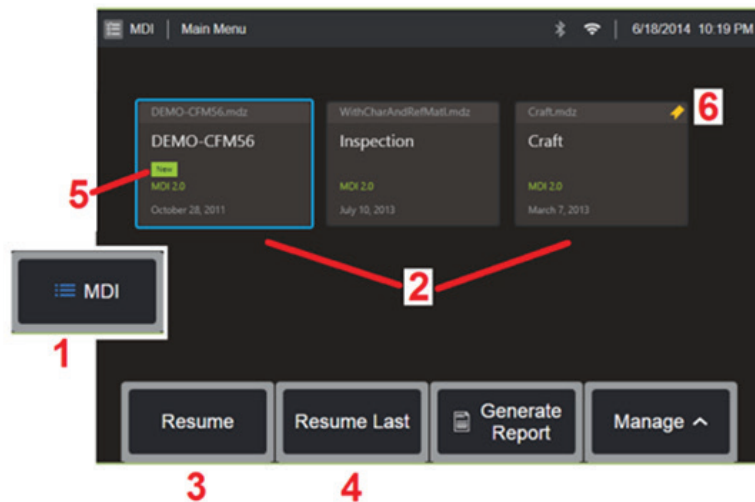
Starting a Menu Directed Inspection

1 – Select to begin the **MDI** process.

2 – Select any loaded inspection.

3 – Select to browse for and **Resume** a previously active inspection.

4 – **Resume the Last** active inspection.

5 – Indicates a newly loaded inspection.

6 – Indicates the last active inspection.

Entering Study Level Information

At the start of an MDI inspection, you are prompted to enter the study level information and to select the directory (folder) into which your inspection results will be saved.

7 – **Study Level Information** (varies for each MDI) is entered at the start of an inspection. Information marked * is required before collecting results.

8 – To enter information, simply choose the corresponding line and the **Virtual Keyboard** will automatically launch.

9 – Use the keyboard to enter information or choose from a user-generated set of **Preset** entries.

10 – Select when finished entering all **Study Level Information**.

11 – You must then identify the **Folder** (directory) into which results acquired during the MDI process are saved. Either **Create a New Folder** or choose an existing one.

12 – Select to complete the information input process.

Selecting an Inspection Point

At this time, you can navigate through the inspection levels until you have reached the desired inspection point.
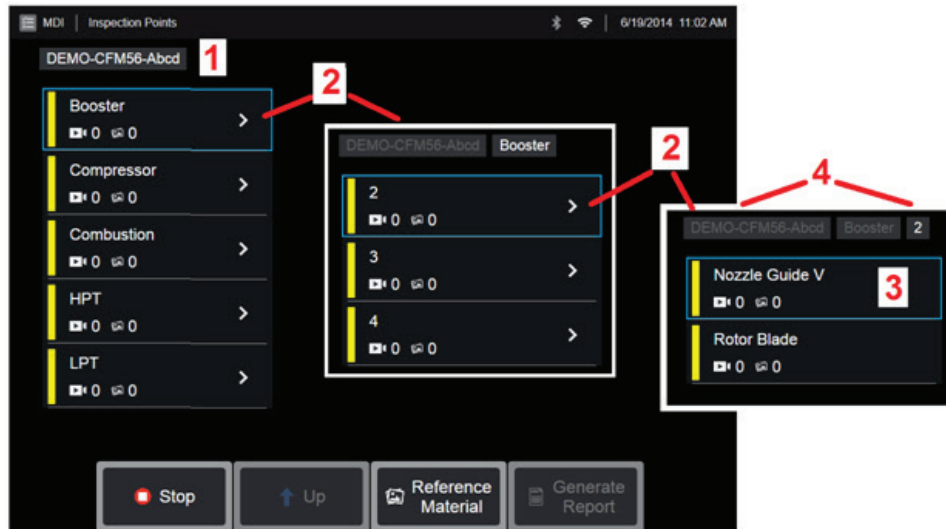
1 – Inspection name and equipment serial number.

2 – Select to navigate to the inspection's next-lowest organization level.

3 – Navigating to the *bottom* level of the inspection allows you to record images and videos.

4 – These labels indicate the level(s) within the inspection and identify your current position.

5 – Click here to learn more about capturing images or Click here to work with videos.

6 – Select soft key labeled with the **Inspection Name** to access this **MDI Leaf Menu**. Use this menu to navigate the List of inspection levels, Stop the current inspection, access **Reference Material** related to the inspection, or **Generate a Report** listing the results stored for the current inspection.

Saving an Image or Video in an MDI Inspection

To save an image in the selected inspection point, press the SAVE hard key. During the save process, some of the following are available:

Required Characterization - If required, a characterization list appears before the save menu. You must select an entry to continue.

Save - Saves the image with the associated MDI data and filename.

Save with Flag - Saves the image with "FLAG" appended onto the filename. If you use this option, you can then generate a report including only the flagged images.

Observation - Assign characterization to this image.

Add Comments - Save typed comments along with the image. When generating a report, these comments are associated with the specific image.

Add Audio Comments - Record audio comments along with the image.

1 – Press this hard key to save the frozen image into the selected inspection point.

Note: The system automatically names the image to correspond to the location in the MDI file currently selected.

2 – **Save Options** are described above (not all appear in every MDI).

Note: Save (or Save With Flag) only after all Comments, Observations, or Audio Comments are entered as this added information will then be associated with the saved image.

3 – These menus allow the user to add **Audio Comments** to any image prior to saving. Be sure to select **Done** to complete the audio-comment recording process.

4 – Select **Comments** to enter written comments to be saved with the image.

5 – Entered comments can be added to a list of **Preset** comments from which you can later select.

6 – Choose **Observations** from a pre-loaded list

Note: Images and Videos saved using MDI are located in the inspection folder created at the beginning of the inspection. The image or video file has Meta data associated with it to ensure communication with data management software such as GEIT Rhythm.
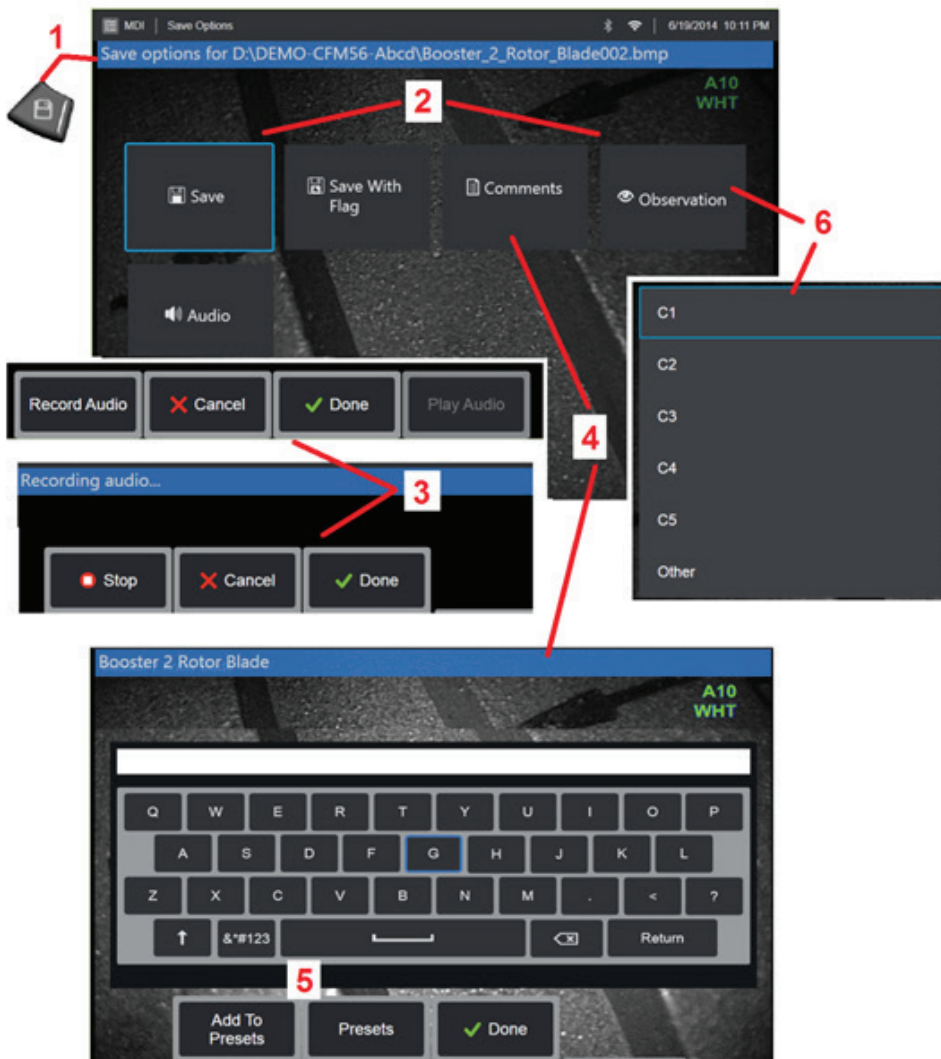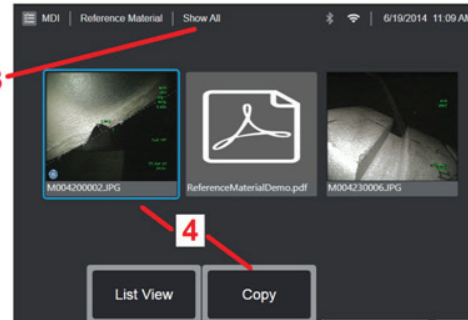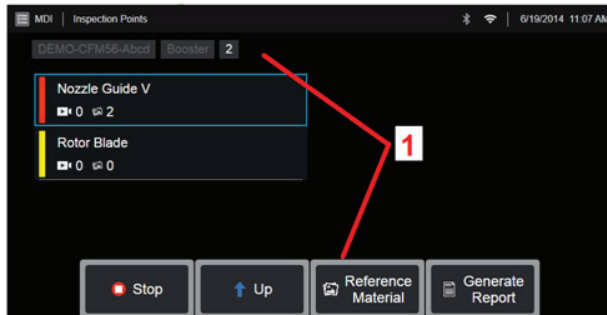
Viewing Reference Material

1 – Select at any level within the inspection to access **Reference Material** associated with the level or point

2 – Select any PDF, image, or video material to open and view on the Visual iQ display

3 – Select **Show All** to access all **Reference Material** associated with the active inspection, which may be more than the material associated with the active level.

4 – Select to **Copy** and paste all reference material for the active inspection *into the folder identified at the beginning of the inspection for storage of results.*

Stopping and Resuming an Inspection

To stop an inspection, which may be resumed or finished at a later time, access the **MDI Leaf Menu** by selecting the soft key bearing the inspection's name and select **Stop**. To resume a previously stopped inspection, select the **MDI** soft key, then choose to either **Resume the Last** inspection or browse for a previous inspection to **Resume**.
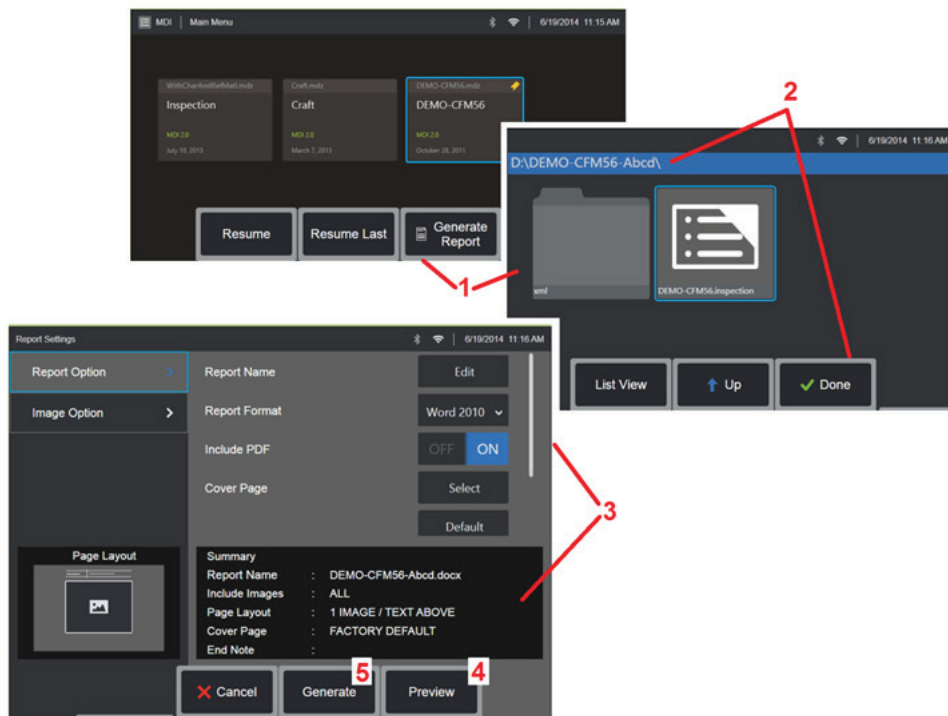
Generating an MDI Report

Follow this process to generate an MDI report.

1 – Select to **Generate a Report** and, if no inspection is active, choose the desired inspection.

2 – After selecting the inspection for which you wish to generate a report, choose **Done**.

3 – Report contents, page layout, and other features can be customized as described in the next section of this manual.

4 – **Preview** the report on the Visual iQ display.

5 – **Generate** an MS Word version of the report, which will be saved in the folder identified for this inspection.
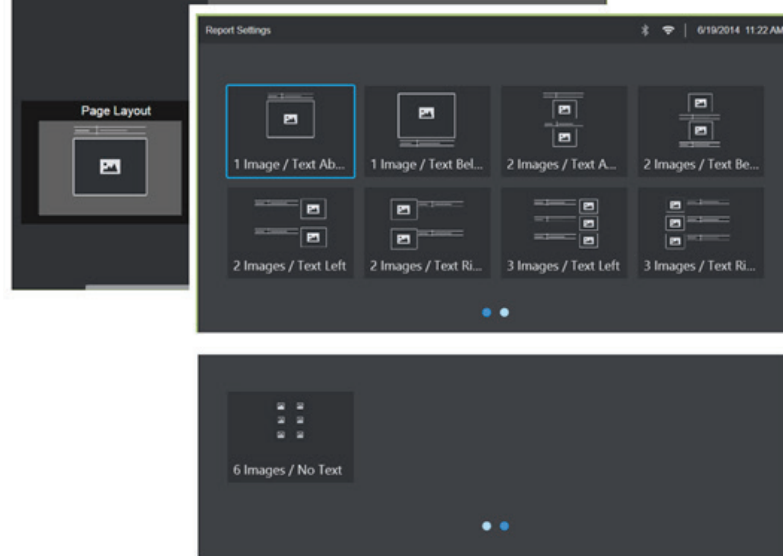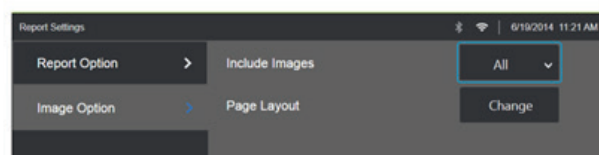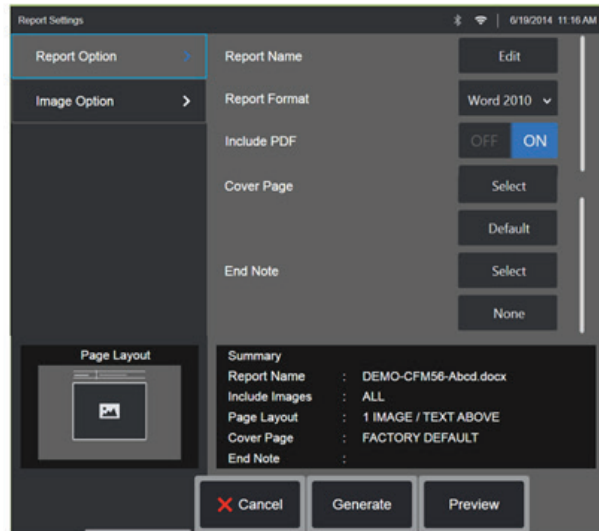
Customizing an MDI Report

Customize an inspection report by specifying the following parameters:

REPORT OPTIONS:

- **Report Name** – Override the automatic inspection report file name.

- **Report Format** – Choose the version of MS Word in which to publish.

- **Include PDF** – Creates a PDF version of the report (can view on the Visual iQ display).

- **Cover Page** - Select the cover page to include in the inspection report.
  - FACTORY DEFAULT - Use the factory default settings for all parameters.
  - BROWSE - Select an MS Word doc to use as report cover page.

- **End Note** - Select the pages to include as the last pages of the report
  - NONE - Don't include any custom features in your inspection report.
  - BROWSE - Select an MS Word doc to include as report end note.

IMAGE OPTIONS:

- **Include Images** - Select either all images or only flagged images to be included in the inspection report.

- **Image Layout** - Select from several styles of text and image layout or select No Text

Maintenance and Troubleshooting

Inspecting and Cleaning the System

Inspect and clean the Visual iQ system before and after each use. If using the system in a dirty environment, clean the components more frequently as needed.

If images are distorted or blurred within normal range, and if the optical tip is securely threaded, the most likely problem is dirty optical surfaces. For best image quality, clean the optical tip and camera head frequently.

If you discover conditions that require evaluation or repair, return the system to GE Inspection Technologies. Early repair of minor conditions can prevent much more costly repair.

⚠ **Caution:** Do not immerse or soak the handset or the probe power plug.

Inspecting and Cleaning an Optical Tip

1 – Check the optical tip for damage or contamination.

2 – Clean all external parts of the optical tip. Use glass cleaner or 70% alcohol-to-water solution and a pointed cotton swab.

3 – Clean only the internal threads of the optical tip. The internal optical lens should only be cleaned when troubleshooting an optical tip that provides poor focus.

⚠ **Caution:** The internal optical lens is surrounded by an O-ring. Use care not to dislodge the O-ring.

⚠ **Caution:** *Do not* use a cotton swab to clean the inside of the 3D phase measurement optical tips tip or damage to the tip may occur.

Inspecting and Cleaning a Probe

1 – Check the probe for damage or contamination. Look for excessive wear in the bending neck, loose strands of the braided weave, or separation of the bonding joints.

Bonding joints

2 – Clean the probe tip, including the lens on the camera head. Use glass cleaner or 70% alcohol-to-water solution and a pointed cotton swab.

Camera head
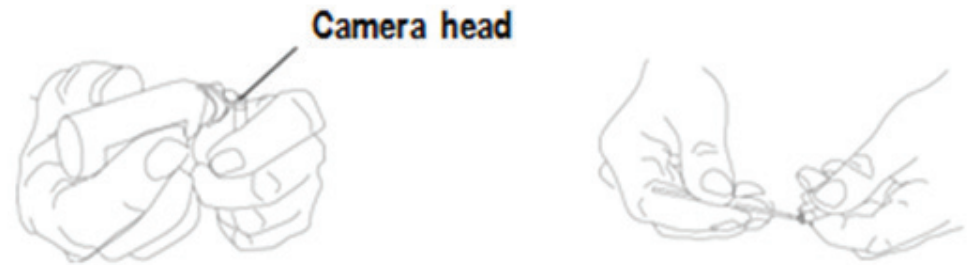
3 – Clean the rest of the probe, including insertion tube and fiberoptic connector. Use a soft cloth dampened with glass cleaner or 70% alcohol-to-water solution.

Cleaning Insertion Tube

Electrical Connectors
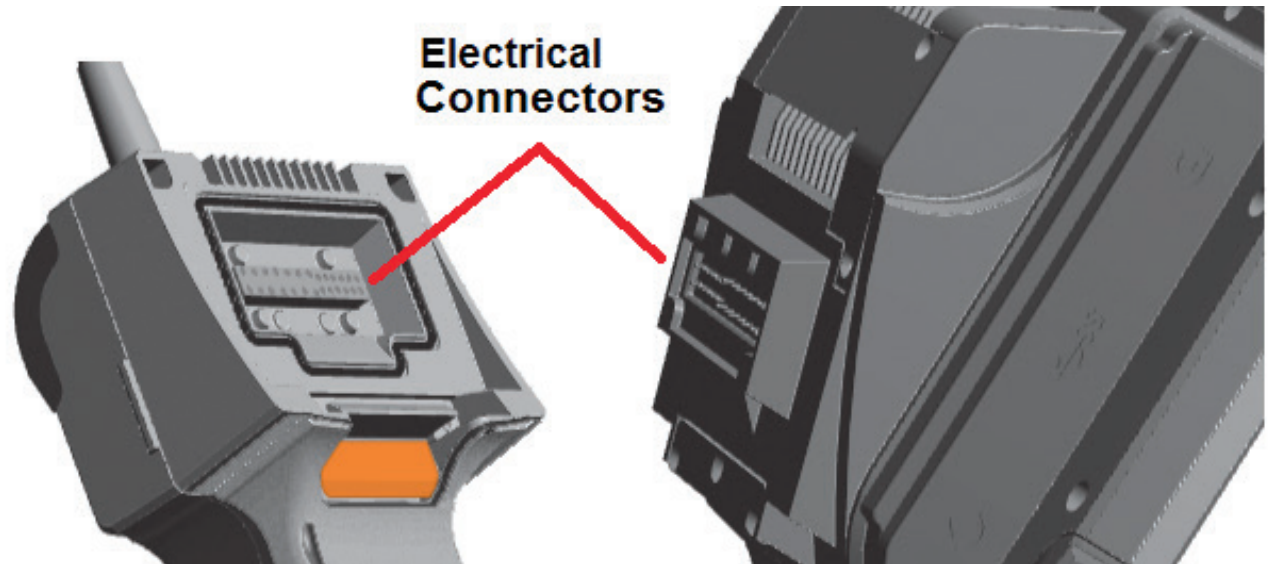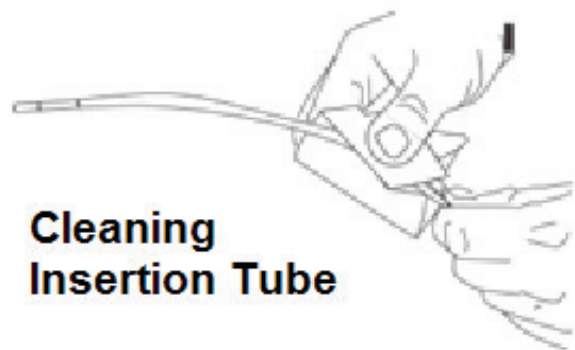
Inspecting and Cleaning the Handset

1 – Disconnect the power cord from the power source.

2 – Check for damage or contamination, including any bent pins on the electrical connector.

3 – Use a soft cloth dampened with glass cleaner or 70% alcohol-to-water solution to clean all parts of the handset, except the electrical connector. Use great care when cleaning the electrical contact pins of the connector. Carefully clean the contact pins with glass cleaner or 70% alcohol-to-water solution using a cotton swab. Compressed air may be used to dry or remove debris from the electrical connector.

Troubleshooting Guide

Image

Condition	Causes	Actions
Images are distorted or blurred within normal range.	• Optical tip is not threaded onto the camera head securely. • The optical surfaces are dirty. • No tip optic or head guard is installed on camera tip.	Reinstall the optical tip. See **"To Attach an Optical Tip"** • Clean the optical tip and the camera head. See **"Inspecting and Cleaning an Optical Tip"** and **"Inspecting and Cleaning a Probe"** • The Visual iQ 6.1mm diameter probes require the use of the 6.1mm headguard supplied. This headguard is unique to the Visual iQ 6.1mm in that it contains an aperture unlike previous product generations. • Remove the tip optic. • Try a different tip optic.
Image quality is otherwise poor.	Various	• If available connect a different probe to handset. • If image quality issue is associated with a specific probe contact GE Inspection Technologies to obtain a return material authorization (RMA).
No image appears in the display. (Hard Keys are lit)	Various	• Verify that the probe is properly seated and latched. See **"To Install a Probe"** • Reboot system. • If available connect a different probe to handset. • If image quality issue is associated with a specific probe contact GE Inspection Technologies to obtain a return material authorization (RMA) • Point the probe tip toward a bright light and see if image appears. If image appears, the problem is associated with lamp operation. If still no image, contact GE Inspection Technologies to obtain a return material authorization (RMA). • If a Displayport cable was purchased connect to a Displayport capable monitor. Determine whether an image appears on it.
Dark video image	Various	• Clean the optical tip and the camera head. See **"Inspecting and Cleaning an Optical Tip"** and **"Inspecting and Cleaning a Probe"** • Verify the LCD Brightness is properly adjusted for the ambient condition. • Check the insertion tube and bending section for severe kinks or dents. • No LED operation
Frozen image "jitters" or is blurred.	• Probe tip was moving when image was captured.	• Unfreeze then refreeze the image, keeping probe tip steady.

05/13/2015

Probe

Condition	Causes	Actions
Reduced articulation in the bending neck.		
Bending neck is not articulating.	• System is in an articulation-disabling mode such as Steer-and-Stay, freeze frame, File Manager, or any Menu function	• Exit the articulation-disabling mode. • Power down the Visual iQ. Leave the system off for at least 15 seconds so that it can complete its shutdown sequence. Then turn it back on.
Insertion tube does not freely withdraw from the storage reel.	• Insertion tube is stuck.	• Gently push the insertion tube in and out with a slight twisting motion in order to free the probe. If probe cannot be freed contact GE Inspection Technologies Tech Support.

Handset

Condition	Causes	Actions
Odd behavior or limited functions.	Various	• Reboot system.
Reduced light output	• High-temperature operation will cause system to automatically limit LED power. • No fan operation	• If reduced light output is acceptable, normal use may continue. If greater light output is required, power system down and allow to cool. • Verify that both fans are operating. Clean with compressed air to remove dirt, and debris.
Reduced system response speed	• High-temperature operation will cause system to automatically limit Microprocessor power. • No fan operation	• If reduced processing speed is acceptable, normal use may continue. If greater processing speed is required, power system down and allow to cool. • Verify that both fans are operating. Clean with compressed air to remove dirt, and debris.
Automatic over-temp shutdown	• Over-temp shutdown • No fan operation	• Allow system to cool adequately prior to power-up. • Verify that both fans are operating. Clean with compressed air to remove dirt, and debris.
Erratic touchscreen behavior	• Lack of grounded AC power	• Remove charger from handset to determine if erratic behavior is caused by AC charger. • Connect charger to known "good" grounded outlet.

Power

Condition	Causes	Actions
When plugged into AC power, system will not charge.	• No AC power present • Incorrect charger • Defective charger	• Check AC power source. • Check power cable connections. • Verify the correct charger is marked with 100 – 240V AC 50/60Hz 18VDC 3.34A. • Contact GE Inspection Technologies for a replacement charger.
When plugged into AC power, system will not turn on.	• Incorrect charger • Defective charger • Defective Battery	• Verify the correct charger is marked with 100 – 240V AC 50/60Hz 18VDC 3.34A. • Contact GE Inspection Technologies for a replacement charger. • Try another battery. • If replacement battery does not restore operation contact GE Inspection Technologies to obtain a return material authorization (RMA).
System runs when connected to AC power only.	• Battery disconnected or incorrectly connected. • Battery low, not charging, depleted or defective.	• Disconnect and reconnect battery. • Verify battery charge level. • Recharge or replace the battery.

Software

Condition	Causes	Actions
Time, date, or other settings are lost when system is turned off.	• Internal battery needs replacing. (Normal life is five years.)	• Return system to GE Inspection Technologies to have internal battery replaced. Contact GE Inspection Technologies to obtain a return material authorization (RMA).

APPENDICES

Appendix A. Technical Specifications

Operating Temperature	
Tip	-25ºC to 115ºC (-13ºF to 239ºF). Reduced articulation below 0ºC (32ºF)
System	-20º to 46ºC (-4ºF to 115ºF). LCD may require warm-up period below 0ºC (32ºF).
Storage Temperature	-25º to 60ºC (-13ºF to 140ºF)
Relative Humidity	95% max, non-condensing
Waterproof	Insertion tube and tip to 14.7 psi (1 bar, 10.2 m of H2O, 33.5 ft of H2O).
Hazardous Environments	Not rated for use in hazardous environments.
Camera	
Diameter Probe	4.0 mm (0.16"), 6.1 mm (0.24"), 8.4 mm (0.33")
Image Sensor	1/6" Color SUPER HAD™ CCD camera (6.1 mm, 8.4 mm) 1/10" (4.0 mm)
Pixel Count	440,000 pixels
Housing	Titanium
System	
System Dimensions	17.1 cm × 19.7 cm × 38.1 cm (6.75" × 7.75" × 15")
Case Dimensions (Small, standard)	35.0 cm × 54.5 cm × 23.0 cm (13.78" × 21.46" × 9.05")
Case Dimensions (Large, optional)	57.2 cm × 56.3 cm × 41.2 cm (22.52" × 22.16" × 16.22")
System Weight	In small case with contents: 10.2 kg (22.4 lbs). In large case with contents: 19.6 kg (43.2 lbs). Out of Case: 6120 system - 3.0 kg (6.7 lbs). 6110 system - 4.0 kg (8.7 lbs).
Construction	Magnesium and Polycarbonate housing with integrated elastomeric bumpers
LCD Monitor	Integrated (6.5") active matrix XGA color LCD, daylight readable display, with optically-bonded, multipoint capacitive Dragontrail™ touchscreen.
Joystick Control	360º All-Way® tip articulation, menu access, and navigation
Button Set	Access user functions, measurement, and digital functions
Audio	Integrated 3.5mm headset / microphone jack or bluetooth headset
Internal Memory	16 GB SSD for user storage

Data I/O Ports	Two USB 3.0 host 'A' ports, one USB 3.0 client micro 'B' port,
Video Out	DisplayPort
Brightness Control	Auto and Variable
Illumination Type	White LED
Long Exposure	Auto - up to 16 seconds
White Balance	Factory default or user defined
Wi-Fi Adapter	802.11a/b/g/n/ac, dual-band (2.4GHz/5GHz), 2x2
Bluetooth Adapter	Bluetooth 4.0

Power	
Lithium Ion Battery	10.8V (nominal), 73Wh, 6.8Ah

Power Supply	
AC	100-240VAC, 50-60Hz, <1.5A RMS
DC	18V, 3.34A

Standards Compliance and Classifications	
MIL-STD-810G	United States Department of Defense Environment Tests Sections 501.5, 502.5, 506.5, 507.5, 509.5, 510.5, 511.5, 514.5, 516.5, 521.5
MIL-STD-461F	U.S. Department of Defense -- Electromagnetic Interference RS103, RE102 - ABOVE DECK
Standards Compliance	Group 1, Class A: EN61326-1, UL, IEC, EN CSA-C22.2:61010-1, UN/DOT T1-T8
IP Rating	IP65 (Disassembled or Assembled)

Patent Information	
Mentor Visual iQ is covered under one or more of the following US Patents: US5734418, US5754313, US6468201, US7819798, US8310533, US8368749, US7262797, US7782453, US8514278, US8213676, US7821649, US8107083, US8422030, US7969583, US8253782, US7902990, US8310604, US8165351, US8760447, US8411083, US7170677, US7564626, US8810636, US8863033, US8976363, US9036892, and US9013469.	

Software	
Operating System	Embedded, multi-tasking operating system
User Interface	Menu-driven and soft button operation; menu navigation using either touchscreen or joystick
File Manager	Embedded file manager supports the following operation on files and folders: copy, cut, create, rename, delete, filter and sort. USB and internal flash storage.

Audio Data	PC compatible AAC (.m4a) file format
Image Control	Invert, Inverse+, Adaptive Noise Reduction, Distortion Correction, Illumination, Brightness, Long Exposure, Single View, Zoom (5x digital), Image Capture and Recall
Digital Zoom	Continuous (5x)
Image Formats	Bitmap (.BMP), JPEG (.JPG)
Video Format	MPEG4 AVC /H.264 (.MP4)
Text Annotation	Built-in full-screen text overlay generator
Graphic Annotation	User placement of arrows
Articulation Control	User-selectable steer vs. steer & stay articulation; tip "Home" return to neutral forward-tip orientation.
Software Updates	Field upgradable via USB ThumbDrive®
Languages	English, Spanish, French, German, Italian, Russian, Japanese, Korean, Portuguese, Chinese, Polish, Hungarian, Finnish and Swedish
Application Software	Menu Directed Inspection (MDI) software digitally guides inspectors through the inspection process, intelligently names files and creates MS Word® and PDF compatible inspection reports.

Probe Measurements

Diameter	Length
4.0 mm (0.15")	2.0, 3.0 m (6.6, 9,8 ft.)
6.1 mm (0.24") or 8.4 mm (0.33")	2.0, 3.0, 4.5, 6.0, 10.0 m (6.6, 9.8, 14.8, 19.7, 32.8 ft.)
Longer lengths up to 30 m are available. Contact your sales representative for details.	

Tip Articulation

Insertion Tube Length	Articulation
2 m - 4.5 m	Up/Down 160° min, Left/Right 160° min
6 m – 10 m	Up/Down 140° min, Left/Right 140° min
Note: Typical articulation exceeds minimum specifications.	

Appendix B. Optical Tip Table

Mentor Visual iQ 4.0mm tips

Part No.	Color	FOV (deg)	DOF mm	(in.)
Forward View				
T4080FF*	None	80	35-inf	(1.38-inf)
T40115FN	Black	115	4-inf	(.16-inf)
Side View				
T40115SN	Red	115	1-30	(.04-1.18)
T40120SF	Blue	120	6-inf	(.24-inf)
Stereo Measurement				
TM405555FG	Black	55/55-FWD	5-inf	(.20-inf)
TM405555SG	Blue	55/55-SIDE	4-inf	(.16-inf)

* Indicates tip with maximum brightness.

Mentor Visual iQ 6.1mm tips

Part No.	Color	FOV (deg)	DOF mm	(in.)
Forward View				
T6150FF	None	50	50-inf	(2.36-inf)
XLG3T6150FG	White	50	12-200	(.47-7.87)
XLG3T61120FG	Black	120	5-120	(.20-4.72)
XLG3T6180FN	Orange	80	3-20	(.12-.79)
XLG3T6190FF	Yellow	90	20-inf	(.79-inf)
XLG3T6150FB	Purple	50(45 DOV)	12-80	(.47-3.15)
T6165FF*	Orange &Blue	65	65-inf	(2.56-inf)
Side View				
XLG3T6150SF	Brown	50	45-inf	(1.77-inf)
XLG3T6150SG	Green	50	9-160	(.35-6.30)
XLG3T61120SG	Blue	120	4-100	(.16-3.94)
XLG3T6180SN	Red	80	1-20	(.04-.79)
3D Phase Measurement				
XLG3TM61105FG	Black	105	8-250	(.31-9.84)
XLG3TM61105SG	Blue	105	7-250	(.27-9.84)
Shadow Measurement				
XLG3TM6150FG	White	50-FWD	12-30	(.47-1.18)
XLG3TM6150SG	Blue	50-SIDE	7-24	(.28-.94)
Stereo Measurement				
XLG3TM616060FG	Black	60/60-FWD	4-80	(.16-3.15)
XLG3TM615050SG	Blue	50/50-SIDE	2-50	(.08-1.97)

* Indicates tip with maximum brightness.

Mentor Visual iQ 8.4mm tips

Part No.	Color	FOV (deg)	DOF mm	(in.)
Forward View				
XLG3T8440FF*	None	40	250-inf	(9.84-inf)
XLG3T8480FG	Yellow	80	25-500	(0.98-19.7)
XLG3T84120FN	Black	120	5-200	(0.20-7.87)
XLG3T8440FG	White	40	80-500	(3.15-19.7)
Side View				
XLG3T8440SF*	Brown	40	250-inf	(9.84-inf)
XLG3T8480SG	Green	80	25-500	(0.98-19.7)
XLG3T84120SN	Blue	120	4-200	(0.16-7.87)
Stereo Measurement				
XLG3TM846060FG	Black	60/60-FWD	4-50	(0.16-1.97)
XLG3TM846060SG	Blue	60/60-SIDE	4-50	(0.16-1.97)

*Indicates tip with maximum brightness.

Appendix C. Chemical Compatibility

Chemical compatibility refers to the probe's ability to come into contact with various liquid substances and not be damaged.

⚠️ **WARNING** Do not use this system in explosive environments.

These substances are safe for a short duration of contact with the insertion tube and tip optics:

- Water
- Aircraft Gasoline
- Jet-A-Fuel
- Isopropyl alcohol
- JP-4 Fuel
- Kerosene
- Synthetic Turbo Oil
- Gasoline
- Diesel Fuel
- Hydraulic Oil
- Inhibited Transformer Oil

Subsequent to contact with the above fluids, the insertion tube and tip optics used must be cleaned prior to storage.

Appendix D. Warranty

GE Inspection Technologies warrants its VideoProbe components, when new, to be free from defects in material and workmanship and to perform in accordance with manufacturer's specifications under normal use and service for a period of one year from the date of purchase from GE Inspection Technologies or its authorized distributors, except that, the light source is warranted for a period of 3 years from the date of purchase, the battery is warranted for a period of 30 days from the date of purchase, and where used, servo motors in the articulation drive system are warranted for the life of this VideoProbe product.

GE Inspection Technologies' obligation under this warranty is limited to the repair or replacement of components determined by GE Inspection Technologies to be defective within the warranty period at no cost to the original purchaser, except for return shipping expenses. It shall be the purchaser's responsibility to return the product to GE Inspection Technologies or one of its authorized service centers. The warranty does not cover accessories or optional equipment not manufactured by GE Inspection Technologies, but these items may be covered by separate manufacturers' warranties.

This warranty extends to the original purchaser and cannot be assigned or transferred to any third party. This warranty shall not apply to any damage or product failure determined by GE Inspection Technologies to have been caused by misuse, accident (including shipping damage), neglect, improper maintenance, modification or repair by someone other than GE Inspection Technologies or one of its authorized service representatives.

These express warranties are in lieu of any other warranties, express or implied, including the warranties of merchantability and fitness for a particular purpose, and no other person has been authorized to assume for GE Inspection Technologies any other liability in connection with the sale of its VideoProbe products. GE Inspection Technologies shall not be liable for any loss or damages, whether direct or indirect, incidental, or consequential, resulting from the breach of any express warranty set forth herein.

Appendix E. Verifying Measurement Tips

Verify measurement tips each time you use them to ensure that no mechanical damage has degraded their accuracy. Visual iQ systems are shipped with a measurement verification block. This tool lets you verify the accuracy of measurement tips. It contains optical measurement targets whose accuracy is traceable to the United States National Institute of Standards and Technology (NIST) measurement standards.

These are the part numbers for the verification blocks used with the Visual iQ:
VER2400C   For 4.0 mm systems
VER2600D   For 6.1 mm systems
XLG3TM84VER   For 8.4 mm systems

To Verify a 3DPM Measurement Tip:

Securely attach a 3DPM tip and then

1 – Navigate to the Measurement & Annotation section of the Settings menu and select Verify.

2 – Insert the tip into the verification block and follow the on-screen prompts to complete the test. The system will automatically check the tip's accuracy, check for contamination on the gratings, and verify the health of the tip LEDs. Note that the results of this automatic verification are logged in a file for troubleshooting (if required).

Note: Accuracy may also be checked by performing manual length measurements between the crosshairs.

To Verify a 3D Stereo or Stereo Measurement Tip:

Securely attach a 3D Stereo or Stereo tip and then

3 – Insert the tip into the appropriate port of the verification block and position the tip to center the target crosshairs in the image.

4 – Freeze the image, select Stereo, and then identify the serial number or the attached tip.

Note: 3D Stereo tips include a + 3D designation on the soft key

5 – Perform manual length measurements between the crosshairs.

With accurate cursor placement, a measurement tip of any type in good condition should give results of 0.100 ± 0.005 inches (1.00 ± 0.05 mm). If your measurement does not fall within these limits, try the suggestions under Troubleshooting Measurements.

Each measurement verification block comes with a calibration schedule and a certificate of calibration (C of C), which notes the calibration date and due date.
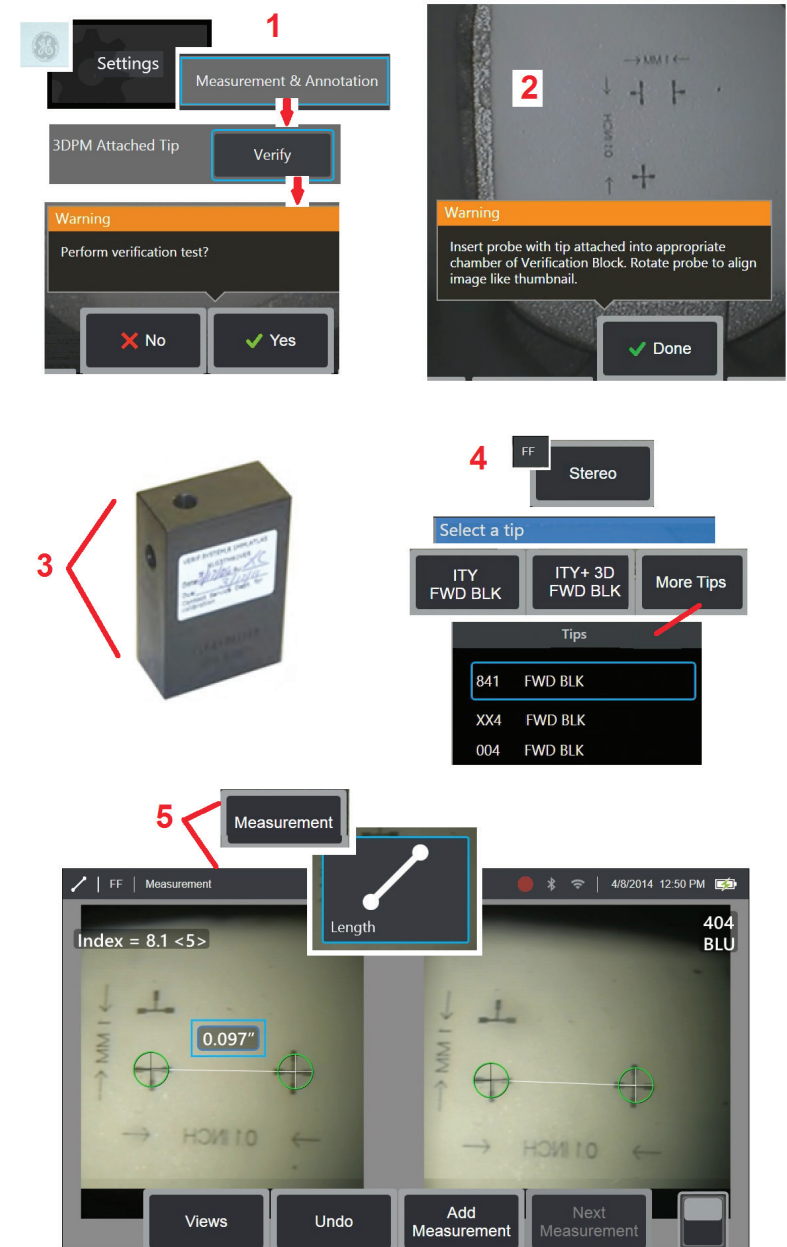
Appendix F. Environmental Compliance

The equipment purchased has required the extraction and use of natural resources for its production. It may contain hazardous substances that could impact health and the environment.

In order to avoid the dissemination of those substances in the environment and to diminish the pressure on the natural resources, we encourage the use of appropriate take-back systems. Those systems will reuse or recycle most of the materials of end-life equipment in a sound way.

The cross-out wheeled bin symbol encourages the use of those systems.

If more information is needed on the collection, reuse, and recycling systems, please contact the appropriate local or regional waste administration.

EU Battery Directive

This product contains a battery that cannot be disposed of as unsorted municipal waste in the European Union. See the product documentation for specific battery information. The battery is marked with this symbol, which may include lettering to indicate cadmium (Cd), lead (Pb), or mercury (Hg). For proper recycling return the battery to your supplier or to a designated collection point.

What do the markings mean?

Batteries and accumulators must be marked (either on the battery or accumulator or on its packaging, depending on size) with the separate collection symbol. In addition, the marking must include the chemical symbols of specific levels of toxic metals as follows:

Cadmium (Cd) over 0.002%
Lead (Pb) over 0.004%
Mercury (Hg) over 0.0005%

The risks and your role in reducing them

Your participation is an important part of the effort to minimize the impact of batteries and accumulators on the environment and on human health. For proper recycling you can return this product or the batteries or accumulators it contains to your supplier or to a designated collection point. Some batteries or accumulators contain toxic metals that pose serious risks to human health and to the environment. When required, the product marking includes chemical symbols that indicate the presence toxic metals: Pb for lead, Hg for mercury, and Cd for cadmium. Cadmium poisoning can result in cancer of the lungs and prostate gland. Chronic effects include kidney damage, pulmonary emphysema, and bone diseases such as osteomalcia and osteoporosis. Cadmium may also cause anemia, discoloration of the teeth, and loss of smell (anosmia). Lead is poisonous in all forms. It accumulates in the body, so each exposure is signifi cant. Ingestion and inhalation of lead can cause severe damage to human health. Risks include brain damage, convulsions, malnutrition, and sterility. Mercury creates hazardous vapors at room temperature. Exposure to high concentrations of mercury vapor can cause a variety of severe symptoms. Risks include chronic inflammation of mouth and gums, personality change, nervousness, fever, and rashes.

Visit www.ge-mcs.com for take-back instructions and more information about this initiative.

Appendix G. Regulatory Compliance

European Community — CE Notice:

The **CE** mark indicates compliance with the essential requirements of Directive 1999/5/EC. Such marking is indicative that this equipment meets or exceeds the following technical standards:

EN 300 328
EN 301 893
EN 301 489-1/EN 301 489-17
EN 62311

European Equipment Classification

Group 1, Class A

The **CE** mark on this product indicates it has been tested to and conforms with the provisions noted within the 2004/108/EC Electromagnetic Compatibility Directive. The Visual iQ system is in conformance with the following standard: EN61326-1.

Declarations of Conformity are held by GE Inspection Technologies GmbH:

GE Inspection Technologies
GmbH Product Service Center
Lotzenäcker 4
72379 Hechingen Germany
Tel: +49(0) 74719882 0
Fax: +49(0) 74719882 16

Safety Mark

The Visual iQ system is in compliance with the following standards:

UL 61010-1, IEC 61010-1, EN 61010-1 and CSA-C22.2 No. 61010-1.

Additional Certification Testing

MIL-STD-461F: RS103, RE102–Above Deck
MIL-STD-810G: 501.5, 502.5, 506.5, 507.5, 509.5, 510.5, 511.5, 514.5, 516.5, 521.5
UN / DOT T1-T8

FCC Compliance Statement:

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.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interferences in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Caution:

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

IMPORTANT NOTE:

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Operations in the 5.15-5.25GHz band are restricted to indoor usage only.

Industry Canada Regulatory Statement:

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions:

1) This device may not cause interferences, and

2) This device must accept any interferences, including interferences that may cause undesired operation of the device.

Cet appareil est conforme avec Industrie Canada exempts de licence standard RSS (s). L'utilisation de ce dispositif est autorisée seulement aux conditions suivantes:

1) il ne doit pas produire de brouillage et

2) l' utilisateur du dispositif doit étre prêt à accepter tout brouillage radioélectrique reçu, même si ce brouillage est susceptible de compromettre le fonctionnement du dispositif.

Complies with the Canadian ICES-003 Class B specifications.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

IMPORTANT NOTE:

IC Radiation Exposure Statement:

This equipment complies with IC radiation exposure limits set forth for an uncontrolled environment.

The transmitter module may not be co-located with any other transmitter or antenna.

Cet équipement est conforme aux limites d'exposition aux rayonnements d'Industrie Canada établies pour un environnement non contrôlé.

Le module émetteur peut ne pas être co-située avec tout autre émetteur ou antenne.

Caution:

This device for the band 5150-5250 MHz is only for indoor usage to reduce potential for harmful interference to co-channel mobile satellite systems.

Because high power radars are allocated as primary users (meaning they have priority) in 5250-5350 MHz and 5650-5850 MHz, these radars could cause interference and / or damage to license exempt LAN devices.

Cet appareil (pour réseaux locaux radioélectriques) dans les bandes de fréquences 5150-5250 MHz est réservé à une utilization à l'intérieur afin de réduire le risque d'interférence avec les systèmes satellites mobiles bicanaux.

Les radars forte puissance sont désignés comme étant les premiers utilisateurs (c'est-à-dire qu'ils ont la priorité) des bandes de fréquences 5250-5350 MHz et 5650-5850 MHz. Ces stations radarspeuvent provoquer des interférences et/ou des dommages à ce périphérique.

Canadian Notice

This equipment does not exceed the Class A limits for radio noise emissions as described in the Radio Interference Regulations of the Canadian Department of Communications.

Le present appareil numerique n'emet pas de bruits radioelectriques depassant les limites applicables aux appareils numeriques de la classe A prescrites dans le Reglement sur le brouillage radioelectrique edicte par le ministere des Communications du Canada.

Brazil Wireless Statement:

ANATEL Este equipamento opera em caráter secundário, isto é, não tem direito a proteção contra interferência prejudicial, mesmo de estações do mesmo tipo, e não pode causar interferência a sistemas operando em caráter primário.

(This equipment operates on a secondary basis, ie, not entitled to protection against harmful interference, even of the same type stations, and cannot cause interference to systems operating on a primary basis.)

South Korea Wireless Statement:

이 기기는 업무용(A급)으로 전자파적합로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다

(EMC registration is done on this equipment for a business use only (Class A). Product seller and user should notice that this equipment is purposed to be used except for house use.)

당해 무선설비는 전파혼신 가능성이 있으므로 인명안전과 관련된 서비스는 할수 없음

(This device shall not be used for life-safety related service due to radio interference possibility.)

Taiwan NCC Wireless Statement:

注意！
依據 低功率電波輻射性電機管理辦法
第十二條 經型式認證合格之低功率射頻電機，非經許可，
公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計
之特性及功能。
第十四條 低功率射頻電機之使用不得影響飛航安全及干擾合法通信；
經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。
前項合法通信，指依電信規定作業之無線電信。
低功率射頻電機須忍受合法通信或工業、科學及醫療用電波輻射性
電機設備之干擾。

Appendix H. Creating a Personalized Logo File

A custom logo can be loaded into the display, where it will appear in the lower left corner (in place of the default GE logo). Suitable logos must be saved as **PNG** file format and must be no larger than 140 by 140 pixels. It is advisable to use image files that are approximatley square. To replace the GE icon with a custom icon:

1 – Tap the lower-left corner of the display (typically contains a **GE Logo**) at any time to open the **Global Menu**, select **Setup** and then open the **System** menu. You can now choose to **Load** a **Logo**.

2 – Select to **Load** a **Logo**. This File Navigation window will open.

3 – Navigate to find the desired logo file.

4 – Choose the logo file and select Done. The newly loaded logo file appears at the bottom left of the display screen, provided it is configured to do so by the Screen and Display Settings.

Note: See next page for instructions to incorporate a transparent logo.
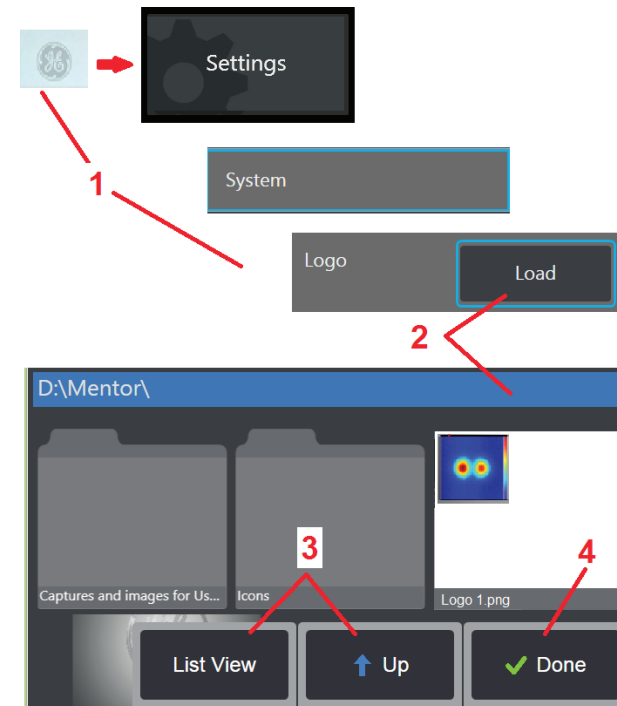
To incorporate a transparent customized logo, you must first save the logo file in Photoshop, Gimp 2, or a similar graphics package capable of creating transparencies. If working in Gimp 2, follow the process below to convert a single-color image into a transparency.

1 – Select and **Open** the PNG file in Gimp2 as shown.

2 – Select **Image > Mode > RGB**.

3 – Choose a single color.

4 – Select **Color to Alpha**.... to convert the specified color to transparent.

5 – Export the transparent image to PNG file type.

You can now **Load** your transparent personalized logo into the Visual iQ.
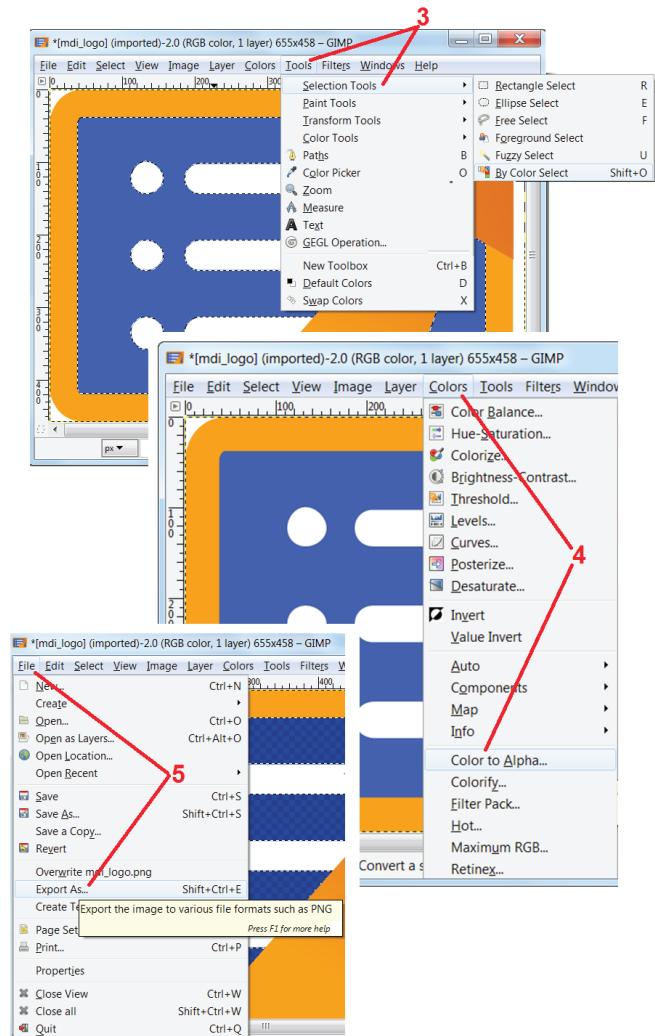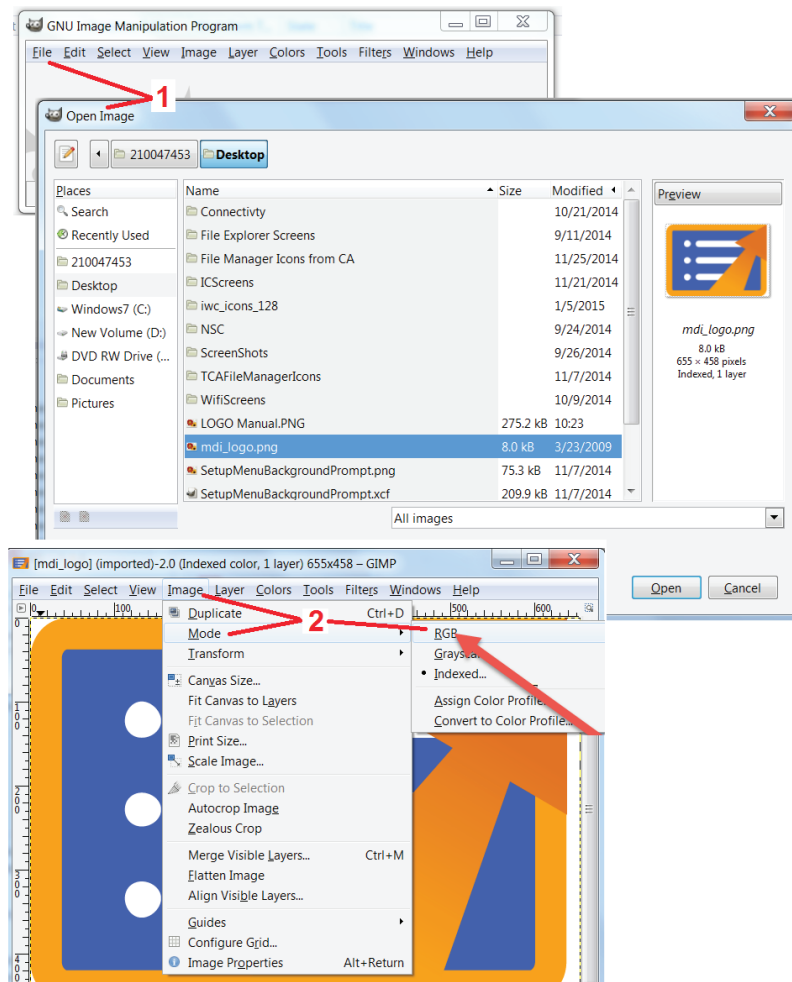
Appendix I. Open Source Software Availability

There are various open source software packages that have been utilized within this product, and to meet license and copyright obligations, a copy of the source code for each package is available upon request, along with the individual licenses and copyright notices for each, for three years from the date of original installation upon the product.

Requesting these source packages is NOT REQUIRED for operation or use of this product. Additionally, only portions of software on this product fall under open source software licenses, with the remainder merely being an aggregation on the product's storage volumes. Thus NO promise is made NOR implied that source code will be provided for the aggregated proprietary software.

With respect to each open source software distribution, no warrantee is expressed nor implied by either the original authors of the software, nor by any other party involved in the distribution of the software. More explicit warranty disclaimers are detailed within the license documentation of each software package, again available upon request. Furthermore such disclaimers and license requirements and restrictions only apply to each open source software package, and DO NOT REFLECT the warranty of the product as a whole.

There are no additional restrictions placed upon copying, distribution, or modification of each software package beyond those of the original licenses, expressed or implied, due to their inclusion in this product.

To request a copy of these open source software packages, please have your product model and serial numbers ready, and call customer support representatives at +1 (315) 554-2000, option 3.

Appendix J. Restoring Factory Settings

1 – Tap the on-screen **GE Icon** at any time to open or close the **Global Menu**, which provides access to several features including the **Settings Menu.**

2 – Tap to open the **Settings Menu.**

3 – Select Restore, then confirm by selecting Yes to reset all values of the active profile to the factory default values **(Click here to learn more about changing the current profile or creating a new one).**

Note: Restoring factory defaults will automatically cause the operating language to revert to English. **Click here to learn how to change the operating language selection.**
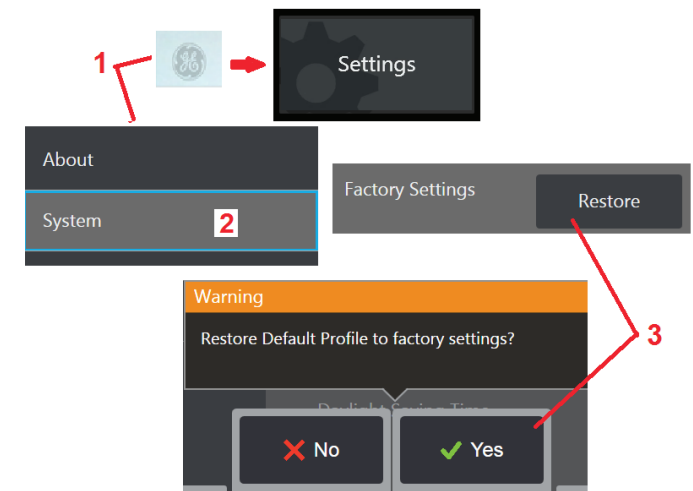
Appendix K. Updating Mentor Visual iQ Software

Software updating requires a connected USB drive or an Internet connection. The updating process must be carried out while the iQ is connected to an AC power source.
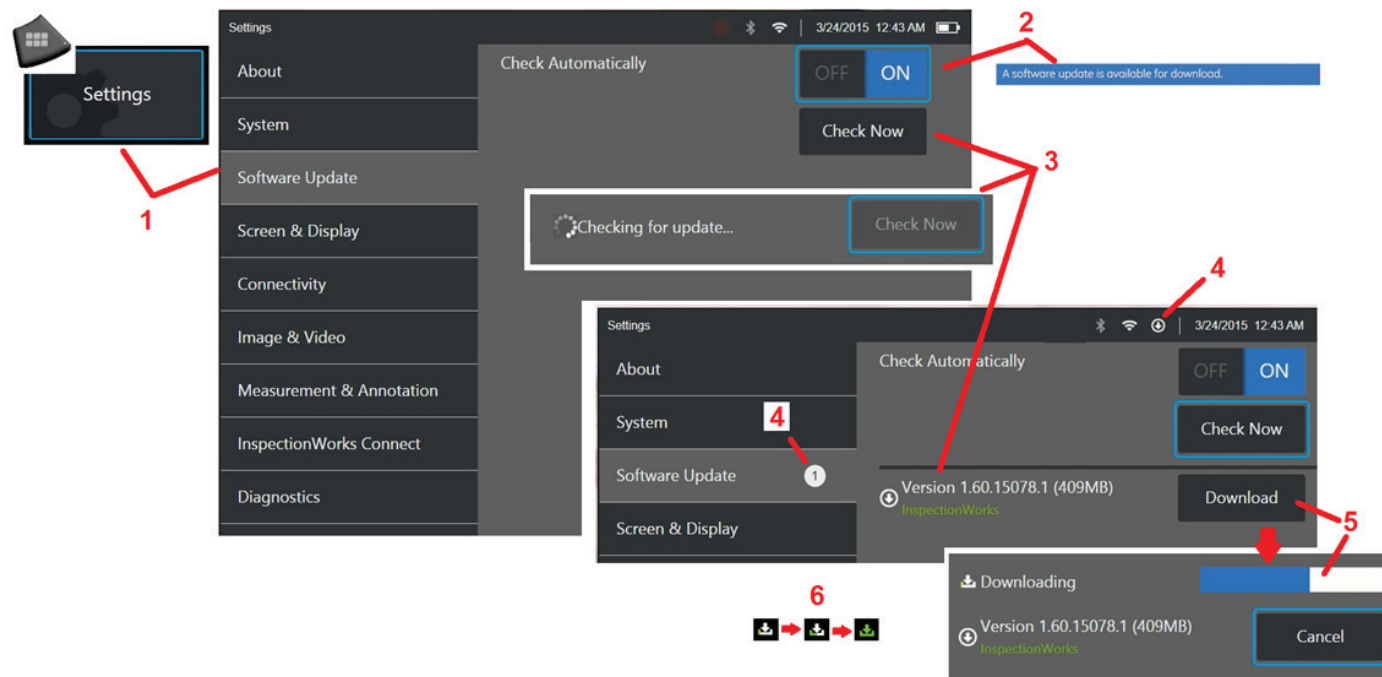
1 – Tap the logo at the lower left corner of the screen or press [icon] to open the **Global Menu**, select the **Settings Menu**, then choose **Software Update**.

2 – When set to **On**, device periodically checks for available updates on a connected USB drive and whenever connected to the Internet. This status message appears when updates are detected.

3 – Select to immediately search for available updates on a connected USB drive and/or via the Internet connection.

4 – Status-bar icon appears when software update is available for download while this counter indicates the total number of *new* updates available

5 – Select to **Download** an update via the Internet connection. This status-bar icon (**6**) indicates download progression. Once downloaded (or if the update is found on a USB drive), you will be prompted to **Install** the upgrade before software modification begins.

Note: Updating the software will not affect files stored in the File Manager, Profiles, or other settings made by the operator.

Appendix L. LongSteer™ Specifications

Supply pressure: 100 – 150 PSIG

Do not exceed supply pressure of 150 PSIG

Dry air must be provided by the user.

To get full articulation, insertion tube must be extended at least 10 feet off the reel.

User is able to continue to inspect and steer while removing the probe from the reel. No need to remove the entire length of the probe from the reel prior to operation. This allows the user to only extend the length of probe needed to inspect the asset.

10mm/8.4mm Shaft: 18m and 30m lengths available

10mm/6.1mm PM Shaft: 18m and 30m lengths available

Appendix M. InspectionWorks Connect (IWC) Optional Collaboration Capability

InspectionWorks Connect is an Internet service that enables video collaboration between Inspectors and remotely located Experts. Inspectors control their Visual iQ while simultaneously connecting through the IWC cloud infrastructure to a remote Expert via the IWC web portal. This allows the Inspector and Expert to share inspection video, exchange chat messages, and make on-screen annotations (circles, text, arrows or freehand drawings), which are seen by both participants. Collaborating with an IWC session requires:

- Ensuring your Visual iQ is equipped with this optional feature

- Starting and Stopping a session

- Inviting an expert to participate and Expert Login (supported browser required)

- Using the Chat feature and other on-screen controls

Equipping Your Mentor Visual iQ with the IWC Optional Capability

InspectionWorks Connect is an optional feature *enabled at the time your device is purchased or acquired after device delivery.* To purchase the IWC capability, contact your local GE salesperson or call Customer Care at 1-866-243-2638. You can also contact us using our online contact form, https://inspectionworks.com/support. You may obtain a 30-day trial license, which allows full access to IWC's capabilities.

IWC requires a Wi-Fi, wired, or cellular Internet connection and an MViQ software version of 1.5 or newer.

1 – Tap the logo at the lower left corner of the screen or press [icon] to open the **Global Menu**, then select **InspectionWorks Connect**.

Note: If your device has already been equipped with IWC capability, the Start Session screen will display and you can begin an IWC session.

2 – Select and enter the required information to begin a 30-day trial session or contact GE (see information above) to purchase the IWC capability.

3 – To active IWC capabilities purchased after device delivery, select **InspectionWorks Connect** in the **Settings** menu.

4 – Select **Activate** to enter your product key. Other selections allow you to turn on-screen IWC controls **On** or **Off**, specify the **Server** through which the IWC session occurs, run a **Network Test** to determine if the network connection is sufficient to support IWC communication, and check when your trial activation ends.

5 – Touch to enter the **Product Key**. The **Virtual Keyboard** will display. Select **Done** after entering the key, then **Activate** to complete the IWC-enable process.
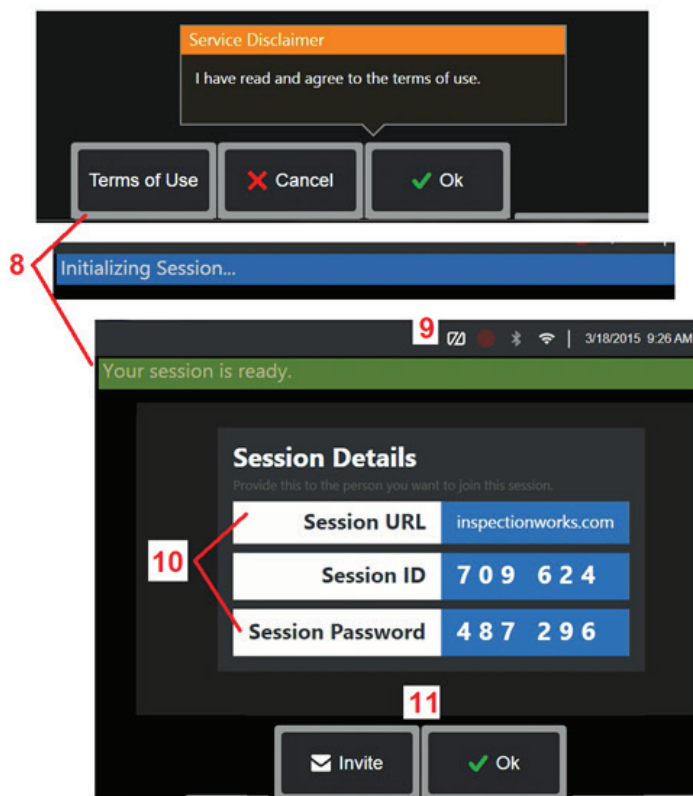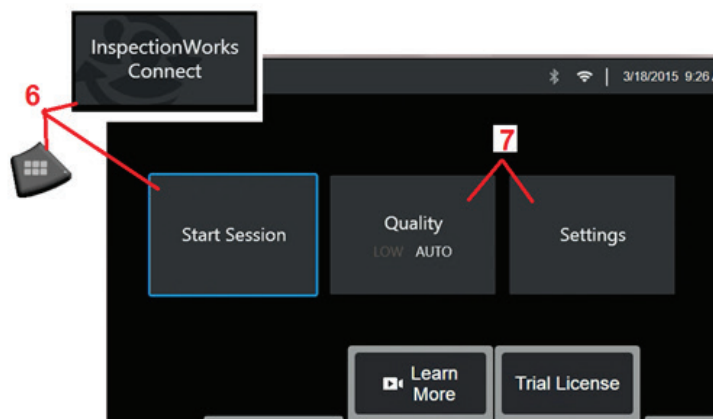
Starting and Stopping an IWC Session

InspectionWorks Connect is an Internet service that enables video collaboration between an Inspector and a remotely located Expert. Inspectors control their Visual iQ, sharing inspection video, exchanging chat messages, and making on-screen annotations seen by both participants. InspectionWorks Connect is an optional feature *enabled at the time your device is purchased or acquired after device delivery*.

To begin an IWC session:

6 – Tap the logo at the lower left corner of the screen or press to open the **Global Menu,** then select **InspectionWorks Connect**.

Note: As long as your device has already been equipped with IWC capability, the Start Session screen will display and you can begin an IWC session. If it does not, click here to learn more about Equipping Your Mentor iQ with IWC.

7 – Select **AUTO** or **LOW** image **Quality** (a **LOW** setting allows for streaming video over a network with limited bandwidth) or **Settings** to turn on-screen IWC controls **On** or **Off**, specify the **Server** through which the IWC session occurs (not a task you will normally perform), run a **Network Test** to determine if the network connection is sufficient to support IWC communication, and **Activate** IWC (or check when your trial activation ends).

8 – After reading the **Terms of Use**, select **Ok** to start your session.

9 – This icon appears when an IWC session is enabled but the screen is not currently being shared with an expert.

10 – This session URL, identification, and password are required by anyone joining the session as a remote **Expert**. Only one Expert at a time can participate in a session. Automatically deliver this log-in information to any email address by selecting **Invite** (**11**). Alternatively, select **Ok** to begin your session without automatically inviting an Expert.

Note: A session URL, ID, and password can be shared with an Expert who can then log into the Expert portal and connect to your session. This can be accomplished automatically by selecting the Invite button. To manually log into an IWC session, anyone with a supported web browser can simply go to https://inspectionworks.com/connect/ or click on the Join a Live Connect Session button on the InspectionWorks home page. They need only input the inspector-provided ID and Password to complete the process.

To end an IWC session:

12 – To stop a session at any time, open the **Global Menu**, then select **InspectionWorks Connect.** Select the **Stop Session** button.

Emailing an Invitation to Join an IWC Session and Expert Login
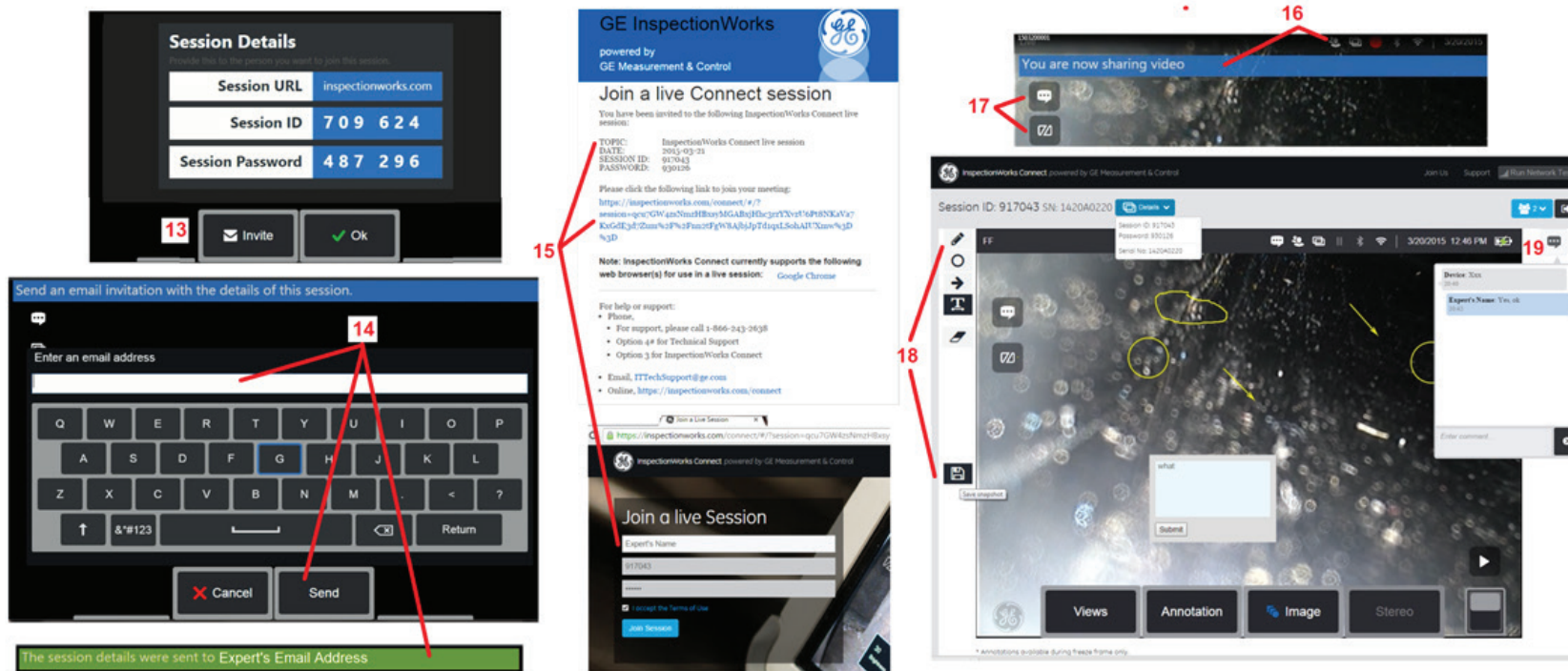
13 – Select **Invite** to specify the email address of an **Expert** to whom you wish to automatically deliver the session URL, identification, and password.

14 – Input the **Expert's** email address and select **Send**. All required login information and a link to the IWC website will be automatically included in the email.

15 – After receiving this invitation email, the **Expert** needs only to click on the included link, input an on-screen name, and select **Join Session.**

Experts can access IWC with any device capable of making an Internet connection and running a supported browser.

16 – This notification appears on the Visual iQ display when an **Expert** joins the session. This icon remains whenever an **Expert** is logged into the session.

17 – Select the upper button to open the **Chat Box** and/or send a chat message. Select the lower button to stop sharing the displayed image with the logged-in **Expert**. Note that *stopping display sharing does not end the IWC session.* Touch here to toggle screen sharing **On** and **Off**.

18 – **Expert** onscreen controls allow for free-hand drawing, insertion of circles and arrows, placement of text notes, and removal of annotated features. The Expert can also save screen captures to his or her computer. *Note: Expert on-screen controls are only functional when the Visual iQ display screen is frozen by the Inspector – Expert has no control over Visual iQ operation.*

19 – **Expert** and Visual iQ **Inspector** can send and receive chat messages throughout the session, whether or not the display screen is currently shared.
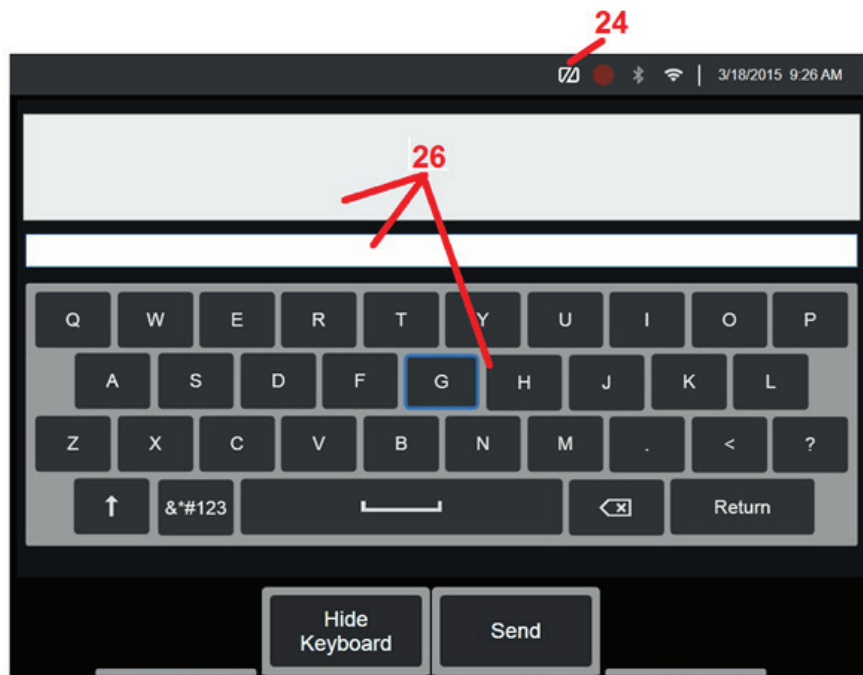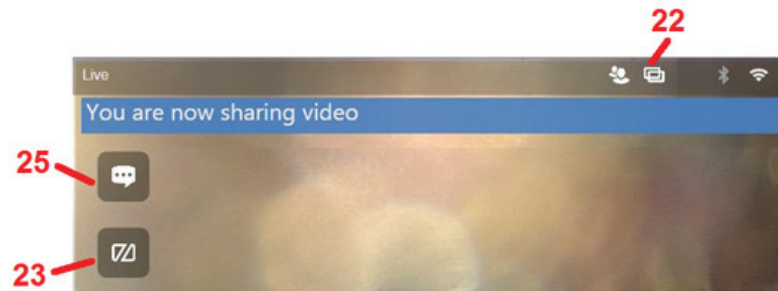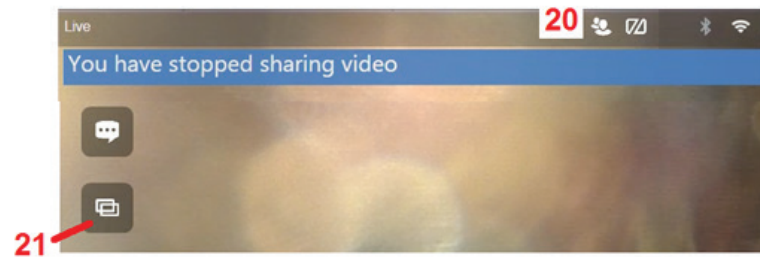
IWC Controls on the Visual iQ Inspector's Screen

20 – This icon appears on the Visual iQ display when an **Expert** joins the session. Whether or not the displayed image is shared, this icon is displayed whenever an **Expert** is logged into the session.

21 – Press here to share the displayed image with the logged-in **Expert**.

Note: Only the Visual iQ Operator can control whether or not the displayed image can be viewed by the remotely located Expert.

22 – This icon indicates the displayed image can be viewed by the logged-in **Expert**.

23 – Press here to stop sharing the displayed image with the logged-in **Expert**. *Note: stopping display sharing does not end the IWC session.*

24 – This icon indicates the displayed image can not be viewed by the logged-in **Expert**.

25 – Select to open the **Chat Box**. Note that **Expert's** chat messages momentarily appear on the Visual iQ's display screen and remain viewable throughout the session by opening the Chat Box.

26 – **Expert** and Visual iQ **Inspector** can send and receive chat messages throughout the session, whether or not the display screen is currently shared.

Index

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