

Everest Mentor Flex VideoProbe User's Manual



Table of Contents

Table of Contents

About this Manual.....	5
Technical Support.....	5
Standard Equipment.....	6
Optional Features.....	6
Safety Information.....	7
General Warnings.....	7
Battery Warnings.....	8
Informations sur la sécurité.....	9
Component Identification.....	11
Touchscreen and Keys – Dual Control Systems.....	13
Unpacking, Assembling, and Powering the Mentor Flex.....	14
About the Battery.....	16
Supplying Power to the Mentor Flex.....	17
Powering the Mentor Flex On and Off.....	17
Changing Optical Tip Adapters.....	18
Setting Up the Operating System.....	19
Working with Profiles.....	20
System Setup.....	21
Setting Date and Time.....	21
Selecting a Language / Customized Formats.....	21
Other System Settings.....	22
Steering Sensitivity Settings.....	22
Screen & Display Setup.....	23
Connectivity Setup.....	24
Image & Video Setup.....	25
Executing a White Balance.....	25

Measurement & Annotation Setup.....	26
Capturing and Adjusting Images.....	27
Steering the Probe.....	27
Freezing the Image.....	29
Saving Image Files.....	30
Working with a Recalled Image.....	31
Zoom to Magnify.....	32
Image Transformation Settings.....	33
Annotating with Text and Arrows.....	35
Working with Video.....	36
Recording Live Video.....	36
Working with a Recalled Video.....	37
Measurement Types.....	38
Measurement Tips.....	38
Measuring Features and Indications.....	39
Stereo Measurements.....	39
Stereo Measurement Types.....	44
Comparison Measurements.....	45
Troubleshooting Measurements.....	46
Managing Files: Working with Removable Storage Devices.....	47
Editing /Creating Folders.....	48
MDI: Loading and Unloading Menu Directed Inspections.....	49
Entering Study Level Information.....	49
Selecting an Inspection Point.....	50
Stopping and Resuming an Inspection.....	50
Saving an Image or Video in an MDI Inspection.....	51
Viewing Reference Material.....	52

Generating an MDI Report.....	53
Customizing an MDI Report.....	54
Maintenance and Troubleshooting	55
Inspecting and Cleaning the System	55
Troubleshooting Guide	57
Probe	58
Handset	58
Power.....	59
Software.....	59
Appendix A. Technical Specifications	60
Appendix B. OTA Table	64
Appendix C. Chemical Compatibility	66
Appendix D. Warranty	66
Appendix E. Verifying Measurement OTA's	67
Appendix F. Environmental Compliance	68
Appendix G. Regulatory Compliance	70
Appendix H. Creating a Personalized Logo File.....	72
Appendix I. Open Source Software Availability	74
Appendix J. Restoring Factory Settings.....	74
Appendix K. Updating Software	75
Appendix L. Streaming to an iPad / iPhone	76
Index	78

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 Everest Mentor Flex VideoProbe™ system. To ensure operator safety, please read and understand this manual prior to using the system.

Technical Support

For additional assistance, go to www.bakerhughesds.com/waygate-technologies for a complete listing of contact information. Technical Support contact information follows:

Global Phone: 1-866-243-2638

Email: RemoteService@BakerHughes.com

System Overview

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

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

With TrueSight™ Imaging, Mentor Flex delivers a high-intensity light source and superior visual processing, for clearer, sharper videos and images right on your device. 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 Mentor Flex system contains a fixed-focus optical system with a large depth of field.

Stereo Measurement capabilities allow your system to analyze and measure indications and features with precision and accuracy.

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

With InspectionWorks Connect, operators can view real-time, streaming video on an iOS device. Images and saved videos can be wirelessly transferred to an iOS device with the touch of a button.

Available in four insertion tube diameters and various lengths: 3.9mm, 4.0mm, 6.1mm, and 8.4mm diameter.

Standard Equipment

Everest Mentor Flex
3-hour Li-Ion Battery
Mentor Flex Storage Case
Safety and Essential Use Hard Copy

AC Adapter/Battery Charger
Optical Tip Adapter (OTA) Storage Case
USB Thumbdrive (User Documentation)
Quickstart Guide

Software Options

- InspectionWorks Connect: Wireless video streaming, and still image and video transfer to iOS device.
- Menu Directed Inspection (MDI) 2.0: Inspection reporting and image tagging. Menu Directed Inspection Builder PC program
- Inspection Manager: Re-measurement PC Application

Optional Features

HDMI Cable
Insertion Tube Gripper
Insertion Tube Rigidizer
Handset Holder with Integrated Kickstand
Magic Arm Kit
Quick-disconnect handset hook
Quick-disconnect handset hanging strap

Telescoping handset mounting pole
Optical Tip Adaptors (OTA)
Measuring OTA's
Mini-Magic Arm Clamp Kit
Workstation Mentor FLEX case
Hardshell backpack case
Keyboard (wired)

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 Mentor Flex 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 OTA or the head guard, which prevents damage to the tip-attachment mechanism. Keep the head guard on whenever no OTA 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 Mentor Flex 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 spécifiquement à des procédures particulières sont indiqués dans les sections correspondantes de ce manuel.

 Le système Mentor Flex 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 Mentor Flex en général. Les mentions « Attention » qui s'appliquent spécifiquement à des procédures particulières sont indiquées dans les sections correspondantes du manuel.

MANIPULER LA SONDÉ 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 difficile 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 consulter la 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 spécifiées pour être utilisées avec le système Mentor Flex. 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 température 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 modifiez 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



Component Identification

1 – LCD Touchscreen

1a – Touch the lower left corner of the display screen to open the Global Menu. The selected item in any menu or list is identified by this orange 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 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.

1b – Tap the display to toggle between the upper and lower soft keys (double-tap to hide or show the soft keys). Tap anywhere on a displayed Live Image to freeze and unfreeze it. 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).

2 – Side port panel (**2.1** – second DC power port. **Note:** This port allows the unit to run off AC power. It does not charge the battery. Plug into DC port located on the bottom of the battery for on-board charging; **2.2** (2) USB 2.0 ports; **2.3** HDMI Output)

3 – Select any feature in the soft key bar by either touching that feature on the display screen (for instance, touching the box containing the term Zoom) or pressing the corresponding soft key.

4 – Three-hour Lithium Ion Battery

5 – Back Key: short press moves back one screen, long press for live screen. Hold for 5-6 seconds to begin Shutdown. Also use to POWER ON.

6 – Save Key: short press launches a Quick Save, long press opens or closes the Save Options Menu.

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

8 – Enter Key: short press toggles between frozen and live frames and selects Done / Accept

9 – Menu Key: short press opens or closes the Global Menu, long press toggles between first and second level soft key rows.

10 – Trigger Key 1 (Upper): provides start/pause/stop functions for video recording. **Note:** This may be changed in Settings to be programmed as Enter key. Trigger Key 2 (Lower): short press toggles the articulation mode between steer-and-stay mode and steering mode. When in steer-and-stay mode a lock icon appears. A long press returns the articulation system to the neutral (home) position.

11 – Quick-disconnect for handset accessories

Hard Key	Name	Short Press	Long Press
	Back button (and Power On)	Moves back one screen	Moves to live image
	Save button	Quick save (assigns default name and location)	Save with options available
	Save Icon	Quick save (assigns default name and location)	Save with options available
	Menu button	Opens or closes Global Menu	Toggles between first and second rows of soft buttons
	Enter button	Toggles between live and frozen images. Also confirm selection (Done/Accept).	
	Trigger buttons (upper and lower) NOTE: Upper trigger can be programmed as Enter key within Settings.	Upper provides start/pause/functions for video recording. Lower toggles articulation mode between steer-and-stay and steering modes	Upper provides stop functionality for video recording Lower returns articulation system to neutral position
	Video Record Icon	Starts video recording	Stops video recording

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 Mentor Flex display screens.

1 – Touch the lower left corner of the display screen (typically contains the 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 orange 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 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 soft key bar (double-tap to hide or show the soft key and status bars). Alternatively, long-press the Menu key to switch between the upper and lower soft key bars.

4 – Tap anywhere on a displayed Live Image to freeze and unfreeze it. Alternatively, short-press 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 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 orange 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 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.

Note: Connecting a USB-wired keyboard allows for remote control of the borescope for all functions other than probe articulation.

Unpacking, Assembling, and Powering the Mentor Flex



(1) – Handset: the insertion tube is held in the case's internal storage reel, which is accessed through the orange funnel. Be sure to straighten any loops or twists in the insertion tube before feeding it into the funnel.

Note: Insertion tube's rubber Torsional Strain Relief base should be routed through the case's curved passage.

⚠ Caution: Prior to use, always install an OTA or the head guard

(2) Telescoping handset mounting pole

(3) Rigidizer

-
- (4) Handset hands-free hook
 - (5) Power supply / Battery charger
 - (6) Battery / Spare battery

Installing the Battery

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

Insert the battery into the handset. The battery is installed properly when the latching mechanism is engaged. Do not force the battery (6) into the handset, as damage may occur. The battery is keyed and may only be installed in the proper orientation.

 **Caution:** Do not remove the battery while the system is operating unless power is plugged into the side power port for battery hot-swapping.

- (7) C-clamp: Used for handset mount kit
- (8) Insertion tube gripper
- (9) Handset hanging strap / Shoulder strap

Attaching and Removing OTA's

(10) – OTA's are threaded onto the probe with a double set of threads to prevent them from falling into the inspection area.

To Attach an OTA: Verify that the OTA 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:** 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 (3.9 or 4.0mm), 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.

- (11) Handset holder with integrated kick-stand
- (12) Swivel ball: Used in the handset mount kit
- (13) HDMI cable

About the Battery

The Mentor Flex 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 Mentor Flex 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 Mentor Flex or while disconnected from the Flex.

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

Note: Battery run time exceeds battery charge time. A three hour battery will take approximately two hours to charge. Charging time will be longer if the battery is connected to an operating Mentor Flex system while charging.

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



Supplying Power to the Mentor Flex

The Mentor Flex 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 Arms) 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.

Note: The battery will not be charged when connected to DC power through the second DC port located behind the I/O port door.

Powering the Mentor Flex On and Off

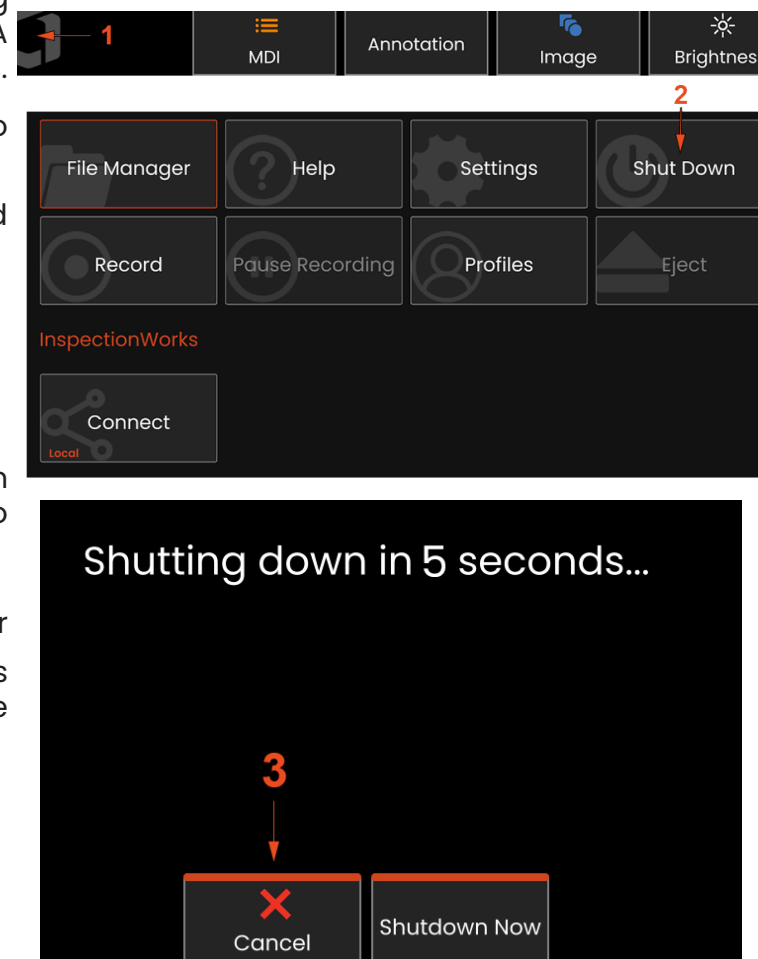
System Power On

Press and hold  until the unit turns on. The buttons and display will light and begin the power-up sequence. After ~ 90 seconds, the system screen will display live video and on-screen controls. The system is now ready for use.

1 - Touch the lower left corner of the display screen containing the on-screen Logo or the  hard key at any time to open or close the Global Menu. This menu provides access to several features including Shut Down. Select Shut Down to power off the Mentor Flex.

2 - Press the Shut Down button to start the shutdown sequence.

3 - Choose cancel if you do NOT want to shut down the instrument.



Changing Optical Tip Adapters

Optical tip adapters (OTA's) are threaded onto the probe with a double set of threads to prevent them from falling into the inspection area. Each OTA provides a unique depth of field, field of view, and direction of view.

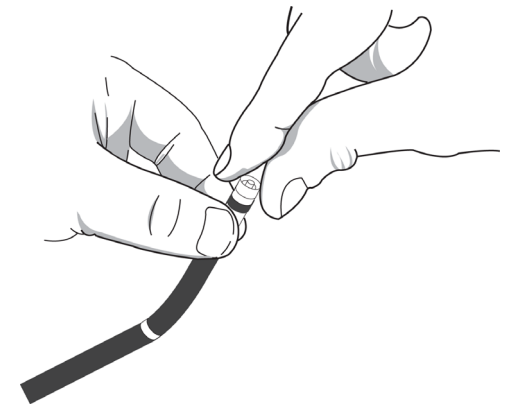
⚠ Caution—Use only finger pressure to remove or attach tips. Using force (including pliers or other tools) might damage the bending neck. Take care not to cross the threads. To reduce cross-threading risk: When installing a tip by hand (6.1mm & 8.4mm) or with an installation tool (3.9mm & 4.0mm), rotate 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.

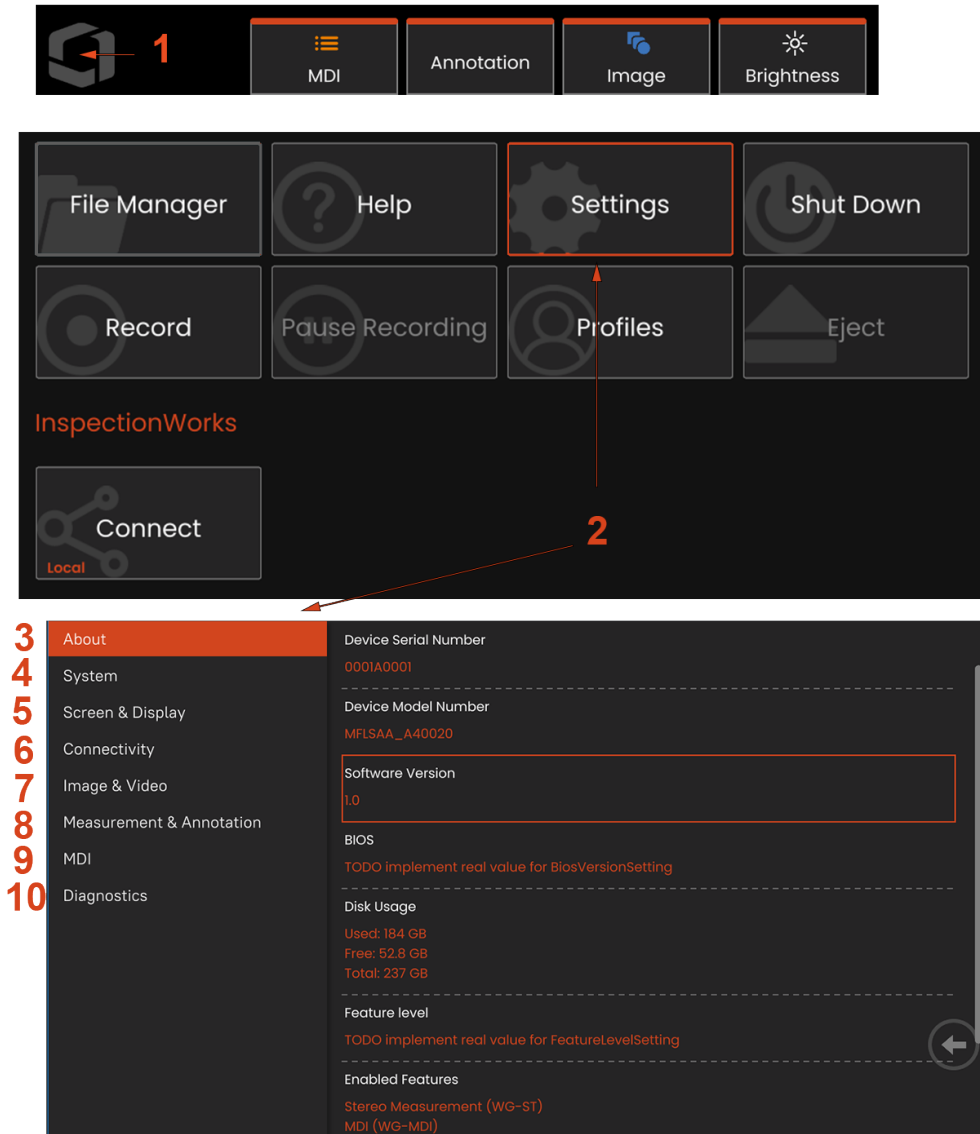
To Remove an OTA: Support the bending neck and head of the probe with one hand, and with the other gently turn the OTA counterclockwise (be sure to use a tip tool when removing 3.9 or 4.0 mm tips), Turn until the tip spins freely, indicating that it has cleared the first set of threads. Gently pull the tip away from probe and continue turning counterclockwise, engaging the second set of threads. Turn until you can remove it.

To Attach an OTA: Verify that the OTA 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 Operating System

1 – Select the lower left corner of the display (which typically contains the on-screen **Logo**) or  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 and software version.

4 – Access to set a System PIN, Restore Defaults, adjust Date, Time, and operating Language, and alter various other system settings.

5 – Allows users to turn on/off touchscreen and customization of what is shown on the display.

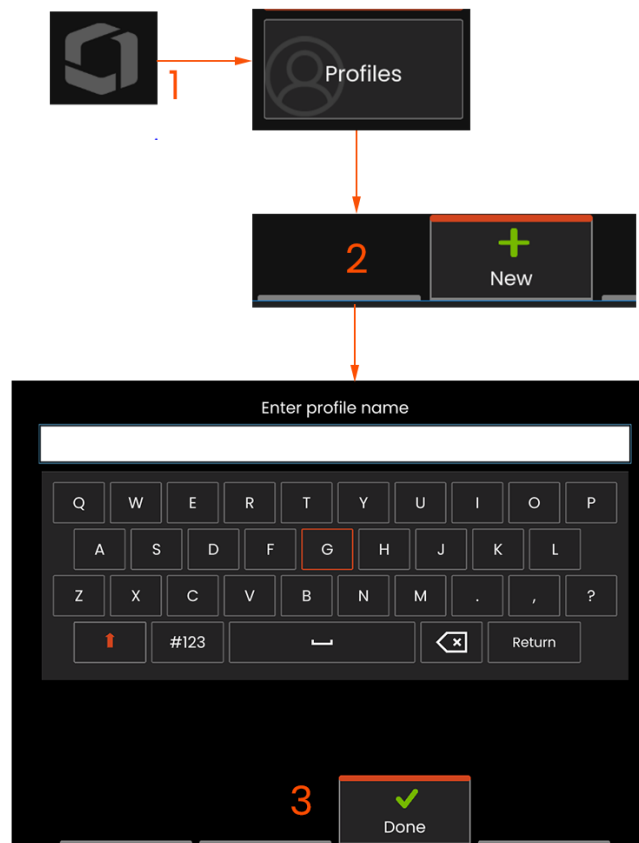
6 – Allows the user to turn Wi-Fi on and off as well as work with networks and identify folders for file sharing.

7 – Allows the user to specify the default directories into which image files and videos are stored. Also used to select image file type and video format. Controls MDI Annotation and imports Distortion Correction Tables.

8 – Allows users to manage and verify OTA, select desired annotation style and import preset annotations.

9 – Allows users to set up options for a menu-directed inspection, including report page layout.

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



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.

System Settings Including:
 Time Format / Time Zone
 Date Format
 Language
 Power Management
 Steering Sensitivity

Image & Video Settings

– All parameters except Distortion
 Correction Table

Measurement & Annotation
 Including:
 Zoom Window
 Stereo Index
 Stereo Index Minimum
 Units

Screen & Display Settings
 – All Parameters

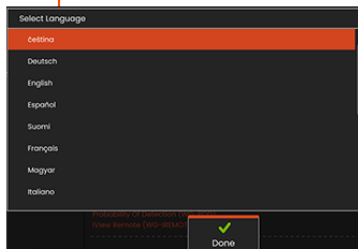
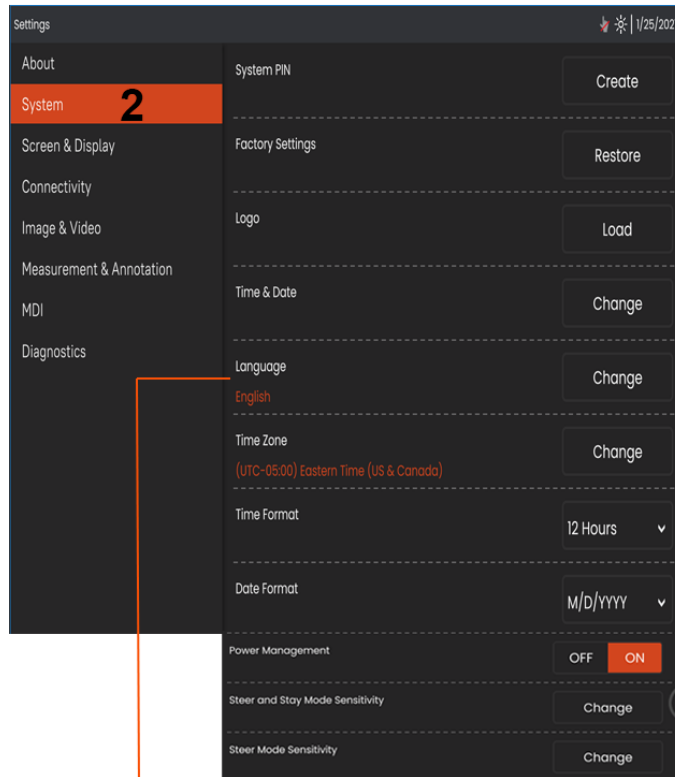
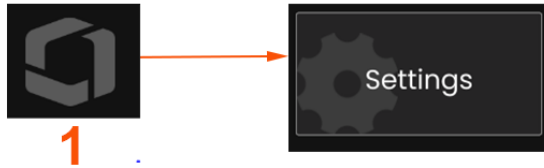
Connectivity Settings Including:
 Wi-Fi on/off

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 above. Anytime the profile is reactivated, the system will apply the settings associated with the activated profile.

Note: Each time the Mentor Flex 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.

Working with Profiles

A Profile defines several parameter settings. As long as more than one profile is available, (the Mentor Flex 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.



System Setup

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

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

3 – Tap to open the virtual keyboard and create or change a System PIN. Once created, accessing the operating screens requires first entering the PIN. This PIN is for the entire system and is not associated with the active profile

4 – Select and follow the on-screen prompts to restore the active [Profile](#) to the Factory Default Settings.

Loading a Logo

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

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

6 – Adjust Time and Date settings.

Select the Time Zone in which you are operating.

Selecting a Language / Customized Formats

7 – Allows users to change the language displayed.

8 – Indicate whether or not the instrument should automatically adjust for time changes due to Daylight Savings.

9 – Specify 12 or 24 hour Time Format.

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

Other System Settings

13 – Setting Power Management to ON conserves battery power by putting the Mentor Flex 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 Flex to a fully powered state.

Steering Sensitivity Settings

14 – The user can select from two probe steering modes: Steer or Steer-and-Stay™. Each mode has its own sensitivity adjustment. For both modes, the factory default sensitivity corresponds to the slider set in the exact middle of the adjustment range ([click here to learn about the differences between these modes](#)).

Note: The factory default setting provides good steering response for most inspections. The sensitivity can be adjusted separately for each mode to optimize the steering for specific inspections or adjust for the preferences of the inspector. Once adjusted, a sensitivity setting is preserved even when the system is powered off.

Steer sensitivity: It is recommended that this adjustment be kept at factory default for most inspections. In this steering mode, the adjustment range changes the sensitivity of the joystick according to the guidelines below, and has no effect on steering speed. Full range of camera motion is available at all sensitivity settings.

Slider at Minimum: Provides more precise steering control when the desired target is within +/- 45 degrees from the camera at its home position. For inspections where the areas of interest are primarily concentrated near the camera's home position this is a useful slider setting.

Slider at middle / factory default: Best for most general inspections. Provides equal joystick sensitivity for the entire camera range of motion.

Slider at maximum: Provides more precise steering control when the desired target is located from 45-180 degrees from the camera at

its home position. For inspections where the areas of interest are primarily looking sideways or even backwards, this is a useful slider setting.

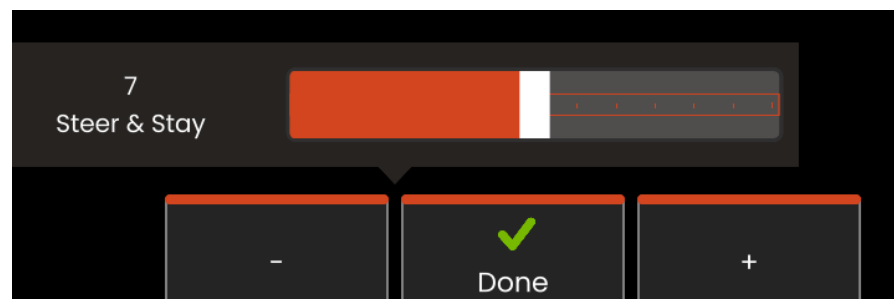
Steer-and-Stay sensitivity: In this steering mode, the speed of camera motion is controlled by how far off center the joystick is pushed. The maximum camera speed occurs when the joystick is pushed fully in any direction. This sensitivity slider adjusts the maximum speed for camera motion in Steer-and-Stay™ mode.

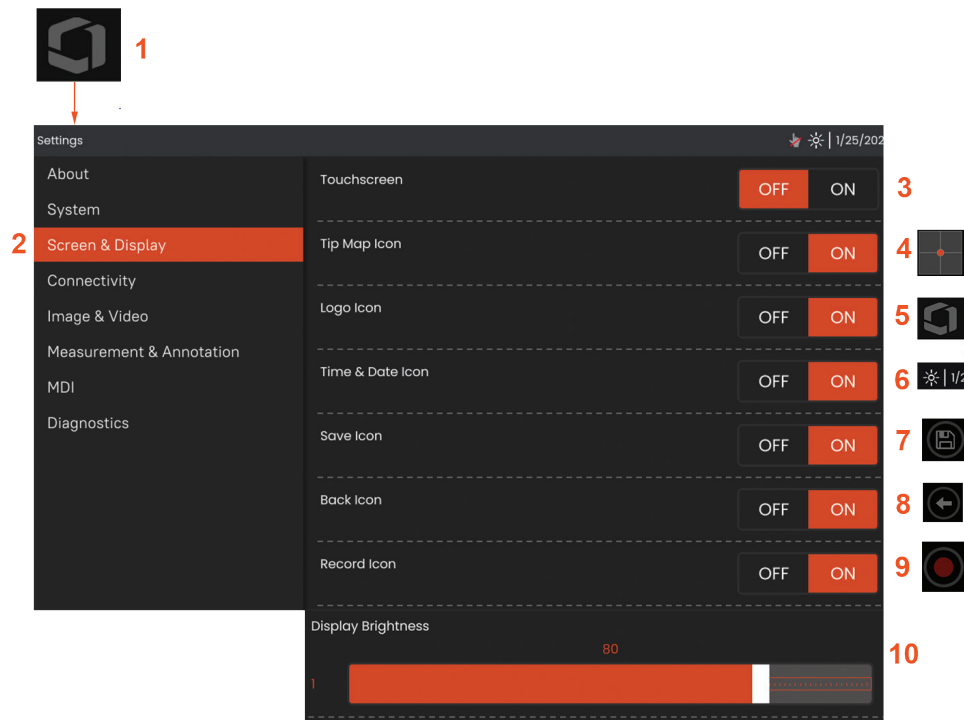
Slider at Minimum: This reduces the maximum steering speed to roughly 1/2 of factory default. Reducing maximum steering speed may be useful for inspections using a close focus tip, where the camera is positioned very close to the surface being inspected, or if steering while using significant amounts of digital zoom. In these cases, slowing the camera motion down will provide more precise fine camera control.

Slider at middle / factory default: This is the factory default speed, and is a good starting point for most inspections.

Slider at Maximum: This increases the maximum steering speed approximately 2x compared with the factory default. Increasing maximum steering speed may be useful for experienced inspectors, who can use the faster steering to complete an inspection more quickly.

Note: While using the slider with Steer & Stay or Steer, the effect of the slider setting can be seen in realtime by moving the camera with the joystick.





Screen & Display Setup

- 1** – Tap the on-screen **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** () graphically represents the extent to which the OTA 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 on-screen logo 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** – Turn the **SAVE** icon **ON** or **OFF**.
- 8** – Turn the **BACK** icon **ON** or **OFF**.
- 9** – Select to turn the **Record** icon **ON** or **OFF**. These icons appear in the display's bottom right corner when recording video
- 10** – 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 Logo (or press the  hard key) to open the Global Menu, then open the Settings Menu.

2 – Select **Connectivity** to work with settings that control the connection of the Mentor Flex to WiFi networks.

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

Working with WiFi

4 – Select Connect to display a list of available networks.

5 – Select to view a list of already-known WiFi networks to which the Flex 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).

Image & Video Setup



1 – Tap the on-screen Waygate Logo (or press ) to open the Global Menu, then open the Settings Menu.

2 – Select to change 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 where quick-saved images are stored ([Click to learn more about Saving Images](#)).

5 – Set the video recording format to either H.264 High or H.264 Low.

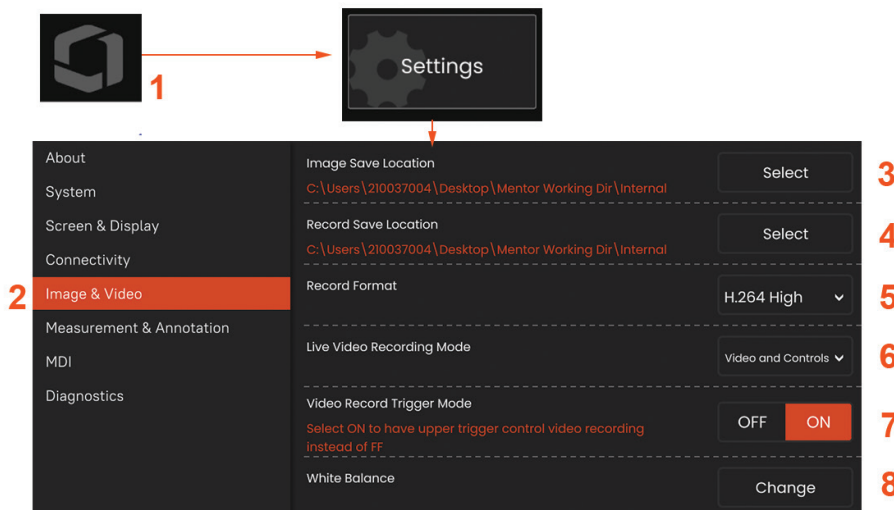
6 – Live Video Recording Mode allows users to customize what is being recorded, video and controls or raw video..

7 – .Allows users to select upper-trigger control for video recording.

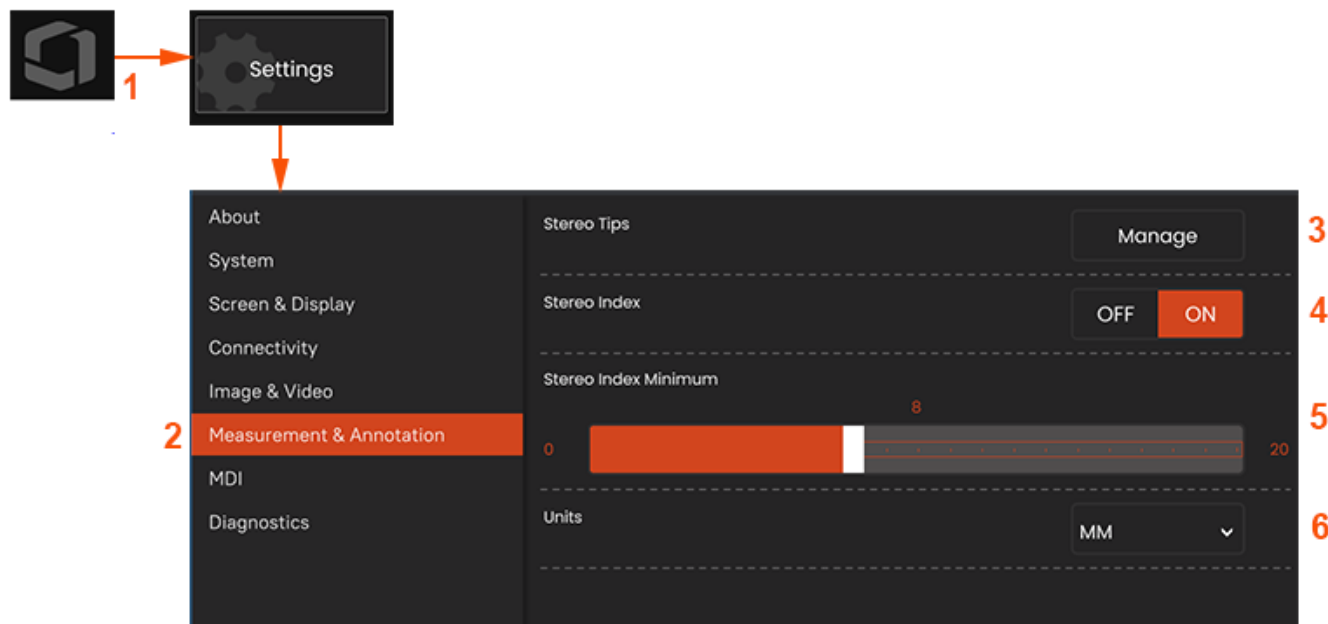
Executing a White Balance

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.

8 – Select New and follow the prompts or select Default to restore factory color settings.



Measurement & Annotation Setup



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

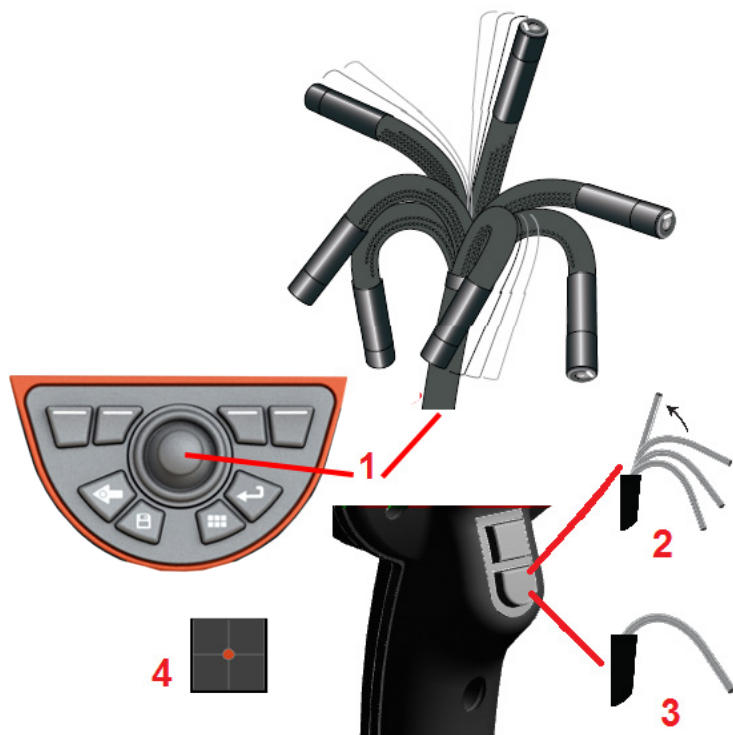
2 – Select to alter the **Measurement and Annotation**-specific settings shown here.

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

4 – Controls the display of the Stereo Index, which appears during Stereo Measurement. [Click here for more about Stereo Index.](#)

5 – 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.

6 –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. **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.

Note: Connecting a USB-wired keyboard allows for remote control of Flex functions and probe articulation. See [Appendix](#) for a list of function key and key-press combinations equivalent to Flex button and joystick operations.

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 OTA 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.

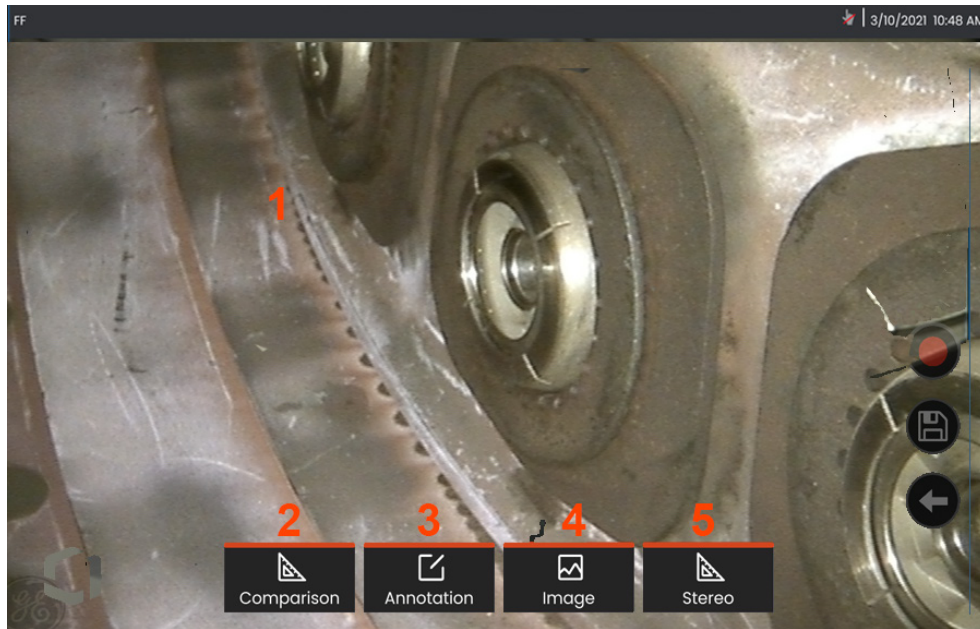
-
- Grippers: Cylindrical handles that slide over the insertion tube to make it easier to control. Grippers are threaded to connect to rigidizers and to access port couplers.

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 100°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 – 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 ) to unfreeze the display.

2 – Measure features of the frozen image can be performed by selecting the **Comparison** menu.

3 – Add notes or arrows to the frozen image by clicking the **Annotations** menu.

4 – Select and adjust four image transformation settings including, **Distortion Correction**, **Invert**, **Inverse+**, and **Zoom**

5 – 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.

Saving Image Files



Image files can be stored in the Mentor Flex or a detachable device. The **Quick-Save** feature stores a file with a default name and file type in a default directory. Alternatively, use the **Save Options Menu**.

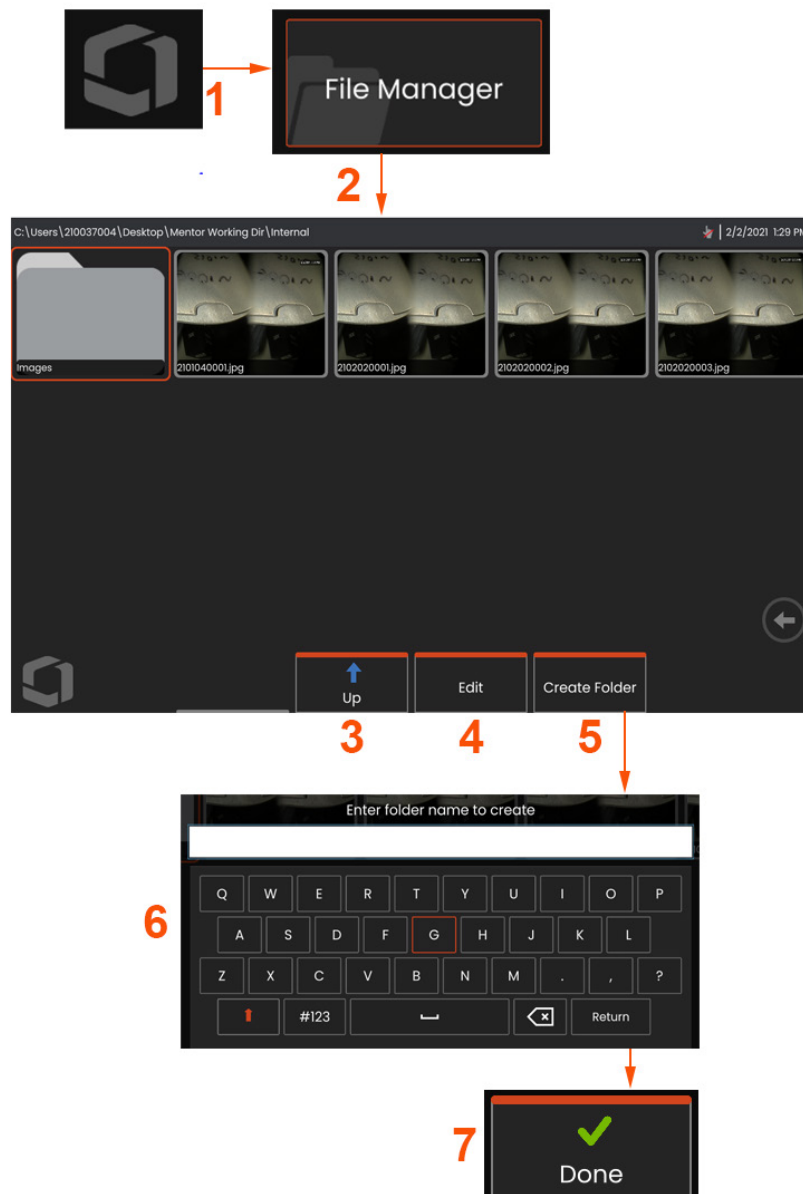
1 – Perform a short press of this hard key to **Quick Save** the displayed image in the default directory. A long press of this key opens the **Save Options Menu**.

2 – At all times, the intended saving location is listed here. After a file is stored, the status bar at the top of the screen indicates **"Saved."** The file name.

3 – While in the process of saving an image file, a menu bar appears with options for your image.

4 – Choose an annotation by typing in the appropriate text on the virtual keypad.

5 – Tap **Done** when complete.



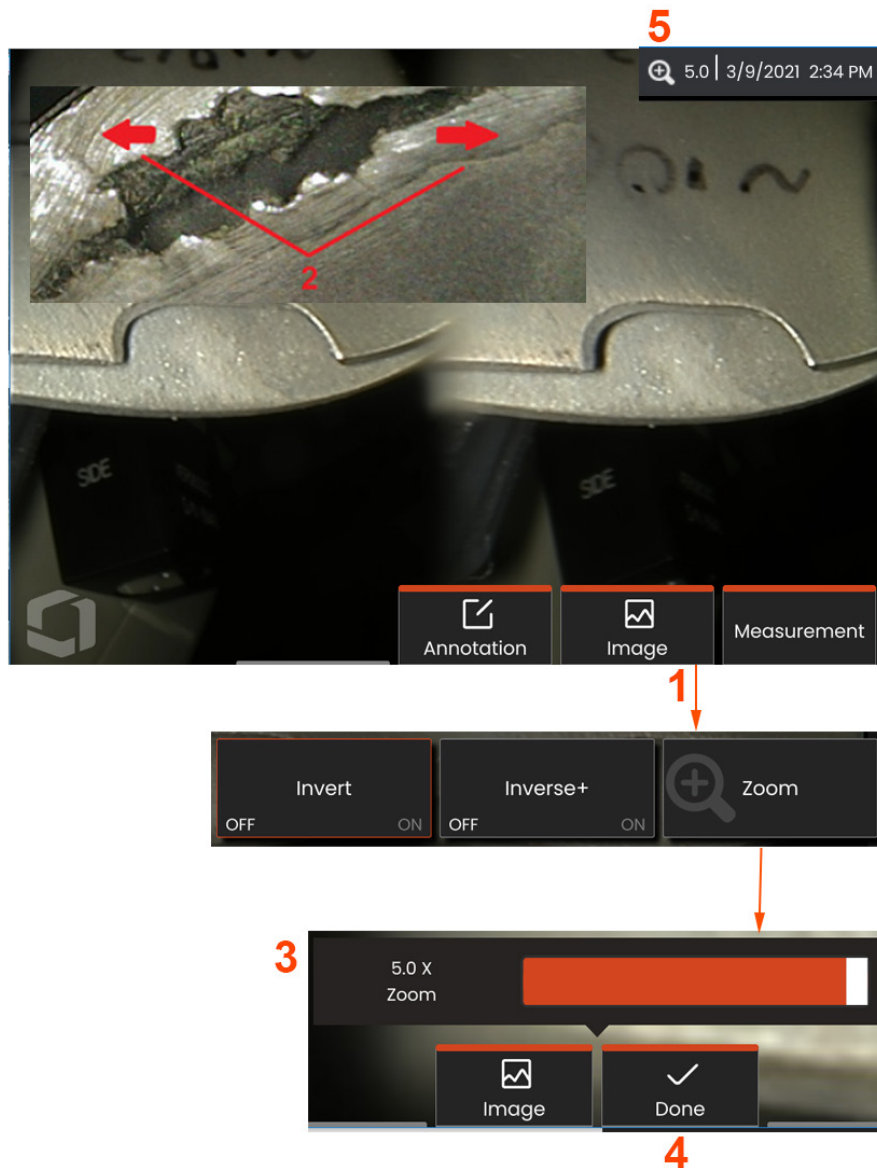
Working with a Recalled Image

Image and video files can be stored in the Mentor Flex 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 Logo (or press the  hard key) to open the Global Menu,
- 2 – select File Manager.

Note: Selecting the Recall soft key (when enabled) automatically opens the last saved image (provided one has been saved since the Flex 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.

- 3 – Select to navigate to the next higher directory within the File Manager.
- 4 – Select to Copy and otherwise Edit stored files
- 5 – Tap to create a new folder in the directory.
- 6 – Use the virtual keyboard to name your folder
- 7 – Choose **Done** when complete.



Zoom to Magnify

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

Note: The Mentor Flex offers two equivalent zooming methods.

1 – Select this soft key (when available) or select the Zoom control in the Image menu 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).

Note: In Live Image and Freeze Frame zoom values less than 1.0X will be available to show more of the camera's view (black bars displayed on left and right of the image).

4 – Select when the image magnification process is complete.

5 – When the image is zoomed, the  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.)

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

2 – 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, video 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.

3 – **DarkBoost** is a live video processing function that digitally brightens darker areas in scenes with bright foreground surfaces or glares without over exposing or degrading the contrast of more uniform scenes. The level of Dark Boost can be adjusted by dragging the adjustment bar left or right.

4 – Tap the on-screen **Zoom** to enlarge an image (up to 5x).

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

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

6 – 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.

7 – Tap the on-screen **Exposure Lock** to toggle between **OFF** and **ON**.

8 – 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 OTA, since the prism contained in these tips would otherwise show an inverted image.

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

10 – Tap to turn the illumination LED ON or OFF

11 – Tap **Color Saturation** to gain access to an adjustment bar. Slide the adjustment bar to intensify or dull the colors in the image.

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

13 – Choose **Done** when transformations are complete.

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

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



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 – 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.

3 – Adding annotation begins by selecting **Text** or **Arrow**. Selecting **Text** opens the **Virtual Keyboard**. Enter the desired note.

4 – Select **Done** when finished typing the note, which will appear on the image surrounded by a green 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**.

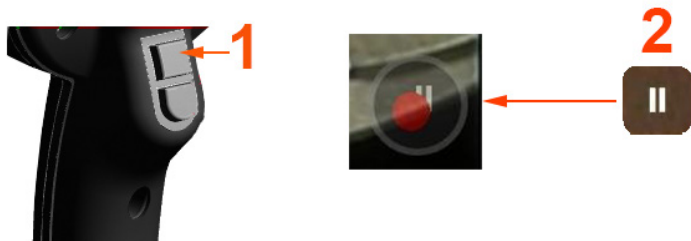
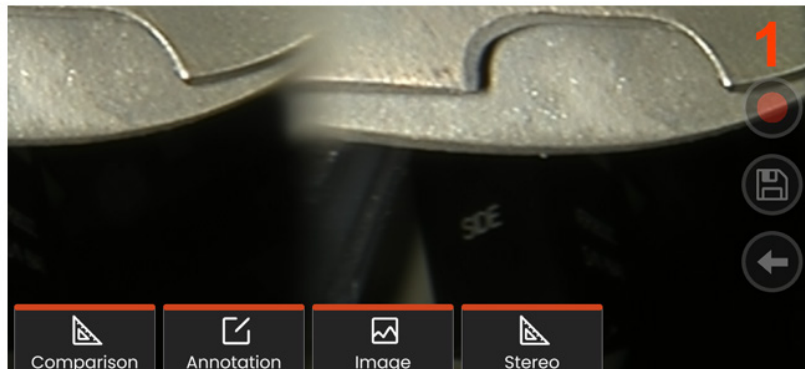
5 – Select **Edit** to change the annotation.

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.

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

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. You can record video onto the internal drive or any other removable storage device.

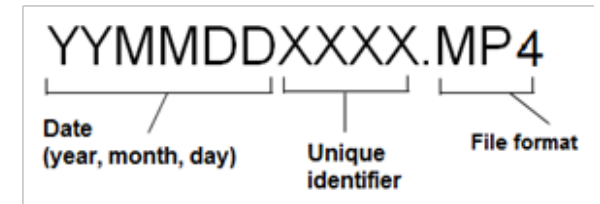


Recording Live Video

There are two methods to begin video recording:

- Tap the Video Recording icon in the lower-right side of the display (when available)
- Press the upper-trigger button (Video Record Trigger Mode must be set to "ON.")

1 – Select the Record button or upper-trigger to begin recording video in the user-selected format. 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 and/or turn off the touch screen control icons in Settings.

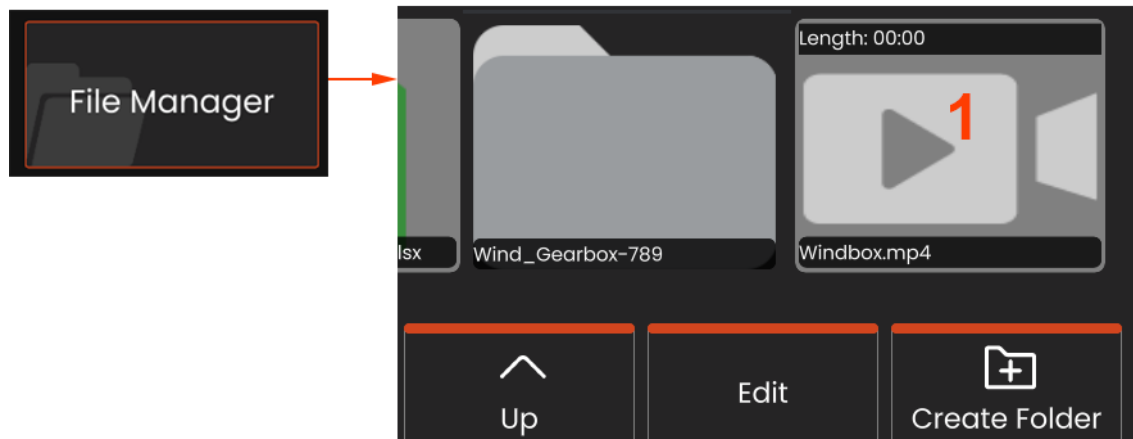


2 – While recording video there are two methods to Pause/Resume video recording: – Tap the Pause/Resume icon in the lower-right side of the display (when available) – There are two methods to Stop video recording:

- Press and hold the Pause/Resume icon in the lower-right side of the display (when available)
- Press and hold the upper-trigger button (Video Record Trigger Mode must be set to "ON.") 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.

Working with a Recalled Video

1– To recall a saved video file, navigate to the saved file via the File Manager. Select the video (which will have an mp4 file extension). The video will automatically replay. Soft keys will appear to control the video while it is playing. Use the joystick to rewind or fast-forward the video.



Video Recording File Sizes

	4GB	8GB	16GB	32GB
Mentor Flex MPEG4 High	111 min	222 min	444 min	888min
	1.85 hours	3.7 hours	7.4 hours	14.8 hours

Measurement Types

The Mentor Flex system supports two types of measurement: stereo and comparison.

Type	Advantages	Considerations
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.
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: Stereo tips must be manually selected each time a stereo measurement is performed.

Unlike standard OTA's, StereoProbe® (1) measurement tips are factory-calibrated for use with specific handsets and will not measure accurately with other handsets. These tips are matched to handsets by the serial numbers (2) identified on each OTA and each handset label (3). Calibration data is stored in memory in the handset.

Note: To ensure measurement accuracy, verify the tip's accuracy each time it is installed. Refer to [Appendix](#) for verification procedures.

Measuring Features and Indications

The Mentor Flex allows you to measure features or indications either before or after saving an image. You can save up to five measurements per image. All saved measurement images can be re-measured on a PC using Inspection Manager software from Waygate Technologies. For details, call your local sales representative.

In order to perform stereo measurements, the image must be captured using a stereo tip. You can save measurement images as JPEGs. You can view these files, including the measurement results, in most .JPG viewing applications, such as Windows Paint

Notes:

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

- Waygate Technologies cannot guarantee the accuracy of measurements calculated by the Mentor Flex system. Accuracy varies with the application and the operator's ability.

- The Mentor Flex system can display measurement images that were captured on the Everest XLG3™, Mentor Visual iQ, XL Go, XL Vu, and XL Flex+ VideoProbe systems, including their previously captured measurements. However, it does not support re-measurement of images captured with systems other than the Mentor Flex.

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 Mentor Flex 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 OTA, 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

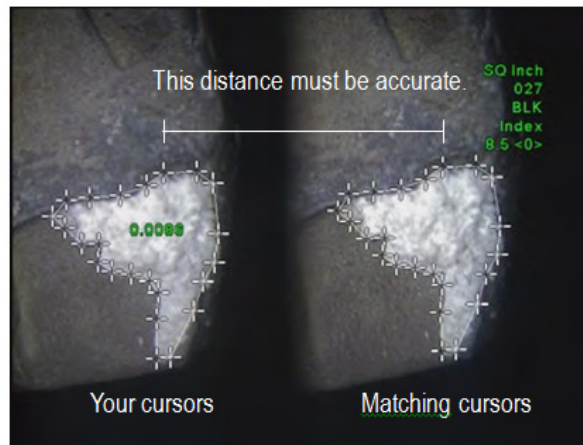
For maximum accuracy in any type of stereo measurement, you must begin by positioning the stereo tip carefully. To position the probe tip (before freezing) for a Stereo Measurement Image:

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



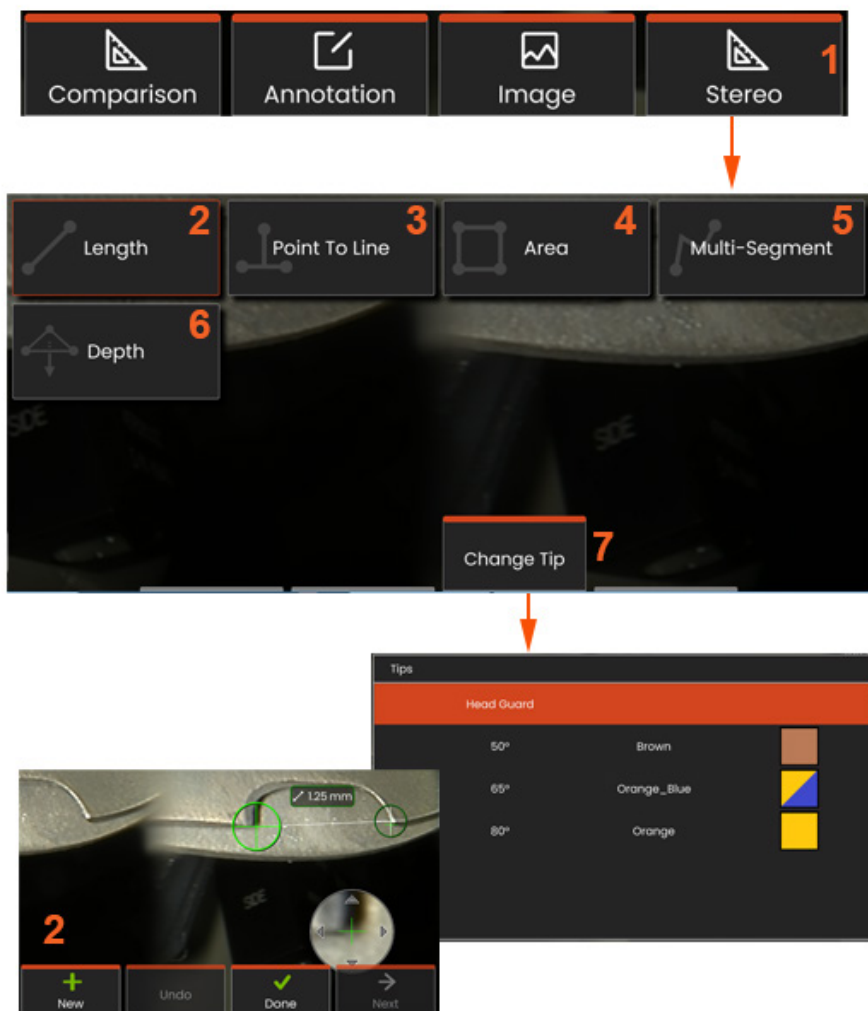
Good Example -- Object is:
 Fully visible on both sides.
 Well lit with minimal glare
 Oriented to allow placement of cursors at left and right edges of circle or gap

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 OTA 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.



Stereo Mode Measurement Procedure, Part 1

Prior to collecting stereo measurements, a calibrated stereo OTA must be attached to your Mentor Flex. Properly position the tip for measurement, which may be aided by temporarily displaying a single image by turning **Single View** mode **ON**. 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 to access the Measurement menu.

2 – **Length**

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

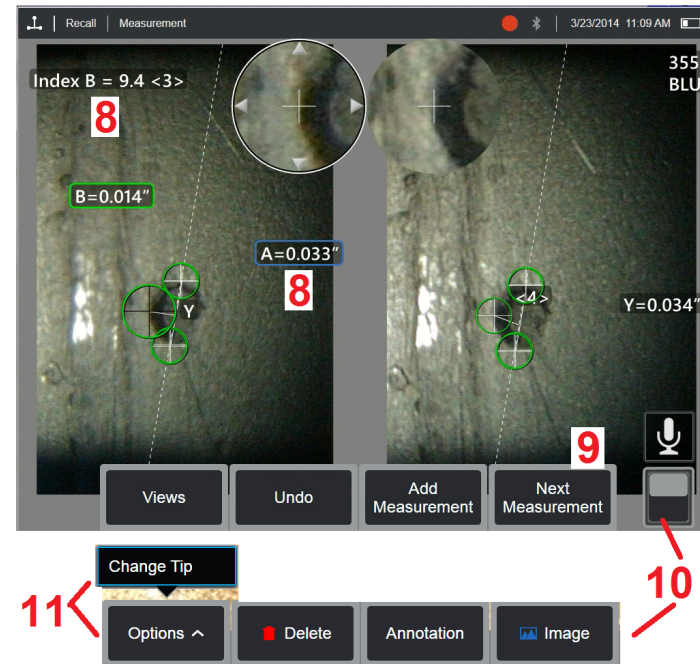
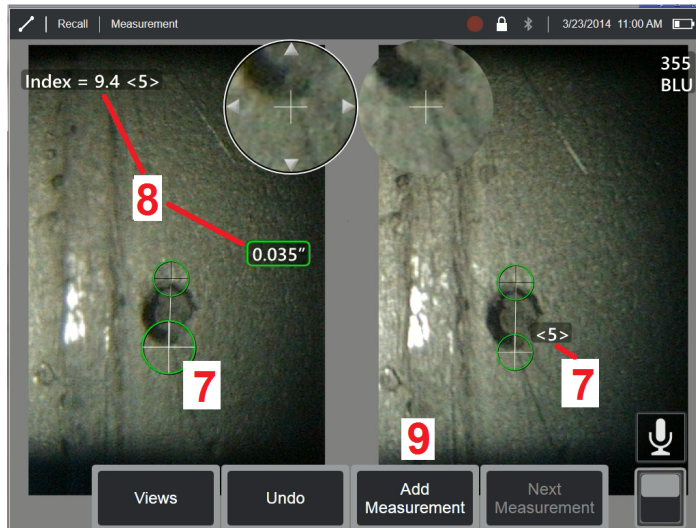
Note: First cursor appears on the left screen, where all user-placement of cursors will occur (the matching cursors appearing in the right display are generated by the Mentor Flex system – as the user moves each left-screen cursor, the matching cursor in the right half-screen moves accordingly – be sure 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

4 – **Area**

5 – **Multi-Segment**

6 – **Circle Gauge**

7 – **Change Tip** allows users to select a different tip from their list of calibrated tips.



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.



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 makes a selection active 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 **New** to add another measurement (up to five are allowed on any display). Once more than one measurement is displayed, select **Next** to change which measurement is active (or simply tap on any existing measurement cursor to make it active).

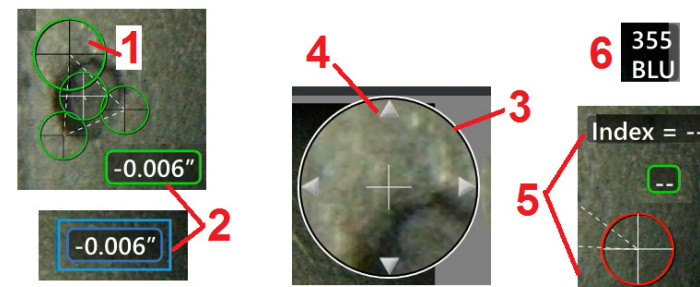
10 – Tap to access alternate rows of soft keys. Double tapping in this location hides or displays the soft keys and status bar.

11 – Select **Change Tip** (if working with a frozen image) 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: Changing the tip is not allowed when working with a recalled image captured with a stereo OTA.

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 matched strength (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 match 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.

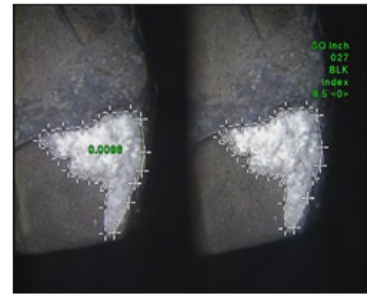
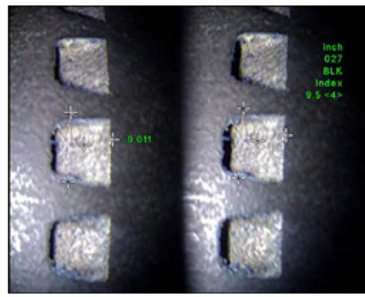
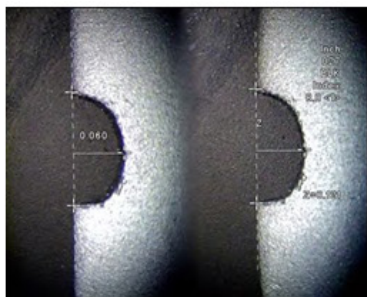
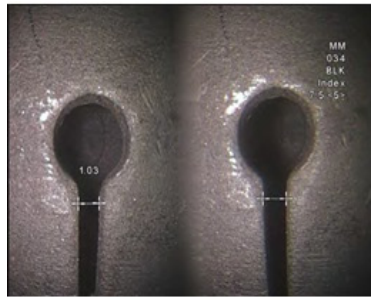
4 – Tap on these arrowheads near the perimeter (or use the joystick) to move the cursor.

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 OTA currently selected ([click here to identify the stereo tip](#))

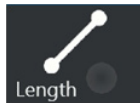
Stereo Measurement Types

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

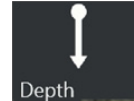


Cursor Placement:

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.

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.

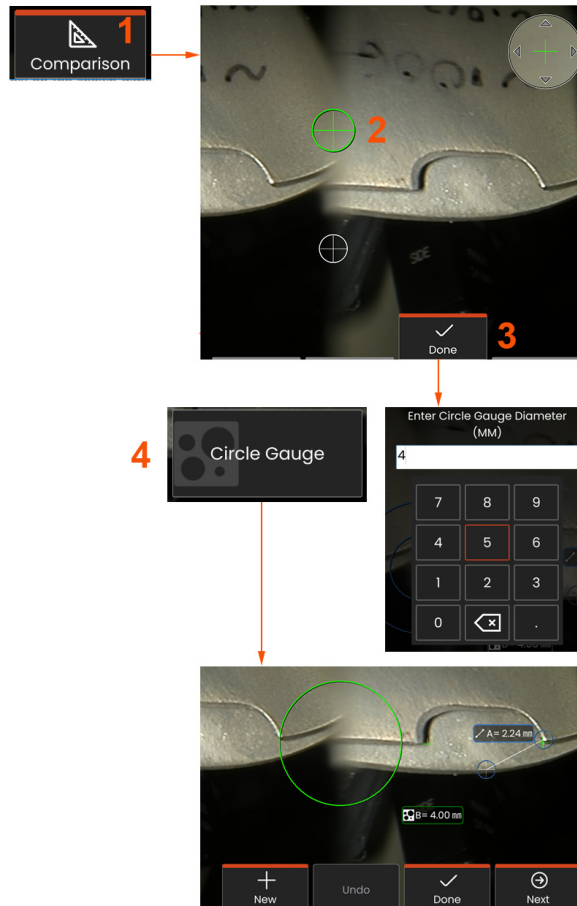


Cursor Placement:

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 Mentor Flex processor uses these known dimensions as a reference scale for measuring an unknown target. You can take comparison measurements on a frozen image or on a recalled image that was saved in **Comparison** measurement mode.

Making a Comparison Measurement

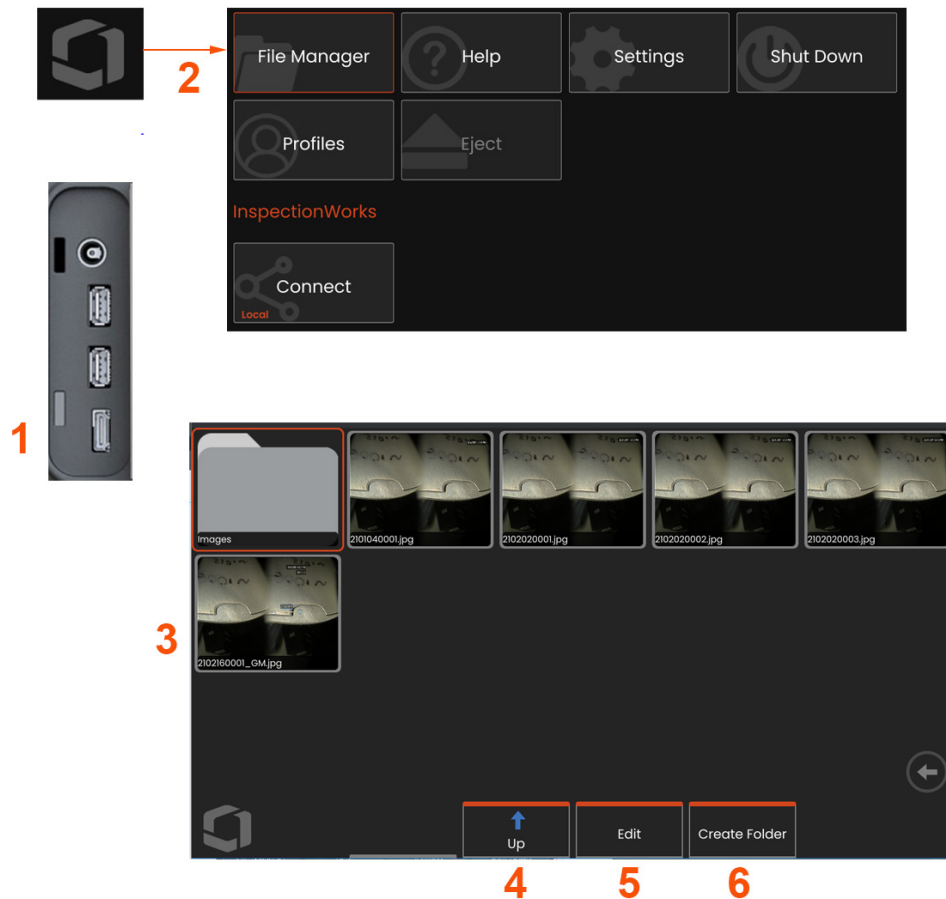
Use the head guard or attach any standard forward-view or side-view tip to the probe. Select the **Field of View (FOV)** for your tip from the soft key or the touch screen. This allows the system to improve accuracy by compensating for the tip's optical distortion. If FOV is not known consult [Appendix 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** mode and choosing the appropriate tip.
- 2** – A reference of known length must next be input by placing two cursors and defining the reference length. Arrange measurement cursors to determine the unknown dimension. In this case, the system is performing a **Circle Gauge** measurement.
- 3** Select Reference, to input or change a New Reference Dimension, New to add another measurement (up to 5), or change the active measurement by selecting Next.
- 4** – 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

Stereo Measurements

- Move the probe tip as close as possible to the target, maximizing magnification.
- Verify that the OTA 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.](#)
- 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. 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

One or more USB storage devices can be connected and, accessed through its File Manager, written to and copied from, and Ejected using the features described here. Files must first be saved in a directory located in the hard drive or on a connected USB storage device.

- 1**– Insert the USB Storage Device into either of the USB ports.
- 2**–To access files or folders on the USB , tap the on-screen **Logo** (or press the  hard key) to open the **Global Menu**, then select **File Manager**.
- 3** –Select the desired device, then navigate, access files or folders, and write to or copy from the drive as you would work with the internal memory. [Click here to learn more about working with the File Manager.](#)
- 4** –Use the **Up** button to navigate the file structure
- 5** –**Edit** allows the renaming of a file.
- 6** –**Create Folder** creates a new folder in the active location.



Editing /Creating Folders

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

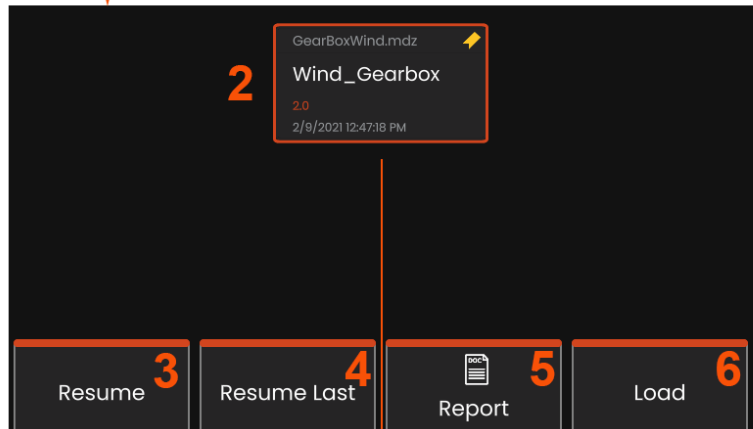
1 – To edit files or folders, tap the on-screen **Logo** or press  to open the **Global Menu**, then select **File Manager**. Alternatively, select the **Recall** soft key (when enabled), which allows you to recall a stored image or video and/or edit files and folders.

2 – To create a new folder, first access the **File Manager**, then navigate to the desired drive location.

3 – Select to navigate to the hierarchy within the **File Manager**.

4 – To **Create a New Folder**, enter folder name using the virtual keyboard.

5 – Click down when complete.



2

Gearbox Serial Number *	
Gearbox Manufacturer	
Operation Period (hrs)	
Production [kWh]	
Date	2/16/2021
Time	12:55 PM (Eastern Standard Time)

☒ Done

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 sixteen MDI inspection files may be loaded at any given time.

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

2 – Select to choose a recent inspection template; which will prompt further input from inspector, based upon the study.

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.

2 – **Study Level Information** (varies for each MDI) is entered at the start of an inspection. Information marked * is required before collecting results. To enter information, simply choose the corresponding line and the **Virtual Keyboard** will automatically launch.

Select **Done** when finished entering all **Study Level Information**.

3 – **Resume** the active inspection.

4 – **Resume Last** inspection.

5 – Create a **Report**.

6 – **Load** a new inspection.

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.

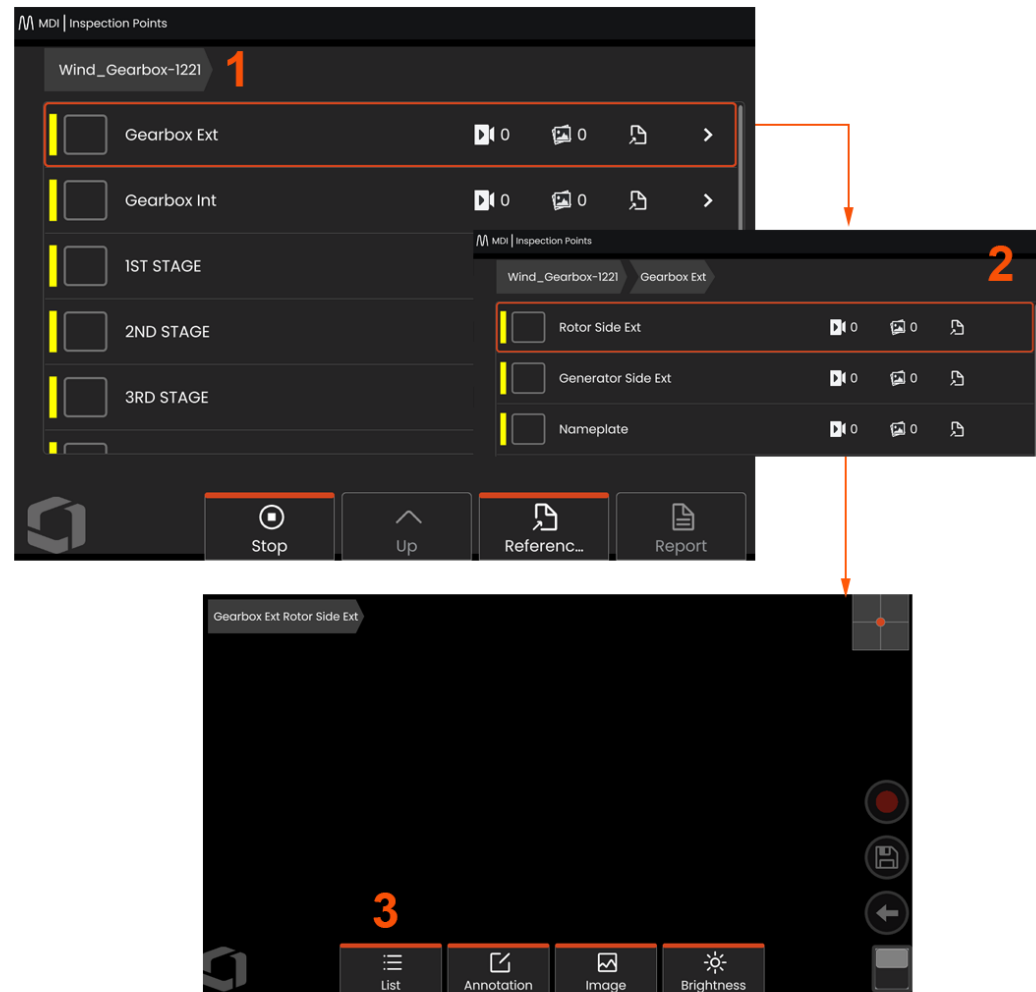
2 – Navigating to the **bottom** level of the inspection allows you to record images and videos.

Note: When selected, a check mark indicates the inspection point has been reviewed and approved. Approving a parent inspection point automatically approves all child inspection points.

3 – Select the **List** soft key to access the 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.

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**.



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.

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

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

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

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

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

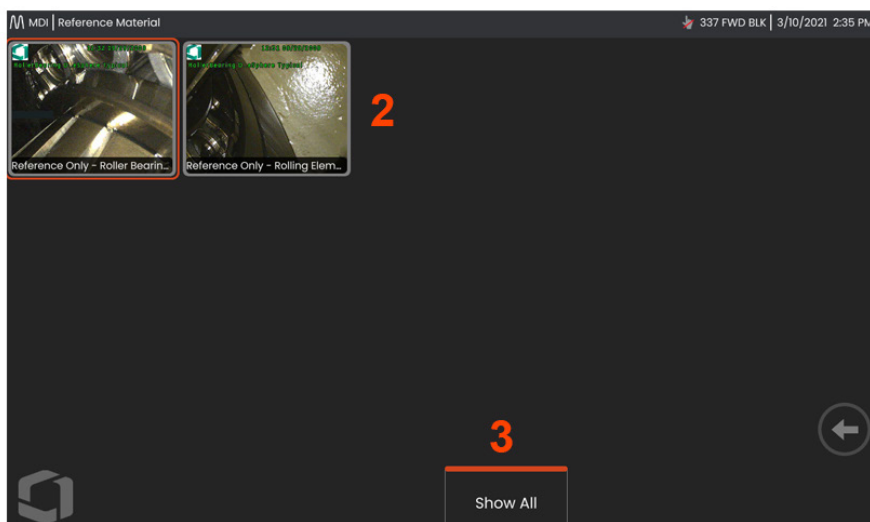
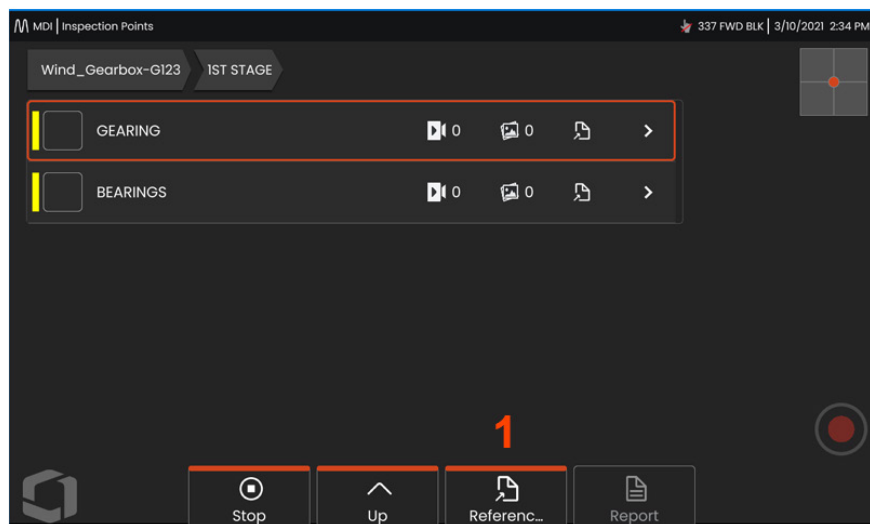
Note: Recently used entries will be displayed above the virtual keyboard text box for quick selection.

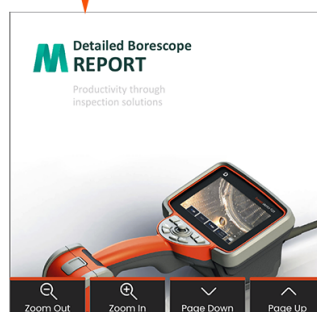
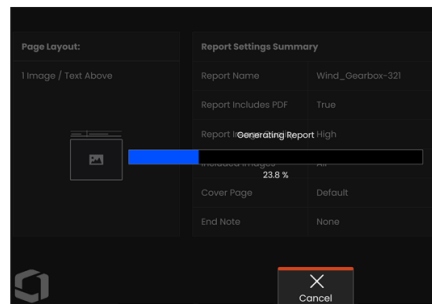
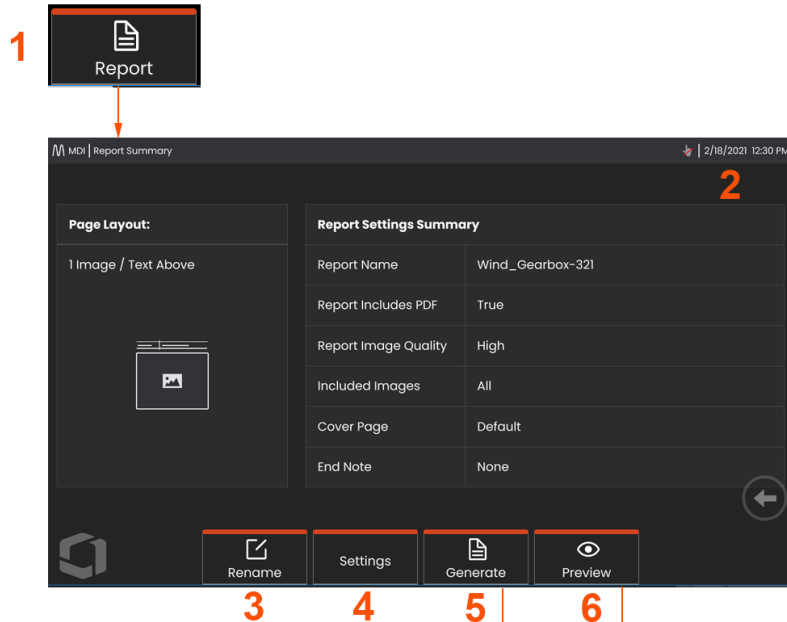
4 – Choose **Observations** from a pre-loaded list

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 InspectionWorks Insight.

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, .jpg, or .bmp image to open and view on the Mentor Flex 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.





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, a summary will be presented.
- 3 – **Rename** can be pressed to rename the report.
- 4 – **Settings** can be pressed to change the style of the report.
- 5 – **Generate** an MS Word and/or .pdf version of the report, which will be saved in the folder identified for this inspection.
- 6 – Choose **Preview** to generate an on-screen preview of the report.

1

Show Approved Option

OFF ON

2

MDI File Annotation

OFF ON

3

Include Report PDF

OFF ON

4

Report Cover Page

Default

Select

5

Report End Note

None

Select

6

Report Image Quality

High ▼

7

Included Images in Report

All ▼

8

Report Page Layout

1 Image / Text Above ▼

9

Approved Details Table

Unapproved Nodes ▼

Customizing an MDI Report

Customize an inspection report by specifying the following parameters:

Report Settings:

1 - Show Approved Option– Turn OFF or ON to show approved nodes in the report.

2 - MDI File Annotation – Choose OFF or ON to include annotations

3 - Include Report PDF – Creates a PDF version of the report (can view on the Mentor Flex display).

4 - 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.

5 - Report 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:

6 - Report Image Quality can be adjusted to Low, Medium or High

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

8 - Report Page Layout – Select from several styles of text and image layout or select No Text

9 - Approved Details Table allows users to show unapproved nodes, All nodes, or OFF

Maintenance and Troubleshooting

Inspecting and Cleaning the System

Inspect and clean the Mentor Flex 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 OTA is securely threaded, the most likely problem is dirty optical surfaces. For best image quality, clean the OTA and camera head frequently.

If you discover conditions that require evaluation or repair, return the system to Waygate 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 OTA

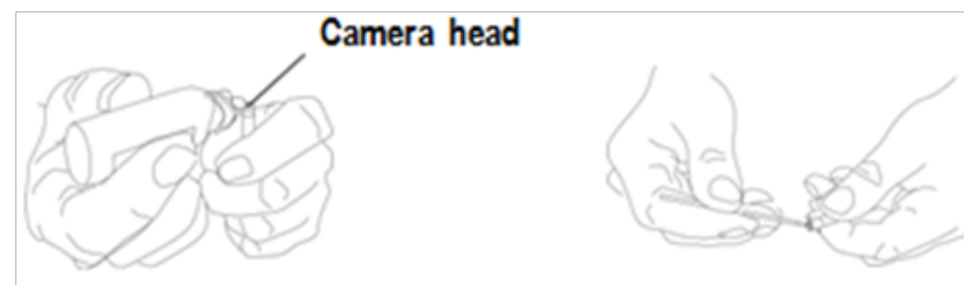
- 1 – Check the OTA for damage or contamination.
- 2 – Clean all external parts of the OTA. Use glass cleaner or 70% alcohol-to-water solution and a pointed cotton swab.
- 3 – Clean only the internal threads of the OTA. The internal optical lens should only be cleaned when troubleshooting an OTA that provides poor focus.

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

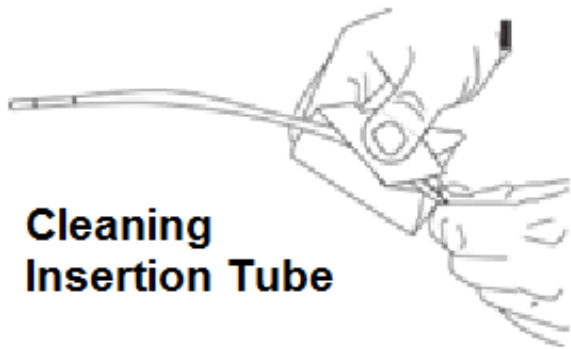
Caution: *Do not* use a cotton swab to clean the inside of the 3D phase measurement OTA's tip or damage to the tip may occur.

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.



- 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.



Cleaning Insertion Tube

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.

Inspecting and Cleaning the Handset

1 – Disconnect the power cord from the power source.

2 – 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. Compressed air may be used to dry or remove debris from electrical connectors.

Troubleshooting Guide

Condition	Causes	Actions
Images are distorted or blurred within normal range.	- OTA 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 OTA. - Clean the OTA and the camera head. • The Mentor Flex 6.1mm diameter probes require the use of the 6.1mm headguard supplied. This headguard is unique to the Mentor Flex 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 image quality issue is associated with a specific probe contact Waygate Technologies to obtain a return material authorization (RMA).
No image appears in the display. (Hard Keys are lit)	Various	- Reboot system. - If image quality issue is associated with a specific probe contact Waygate 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 LED operation. If still no image, contact Waygate Technologies to obtain a return material authorization (RMA). - If a HDMI cable was purchased connect to a capable monitor. Determine whether an image appears on it.
Dark video image	Various	- Clean the OTA and the camera head. - 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.

Probe

Condition	Causes	Actions
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 Mentor Flex. 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 Waygate 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.	If reduced light output is acceptable, normal use may continue. If greater light output is required, power system down and allow to cool.
Reduced system response speed	High-temperature operation will cause system to automatically limit Microprocessor power.	If reduced processing speed is acceptable, normal use may continue. If greater processing speed is required, power system down and allow to cool.
Automatic over-temp shutdown	Over-temp shutdown	Allow system to cool adequately prior to power-up.
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. • Ensure the power cable is plugged into the DC port located on the bottom of the battery and not the DC port located under the I/O door next to the display. • Contact Waygate 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 Waygate Technologies for a replacement charger. • Try another battery. • If replacement battery does not restore operation contact Waygate 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 Waygate Technologies to have internal battery replaced. Contact Waygate Technologies to obtain a return material authorization (RMA).

Appendix A. Technical Specifications

Operating Temperature	
Tip	-25°C to 100°C (-13°F to 212°F). Reduced articulation below 0°C (32°F)
System	-25° to 46°C (-13°F to 115°F). LCD may require warm-up period below 0°C (32°F).
Storage Temperature	-25° to 60°C (-13°F to 140°F)
Relative Humidity	95% max, non-condensing
Waterproof	Insertion tube and tip to 14.7 psi (1 bar, 10.2 m of H ₂ O, 33.5 ft of H ₂ O).
Hazardous Environments	Not rated for use in hazardous environments.
Camera	
Diameter Probe	3.9mm (0.15"), 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" (3.9mm, 4.0 mm)
Pixel Count	440,000 pixels
Housing	Titanium
System	
System Dimensions	13.7 cm x 19.7 cm x 38.1 cm (5.4" x 7.2" x 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: system - 2.50 kg (5.5 lbs).
Construction	Magnesium and Polycarbonate housing with integrated elastomeric bumpers
LCD Monitor	Integrated (5.8")transmissive color TFT WXGA Advanced Wide View (AWV) LCD, daylight readable, optically-bonded, multipoint capacitive Gorilla Glass Touchscreen.

Joystick Control	360° All-Way® tip articulation, menu access, and navigation
Button Set	Access user functions, measurement, and digital functions
Internal Memory	32 GB SSD
Data I/O Ports	Two USB 2.0 host 'A' ports
Video Out	HDMI
Brightness Control	Auto and Variable
Illumination Type	White LED
Long Exposure	Auto - up to 16 seconds
White Balance	Factory default or user defined
Operating Frequency Bands and Output Power	Please see Appendix Q, page 111
Modulations	DSSS, OFDM
Power	
Lithium Ion Battery	~3-hour run time, 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-810H	United States Department of Defense Environment Tests Sections 501.7, 502.7, 506.6, 507.6, 509.7, 510.7, 511.7, 514.8, 516.8, 521.4
MIL-STD-461G	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

Patent Information	
Mentor Flex is covered under one or more of the following US Patents: US10018467B2, US10319103B2, US10586341B2, US10679374B2, US10699149B2, US6468201, US7170677, US7262797, US7564626, US7782453, US7819798, US7902990, US8213676, US8253782, US8310533, US8310604, US8368749, US8411083, US8514278, US8760447, US8810636, US8863033, US9013469, US9036892, US9074868B2, US9412189B2, US9489124B2, US9588515B2, US9600928B2, US9841836B2, US9842430B2, US9875574B2	
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, create, and delete. USB and internal flash storage.
Image Control	Invert, Inverse+, Distortion Correction, Dark Boost, Color Saturation, Illumination, Long Exposure, Single View, Zoom (5x digital), Image Capture and Recall
Digital Zoom	Continuous (5x)
Image Formats	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	Wireless over the air or field upgradeable via USB thumbdrive
Inspection Works Connect Local	Wired or wireless video streaming and file transfer to iPad or iPhone
Languages	English, Arabic, Chinese, Czech, Dutch, Finnish, French, German, Hungarian, Italian, Japanese, Korean, Polish, Portuguese(Brazil), Russian, Spanish and Swedish, Turkish, Taiwanese.

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
3.9mm (0.15") OR 4.0 mm (0.16")	2.0, 3.0 m (6.6, 9.8 ft.)
6.1 mm (0.24")	2.0, 3.0, 3.5, 4.5, 6.0, 8.0 m (6.6, 9.8, 11.5, 14.8, 19.7, 26.2 ft.)
8.4mm (0.33")	2.0, 3.0, 4.5, 6.0, 8.0, 10.0 m (6.6, 9.8, 14.8, 19.7, 26.2, 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. OTA Table

3.9mm Tips				
Part No.	Color	FOV (deg)	DOF (mm)	DOF (in)
Forward View				
PXT480FG*	None	80	6-80	.24-3.15
PXT490FN	Orange	90	3-40	.12-1.57
Side View				
PXT480SG*	Brown	80	4-80	.16-3.15
PXT490SN	Red	90	2-16	.08-.63
Stereo Measurement				
PXTM45050FG*	Black	50/50-FWD	5-45	.20-1.77
PXTM45050SG*	Blue	50/50-SIDE	4-45	.16-1.77
4.0mm Tips				
Forward View				
T4080FF*	None	80	35-inf	1.38-inf
T4080FF	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

6.1mm Tips				
Part No.	Color	FOV (deg)	DOF (mm)	DOF (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
T61120FF	Gray	120	20-inf	.79-inf
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
Stereo Measurement				
XLG3TM616060FG	Black	60/60-FWD	4-80	.16-3.15
XLG3TM615050SG	Blue	50/50-SIDE	2-50	.08-1.97

8.4mm Tips				
Part No.	Color	FOV (deg)	DOF (mm)	DOF (in)
Forward View				
XLG3T8440FF	None	40	250-inf	9.84-inf
XLG3T8480FG	Yellow	80	25-500	.98-19.70
XLG3T84120FN	Black	120	5-200	.20-7.87
T84120FF	Orange&Blue	120	20-inf	.79-inf
XLG3T8440FG	White	40	80-500	3.15-19.70
Side View				
XLG3T8440SF*	Brown	40	240-inf	9.84-inf
XLG3T8480SG	Green	80	25-500	.98-19.70
XLG3T84120SN	Blue	120	4-200	.16-7.87
Stereo Measurement				
XLG3TM846060FG	Black	60/60-FWD	4-50	.16-1.97
XLG3TM846060SG	Blue	60/60-SIDE	4-50	.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

Waygate 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 Waygate 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.

Waygate Technologies' obligation under this warranty is limited to the repair or replacement of components determined by Waygate 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 Waygate Technologies or one of its authorized service centers. The warranty does not cover accessories or optional equipment not manufactured by Waygate 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 Waygate Technologies to have been caused by misuse, accident (including shipping damage), neglect, improper maintenance, modification or repair by someone other than Waygate 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 Waygate Technologies any other liability in connection with the sale of its VideoProbe products. Waygate 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 OTA's

Verify measurement tips each time you use them to ensure that no mechanical damage has degraded their accuracy. Mentor Flex systems are shipped with a measurement verification block. This tool allows user to verify the accuracy of optic 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 Mentor Flex:

VER2400C	For 3.9mm, 4.0 mm systems
VER2600D	For 6.1 mm systems
VER2600E	For 6.1 mm systems
XLG3TM84VER	For 8.4 mm systems

To Verify a Measurement Tip:

Securely attach an OTA and then

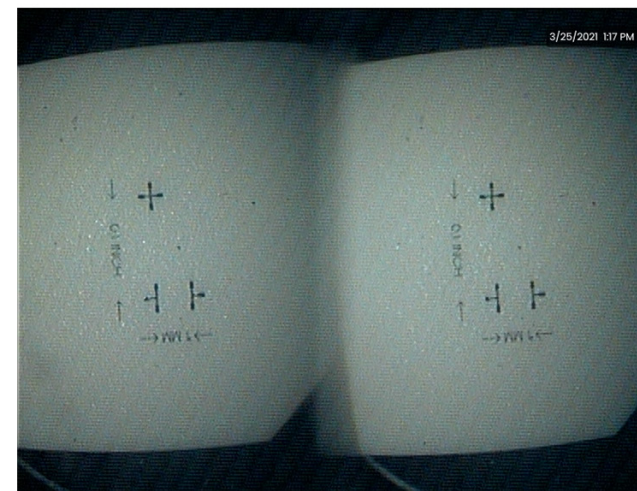
- 1 – Attach the stereo tip securely.
- 2 – Insert the tip into the appropriate port of the verification block and position the tip to center the target crosshairs in the image.
- 3 – Measure the test target using the appropriate metric (inches or millimeters) and evaluate results.

Note: An experienced user can achieve a measurement of 0.100 ± 0.005 inches (1.00 ± 0.05 mm). If the measurement results do not fall within these limits, see Troubleshooting Measurement.

Note: 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.



3



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 advise 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 and are a requirement in many countries.

The cross-out wheeled bin symbol advises the use of recycling/take-back 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 osteomalacia 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 significant. 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 http://ec.europa.eu/environment/waste/weee/index_en.htm for take-back instructions and more information about this initiative.

Appendix G. Regulatory Compliance

European Equipment Classification

Group 1, Class A

The  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 Mentor Flex system is in conformance with the following standard: EN61326-1.

Declarations of Conformity are held by Waygate Technologies GmbH:

Waygate Technologies

GmbH Product Service Center

Lotzenäcker 4

72379 Hechingen Germany

Tel: +49(0) 74719882 0

Fax: +49(0) 74719882 16

Safety Mark

The Mentor Flex 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-461G: RS103, RE102-Above Deck

MIL-STD-810H: 501.5, 502.5, 506.5, 507.5, 509.5, 510.5, 511.5, 514.5, 516.5, 521.5

UN / DOT TI-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.

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 être 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.

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 présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

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 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 approximately square. To replace the current logo with a custom logo, complete the following steps:

- 1** – Tap the lower-left corner of the display (typically contains a **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.

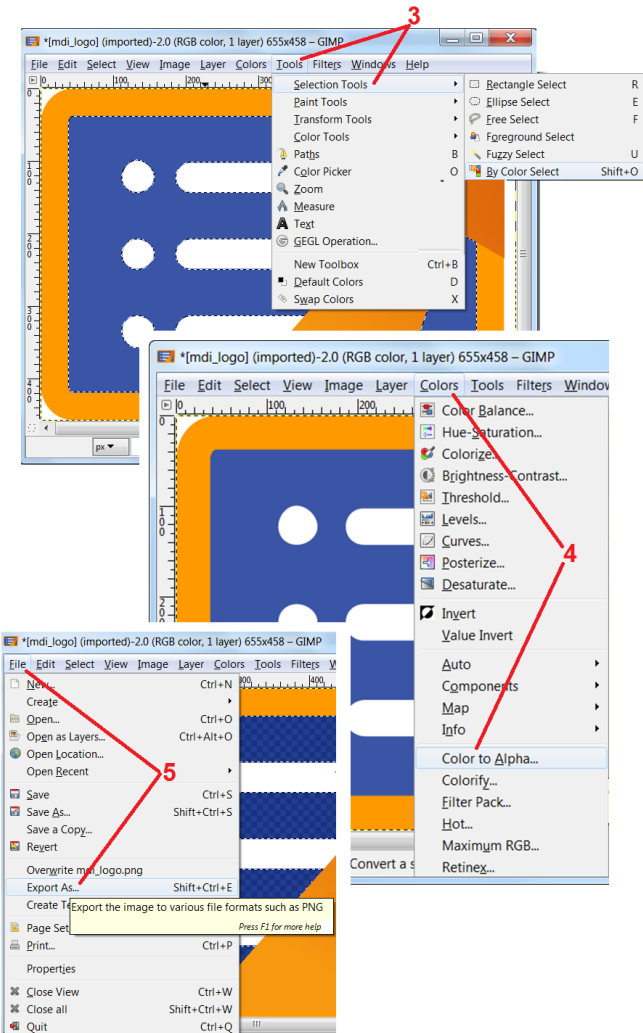
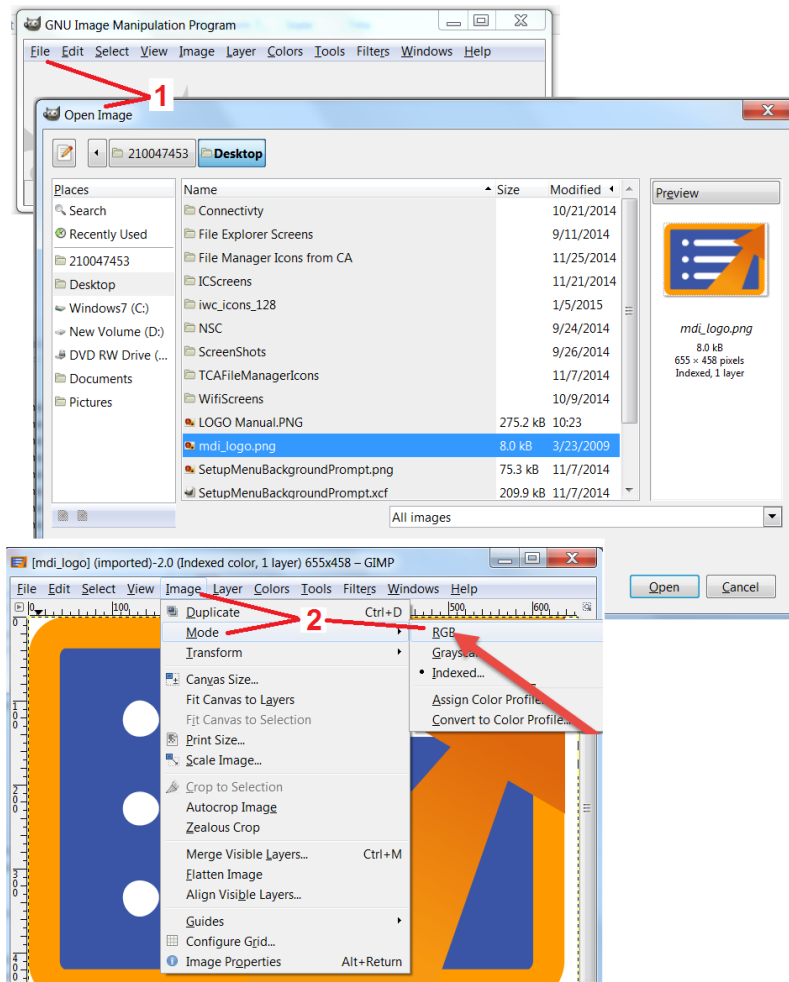
- 1 – Select and Open the PNG file in Gimp2 as shown.
- 2 – Select Image > Mode > RGB.

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 Mentor Flex



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 **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

Note: Restoring factory defaults will automatically cause the operating language to revert to English.

Appendix K. Updating Software

Software updating requires a connected USB drive or an Internet connection. The updating process must be carried out while the Flex is connected to an AC power source.

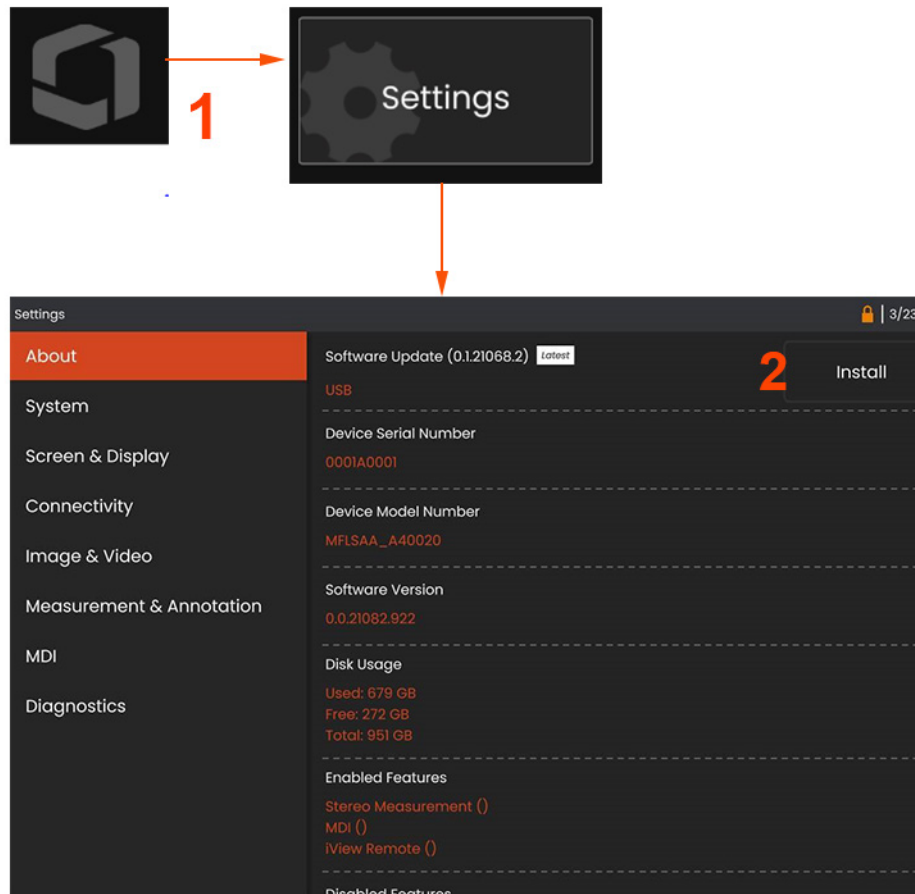


1 – Tap the logo at the lower left corner of the screen or press to open the **Global Menu**, select the **Settings Menu**,

2 – Within the **About** tab, under the **Software Upgrades** section, users will have the option to **Install** upgrades if one is available.

Note: It may take some time for the system to detect available upgrade files from a USB thumbdrive. Please be patient during the process.

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



Appendix L. Streaming to an iPad / iPhone

Connecting an iPad or iPhone to the Mentor Flex allows users to stream video and transfer files from a distance.

Note: InspectionWorks Connect will have to be downloaded on the iPad or iPhone.

- 1. From the App Store, search for Inspection Works Connect.
- 2. Download and Install to begin using an iPad or iPhone.

Appendix M. Controlling with a Keyboard



Flex Operation	Press on Keyboard
1 Far Left Soft Key	FN & F1
2 Middle Left Soft Key	FN & F2
3 Middle Right Soft Key	FN & F3
4 Far Right Soft Key	FN & F4
5 Back	F5
6 Save	F6
7 Menu	F7
8 Freeze/Enter	F8
9 Steering Home	Alt & FN & F12
10 Steer-and-Stay	FN & F12
Save As	Alt & FN & F6
Toggle Soft Key Rows	Alt & FN & F7
Back to Live Screen	Alt & F5

Index

A

AC-to-DC power adaptor 17
Annotation 35
Arrows 35

B

Battery Warnings 8
Brightness 33

C

Charging the Battery 16
Chemical Compatibility 66
Cleaning the System 55
Comparison Measurement 45
Component Identification 11
Connectivity 24

D

Date 21
Date Format 21
Default Profile 20
Distortion Correction 33

E

Editing Files 48
Environmental Compliance 68

F

Factory Default Settings 21
Factory Settings 76
Field of View (FOV) 45
File Manager 31
Files 47
FOV 45
Freeze 29

G

Global Menu 19

I

illumination LED 34
Image 33
Image Save Location 25

Image Transformation Settings 33
Image & Video 25
Insertion Tube 27
Installing the Battery 16
Invert 34

K

Known Networks 24

L

Logo 21, 74
Long Exposure 33

M

Magnify 32
Maintenance 55
Matching Cursors 42
MDI 49
Measurement & Annotation 26
Measurement Tips 38
Measurement Types 38
Measuring 39
Menu Directed Inspections 49

O

Open Source Software 76
Optical Tips 18
OTA Table 64

P

Personalized Logo File 74
Power Management 22
Power On 17
Probes 18
Profile 20

Q

Quick Save 30

R

Recalled Image 31
Recalled Video 37
Recording Live Video 36

Regulatory Compliance 71
Removing the Battery 16
Reset Transforms 34

S

Safety Information 7
Save Options Menu 30
Saving Image Files 30
Screen & Display Setup 23
Single View 34
Software 77
Sound Recording 23
Specifications 60
Steer and Stay mode 27
Steering Mode 27
Steering Sensitivity Settings 22
Stereo Index 26, 40
Stereo Measurements 39
Storage Devices 47
System 21
System Password 21

T

Temperature Sensor Warnings 28
Time 21
Time Format 21
Time Zone 21
Tip Map 23, 27
Touchscreen 13
touch-sensitive control 23
Troubleshooting Guide 57
Troubleshooting Measurements 46

U

Updating Mentor Visual iQ Software 77
USB Storage Device 47

V

Verifying Measurement Tips 67
video 36
video recording format 25
Video Save Location 25
Virtual Keyboard 20

W

Warranty 66
White Balance 25
WiFi 24

Z

Zoom 32

Customer Support Centers

USA

Waygate Technologies, LP
721 Visions Drive
Skaneateles, NY 13152
Tel: +1 832-325-4368
E-mail: Customer.care@bakerhughes.com

Europe

Baker Hughes Digital Solutions GmbH
Robert Bosch Str. 3
50354 Huerth
Germany
Tel: +49 2233 601 111 Ext. 1
E-mail: GEIT.Service.RVI@bakerhughes.com

Asia/Pacific

Baker Hughes Solutions Pte. Ltd.
10 Lok Yang Way
Singapore 628631
Tel: +65 621 3 5500
E-mail: Asia.Servicervi@bakerhughes.com

Japan

Baker Hughes Japan Co., Ltd.
4-16-13 Tsukishima
Chuo-ku, Tokyo 104-0052, Japan
Tel: +81 3 6864-1737
E-mail: service.itsv_jp@bakerhughes.com

China

Baker Hughes Sensing & Inspection Co., Ltd.
No. 8 Xi hu Road, Wu jin high-tech zone
Changzhou, Jiang Su 213164
China
Tel: +86 400 818 1099
E-mail: China_inhouse_service@bakerhughes.com

UAE

Baker Hughes EHO LTD
Waygate Technologies
Mussafah Industrial Area,
Sector : MW-4, Plot: 13A1-A, Str 16th,
Abu Dhabi - United Arab Emirates
PO Box 47513
Tel: +971 24079331
E-mail: adservice@bakerhughes.com

Russia and CIS

Baker Hughes Rus Infra LLC
Presnenskaya nab.10 premises III, floor 3, room 22,
123112, Moscow, Russian Federation
Tel: +7 495 771 72 40 / 43 20
E-mail: wt.service.RCIS@bakerhughes.com

Brazil

GE GEVISA
Prédio GE Bently do Brasil LTda
Rod. Jorn. Francisco Aguirre (SP 101-Km 3,8)
Campinas - SP - Brasil
CEP 13064-654
Tel: +55 19 2104 6983
E-mail: mcs.services@bakerhughes.com

India

GE Oil & Gas India Pvt. Ltd,
M&C ServiceLab,
A/78-1, Chakan MIDC Phase II,
Village Vasuli, Tal-Khed,
Pune 410501, Maharashtra, India
Tel: +91 2135620679
E-mail: India.Service@bakerhughes.com

waygate-tech.com

Assembled in USA

ISO 9001
REGISTERED COMPANY

©2021 Baker Hughes

All rights reserved. Specifications subject to change without notice.
Printed in USA

MFLAMANUAL Rev A

Baker Hughes 
bakerhughes.com