LMI®
Linear Measurement Instruments, Corp.

G-*F*orce

User Manual

Revision 1.14 | September, 2023
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Section 1: Preliminary Information

Thank you for your LMI G-Force purchase. Inside the box, you will find the G-Force, a type-C USB cable, a pre-paired USB Blue Tooth Low Energy (BLE) Dongle, and wall charging unit.

1.1 Warranty Information

This unit is warranted in the USA by LMI against materials and workmanship defects for 1 year from the original purchase date. In case of ownership transfer, the warranty automatically transfers to the new owner and remains in effect for the original 1 year period. Product that proves defective will be repaired or replaced (at our discretion) at no charge during the warranty period, provided it is returned, shipping prepaid, to LMI.

This warranty does not apply in case of accidental damage, misuse or as a result of service or modification by users other than LMI, or by hardware, software, interfacing, or peripherals not provided by LMI.

Please retain this document for your records. No other express warranty is provided. The repair or replacement of a product is your exclusive solution. Any implied warranty of merchantability or fitness is limited to the 1 year duration of this written warranty. Some States do not allow the exclusion or limitations of incidental or consequential damages, so the above exclusion or limitations may not apply to you.

1.2 LMI Customer Service

LMI Customer Service can be reached at **(810) 714-5811** Monday through Friday between 8:00 a.m. and 5:00 p.m. Eastern Time.

Call LMI Customer Service to:

♦ Place orders
♦ Request a RMA
♦ Inquire about the status of an order or repair

1.3 Returns for Service

♦ Please contact Customer Service to obtain a Return Material Authorization (RMA) number. Include a detailed description of the problem.
♦ Pack the equipment properly. Use the original shipping container, if possible. LMI cannot assume responsibility for damage caused by improper packaging.
♦ Send the equipment to the following address:

LMI Corporation
Attn: Repair Department
101 N. Alloy Drive
Fenton, MI 48430

1.4 Technical Support and Training

LMI technical support experts are only a phone call away. Contact Technical Support at **810-714-5811** Monday through Friday between 8:00 a.m. and 5:00 p.m. Eastern Time for the following reasons:

- ♦ To assist in setup and configuring LMI equipment
- ♦ To help implement data collection applications
- ♦ To troubleshoot LMI equipment

You can also reach LMI Technical Support By e-mail at techsupport@lmicorporation.com. You can email your questions anytime. Please include your name, phone number, and a *detailed description* of the problem.

LMI On-Site Training

LMI Technical Support provides on-site training for all LMI products. Contact LMI Support Services at **810-714-5811** for pricing & scheduling information.

Schedule a day at your facility or at LMI in Fenton, Michigan. Please visit us on the web at www.lmicorporation.com for more information.

Section 2: G-Force Operation and Functions

2.1 Overview

The LMI G-Force is a user-configurable tool which measures the force required to close a vehicle door, the velocity of the door after the closing force has been applied, and the work done by the operator to close the door. The device has a simple user interface consisting of three buttons, one tri-color LED, and one suction cup/plunger. It is powered by a long-lasting Lithium-Ion battery that operates continuously for more than 10 hours without recharging.

Using an internal accelerometer coupled with a gyroscope, the G-Force can display velocity, force, or work for quick and easy "on the fly" measurements for doors, deck lids, and liftgates. Users can connect the G-Force to LMI's UGI software to wirelessly collect and export data for later analysis and tracking.

Theory of Operation

The G-Force uses an inertial accelerometer to measure and record the acceleration or angular velocity imparted by the user to the door being tested. The accelerometer data is integrated over time to get velocity over time. This operational method is used for standard vehicle doors. The G-Force also contains a gyroscope that is used to record angular velocity of liftgates and deck lids. A high performance load cell measures force. In all cases, the velocity is integrated over time to obtain the distance traveled by the door. Force is applied during a portion of this distance and this data is incrementally multiplied and summed to calculate the total work done by the user, as indicated by the representative curve examples shown below:
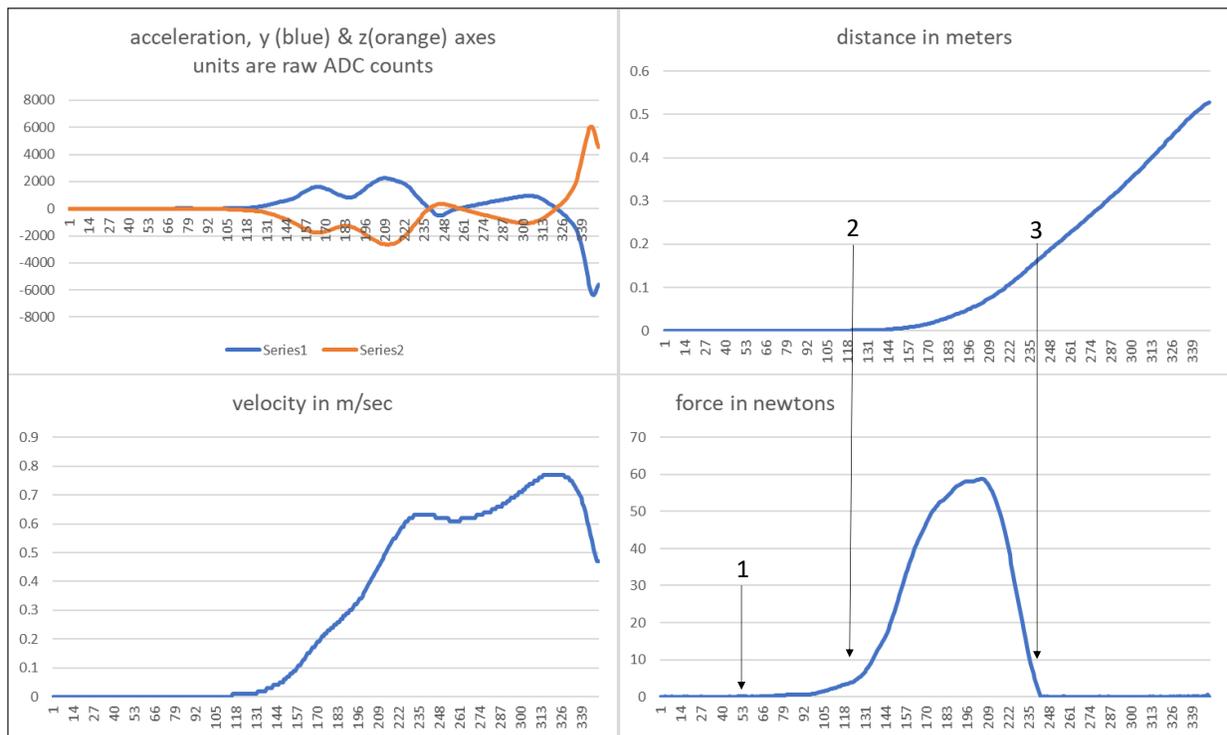
These curves were taken on the front passenger side door of a pickup truck, opened just past the first detent. Data was taken at a sample rate of 200Hz reporting peak velocity (other sample rates are available for use on other style and sizes of doors).

The x axis on these curves are time slots. Each of the 350 slots is 1/200 = 5 milliseconds long. Total length of test window is 350 x .005 = 1.75 seconds. The important thing to note from the force and distance curves is that work is only done between arrows 2 and 3, where both the distance and force are non-zero. The force between arrows 1 and 2 is the pre-load necessary to get the door moving.

2.2 Gauge Layout

Buttons:

Up Arrow button: used to scroll through menu options and SEND data.

Center button: used to enter menu and START a measurement test.

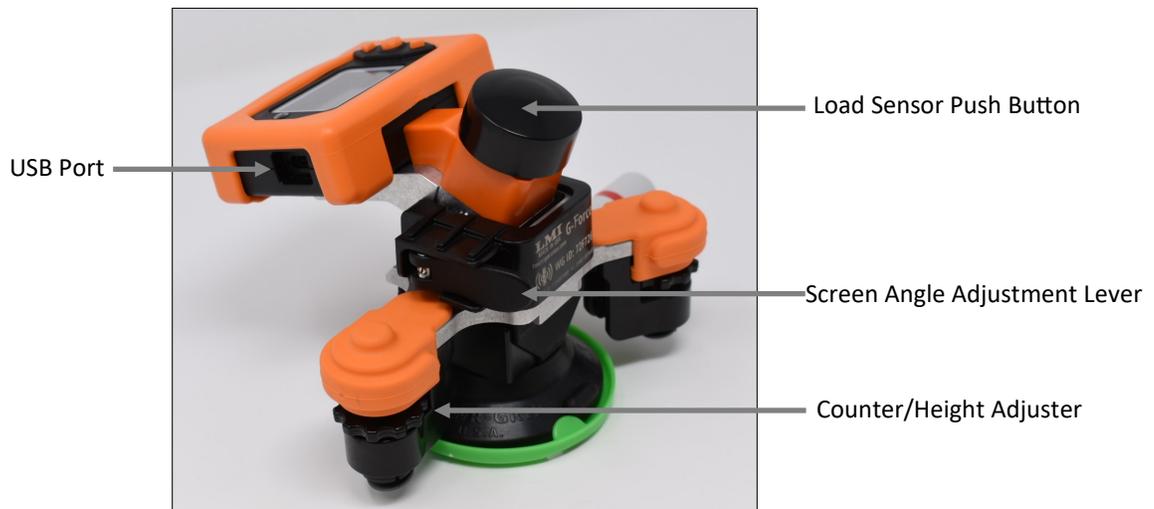Down Arrow button: used to scroll through menu options and REDO test.

Test Start Screen

LED and functions:

The LED will flash different colors to indicate different states of the G-Force.

- When flashing red: Not connected to BLE dongle, waiting to begin a test.

- When flashing green: In setup mode, not connected to BLE dongle. In auditor mode, it denotes that the threshold has been reached.

- When flashing blue: In setup mode, connected to BLE dongle.

USB Port — — — — Load Sensor Push Button

Screen Angle Adjustment Lever

Counter/Height Adjuster

USB Charging Port:

Type-C USB connection that is used to both charge the G-Force and update parameters.

Load Sensor Push Button:

This button operates as a load sensor in combination with a surface that helps ensure repeatability.

Suction Cup/Plunger:

The G-Force attaches to the door through the use of a suction cup and plunger. Attach the suction cup to the vehicle by pumping the plunger until the red line cannot be seen. To remove the G-Force press up on the bottom tab of the suction cup.

Screen Angle Adjustment Lever:

Allows the screen of the G-Force to pivot for a better viewing angle. Unlatch, move the face plate of the G-Force to the desired angle, then re-latch to lock the angle in place.

Contour/Height Adjuster:

Used to stabilize and better fit the contours of the door being measured. Turn clockwise to extend the feet and counter-clockwise to retract the feet.

2.3 Taking a Measurement—Doors

NOTE: The G-Force factory default mode (*Basic mode*) allows the user to perform a test, view the results, and (if required) send those results to LMI's Universal Gauge Interface data collection software. The information below pertains to using the G-Force in Basic mode. See section 3.2 for information on additional modes.

1. Place the G-Force either above or below the door handle with one hand while pumping the plunger with the other until the red line is no longer visible. This means the G-Force is securely attached.

G-Force securely attached

*G-Force **NOT** securely attached*

2. Open the door to the desired location and press the center button on the G-Force. The red LED will stay lit and the screen will display WAIT while the G-Force readies the test. It is important to hold the door as still as possible while the red LED is lit. When the LED turns green and the screen displays READY, close the door by pressing on the black load sensor button with your thumb and index finger as shown below:

Pressing the load sensor

Note: If the Velocity Only feature is enabled, the user can perform a velocity-only test by pushing on the door instead of the G-Force. See Section 3.3 for information on the Velocity Only feature.

3. When the test is complete, the results will be displayed on the G-Force screen. The user is then prompted with a choice to either SEND the data (if using LMI's UGI or other 3rd party data collection software) or REDO the test. Once the data is sent or the REDO button is pressed, the G-Force will return to the Start test screen and another measurement can be taken.

2.4 Taking a Measurement—Liftgates and Deck lids

A note on liftgates and deck lids: Model 7 and Model 8 of the G-Force are set up by default to work with liftgates and deck lids. Users who wish to create their own model can use the G-Force Utility to change the Door Description to LG. Naming the door LG internally switches the G-Force from the door closure algorithm to the liftgate algorithm, which changes the orientation axes and integrates an internal gyroscope that is used to calculate the velocity as the door moves through an arc. In addition, users can select the angle relative to the G-Force that will automatically start the test when the liftgate reaches the angle set in the Start Angle field (see page 19). Models 7 and 8 have this angle set to 180 degrees, which means that the user can manually start the test when the angle from which they wish to test is displayed on the G-Force.

The example below assumes the user has selected the default Model 7 door named LG1.

1. Place the G-Force as close to the liftgate's edge as possible with one hand while pumping the plunger with the other until the red line on the plunger is no longer visible. This means G-Force is securely attached. With the liftgate resting against the striker plate, press the center button on the G-Force to begin the test. The display will look like the example to right and the LED will be solid red in color.

2. Slowly raise the liftgate until the desired angle is shown on the display. While holding the liftgate as still as possible, press the center button (START) on the G-Force. The solid red LED will turn blue and while the word WAIT is shown on the display. When the test is ready, the LED will turn solid green and READY will be shown on the display.

3. If Force is desired in addition to velocity, close the liftgate by pushing on the black load sensor button. Push directly on the liftgate if only velocity is needed.

2.5 Taking a Measurement—Sliders

There are two ways to take measurements on sliding doors. If only velocity is needed, using *SLDR* as the Door Description will reorient the x-axis so that the G-Force can be used on a sliding door. Place the G-Force in Velocity Only mode (see Section 3.1) and attach the G-Force to the side of the slider and then push the door along the track. Model 9 is pre-configured for sliders in this orientation. Sample rate, spec limits, and door order can be changed through the G-Force Utility software.

If force and/or work are required, LMI's SK6446 G-Force Slider Bracket (sold separately) will mount the G-Force 90 degrees perpendicular to the door, orienting the G-Force in the same direction as the sliding door. Users push on the load sensor push button to close the door. Contact sales@lmicorporation.com for more information on the G-Force Slider Bracket.

NOTE: If using the G-Force Slider Bracket, **do not** name the door *SLDR* as it will not work correctly.

SK6446 Slider Bracket (optional)

Velocity Only Mode with SLDR Door Description

Section 3: G-Force Specifics

3.1 Navigating the LMI G-Force

SELECT ONE:

SELECT MODEL
SETUP MODE
USER MODE
USER
VELOCITY ONLY

Main Menu

To enter the Menu screen of the G-Force, press and hold down the center button until the LED goes out (approximately three seconds), then press the down arrow button. From the Menu screen, the operator has the following choices:

Select Model: Allows the user to choose one of ten models within the G-Force.

Setup Mode: Places the G-Force in setup mode so the user can connect the G-Force to the LMI BLE dongle when in the G-Force Utility or UGI.

User Mode: Places the G-Force in one four different user modes (see Section 3.2).

User: Allows for the choice of one of four possible users, one of three shifts, and one of six lines when in Data Collection mode. These details will be included in the data export when the collected data is downloaded to the G-Force Utility software. This data is only recorded when the G-Force is in Data Collect mode.

Velocity Only: Allows for door closure without pressing on the Load Sensor Push button, meaning the user can perform the test with a direct push on the door itself. **When activated, neither force nor work will be measured.**

3.2 User Modes

The G-Force has four user-selectable modes of operation:

> **Basic:** This method allows operators to instantly view readings from the gauge's display. Simply grab the gauge and take measurements. Measurements taken in this mode can also be sent to LMI's UGI data collection software by pressing the up arrow (*SEND)* after the completion of each test (see Section 7).

> **Inline:** Mode reserved for future development.

> **Auditor:** For use as a stand-alone auditing tool to determine both the lowest *latched* closing velocity and highest *non-latched* closing velocity. This mode is useful for field/yard auditing where a PC is not with the user. See Appendix B for more details. See Appendix A for setup and operation.

> **Data Collection:** Allows the G-Force to be used as a stand-alone data collection device with preset trace fields. The maximum storage capacity will vary with the amount of information saved, but if storing only one parameter, the G-Force can hold approximately 500 tests. See Appendix B for setup and operation.

3.3 Factory Default Models

The G-Force comes with 10 preconfigured models that can be used on a variety of door types straight from the box. These preconfigured models are listed below. Each model is fully customizable through the use of the LMI G-Force Utility configuration software (see Section 4).

Note: **To set up a model for liftgate or deck lid testing, the Door Name must begin with LG.** This places that door in Liftgate mode, which utilizes a special algorithm to correctly measure travel through an extended arc.

Model Name	Door Name	Velocity Algorithm	Difference and Default Use
MD1	DF	100Hz Peak	Reports peak velocity at a sample rate of 100Hz. Recommended for most doors.
MD2	DF	200Hz Peak	Reports peak velocity at a sample rate of 200Hz. Recommended for smaller doors or use with short closing distances.
MD3	DF	400Hz Peak	Reports peak velocity at a sample rate of 400Hz. Useful when using as a go/no go gauge on an assembly line.
MD4	DF	100Hz V@d	Reports velocity at a default distance of 100mm with a sample rate of 100Hz.
MD5	DF	200Hz V@d	Reports velocity at a default distance of 100mm with a sample rate of 200Hz.
MD6	DF	400Hz V@d	Reports velocity at a default distance of 100mm with a sample rate of 400Hz.
MD7	LG1	100Hz Peak	Used for liftgates and deck lids that are open past the balance point of the hinge.
MD8	LG1	200Hz Peak	Used for balance point closures of liftgates and deck lids.
MD9 SLDR	SLDR	100Hz Peak Slider Enabled	Reports velocity of the push at a 100 Hz sample rate on a sliding door 10mm from the latch position. Sample time of 2.5 sec.
MD10	DF	100Hz Peak	Reports peak velocity at a sample rate of 100Hz. Recommended for most doors.

3.4 An Explanation of Sample Rates

When selecting and/or configuring a model, the user has a few different choices with regard to sample rate. For the majority of door closing applications, LMI recommends using 100Hz Peak or Closing. Lower sample rates provide more time to complete the test, meaning the door can be open wider and the push can be slower without getting a *buffer full* message. The *buffer full* message simply means the door did not hit the striker in the time allotted to complete the test. If using 400Hz or 200Hz, lower the sample rate down to 100Hz. If already set to 100Hz, the user needs to push the door a little harder to finish the test within 3.5 seconds or try the 50Hz sample rate (only available in firmware 10.24 and greater).

The sample rate is an inverse relationship between the time available to complete a test and the amount of time between each sampled measurement point along the transit of the door. Lower sample rates will result in more time to complete the test. With the sample rate set to LMI's recommendation of 100Hz, the test will have 3.5 seconds for completion, from the start of the push to the striking of the latch. At 200Hz, this time is halved to 1.75 seconds and halved again at a sample rate of 400Hz.

LMI only recommends using the 200Hz and 400Hz sample rates on small doors that do not open far, such as glove boxes, aircraft panel doors, etc.

3.5 The Difference Between Peak and Closing Velocity

Peak Velocity measures the highest velocity reached throughout the test.

Closing Velocity measures velocity at a chosen distance away from the latch of the vehicle. The chosen distance cannot be greater than the total length of the distance from the door at start position to the closed position.

LMI recommends using Peak velocity unless the user is trying to match a legacy system that captured a measurement at a set distance away from the striker plate.

3.6 Charging the LMI G-Force

The G-Force contains a rechargeable lithium-ion battery that can send approximately 4000 readings when fully charged. The G-Force can be charged through the included AC adapter and USB cable or via PC using included USB cable. The G-Force will always be ready for use if charged after or in-between shifts. A dead battery requires approximately 4 hours to fully charge.

Note: The include AC adapter has several face plates for use in countries with different supply voltages. Please use the correct plug adapter for your country.

Note: If using the BLE wireless dongle with the G-Force, is it important to unplug the dongle in between shifts to preserve battery life within the G-Force.

3.7 Mastering Statement

The LMI G-Force comes calibrated from the factory. There is no need for the user to perform calibration on the G-Force. This calibration is stored in the microprocessor of the gauge, even if the battery is removed or replaced.

Calibration of axes ensures the accuracy of all 6 axes (+/-x, +/- y, +/-z) relative to the earth's axis. Calibration consists of reading and storing the offsets and sensitivities for each axis. The offset is the reading from a channel when that channel is in the zero gravity field (perpendicular to the earth's surface). Then each axis is put parallel to the earth's surface in both the +1g and -1g orientation to capture the sensitivities.

Calibration can be verified by pressing and holding the Up button for three seconds, then pressing the Center button. This starts an "All Axes Test." Hold the gauge steady at any angle and verify that A is within +/- .02 of 1.00g. Press the up button to return to the default screen.

The load sensor can be verified by placing a 1kg and/or 5kg certified weight on the sensor

To view live readings of the load cell, press and hold down the center button on the G -Force for three seconds and then press the up arrow button.

The difference between the loaded and unloaded reading should be the weight of the tested certified weight. For example, if the cell shows 0.2 when unloaded, then it should read 5.2kg when a 5kg certified weight is place on the sensor.

Press the up arrow to exit the live readings screen.

Section 4: G-Force Utility Software

4.1 G-Force Utility System Overview and Requirements

The LMI G-Force Utility is a software program that allows users to connect and disconnect the G-Force, edit and save gage parameters, and edit model information.

Additionally, the software will allow users to load custom configurations, view live readings, download velocity/force curves, collect and report basic closure data, and adjust gauge parameters for each of the ten models within the G-Force gauge.

User Requirements:

- Administrative rights on an administrative account are required for installation purposes.
- Basic Read/Write User Rights are necessary for application use.
- Access to at least one USB port on the PC.
- Microsoft Excel must be installed on the PC.

Minimum Computer Requirements:

- Operating System: Windows 10
- Screen Resolution: 1024x768
- Memory: 8GB
- Processor Speed: Intel I5
- USB Port: 1

Recommended Computer Requirements:

- Operating System: Windows 10
- Screen Resolution: 1920x1080
- Memory: 16GB
- Processor Speed: Intel I7
- USB Port: 1

NOTE: The G-Force and G-Force Utility software will **NOT** work on operating systems earlier than Windows 10.

4.2 G-Force Utility License Agreement

The full EULA for LMI's G-Force Utility software can be found when installing the software. You must agree to the EULA before installation can be complete. If you wish to review the EULA after installation, it can be found by clicking on the Information icon on the utility's home screen and then clicking the link titled *Download Software Agreement*.

4.3 G-Force Utility Installation

The G-Force Utility software can be found on the USB drive that shipped with your G-Force or from our website. **The user must have administrator credentials and be logged in under an administrator account on the PC for proper installation.** Double-click on the installer and follow the screens below:
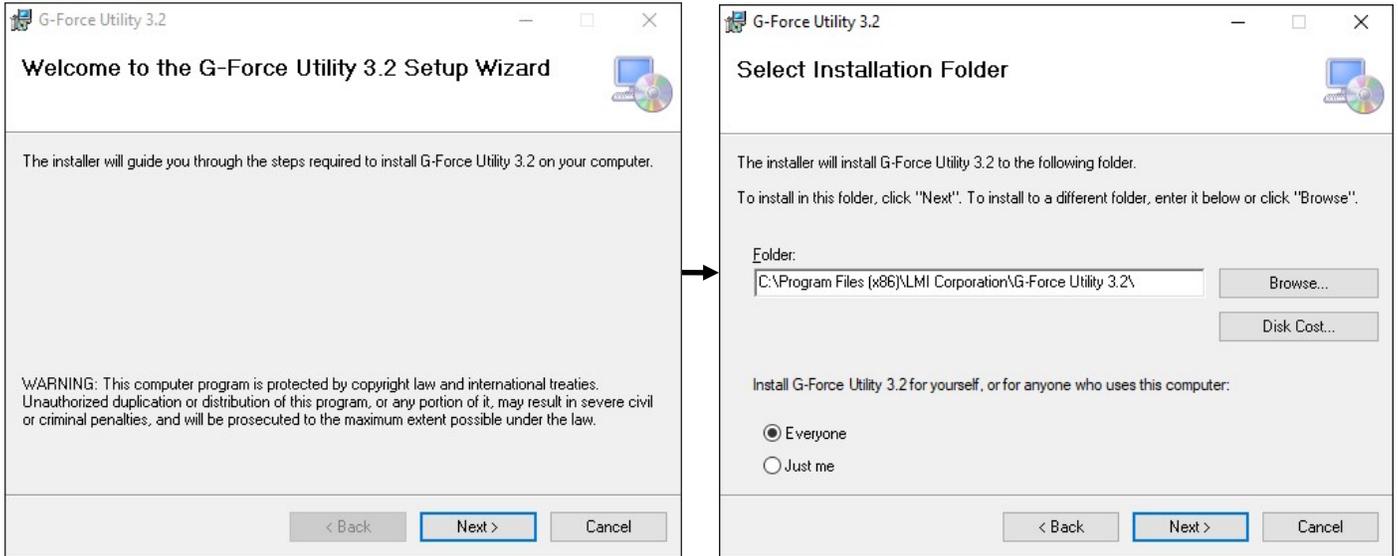
Note: LMI highly recommends installing for *Everyone* and leaving the default folder selected when installing.
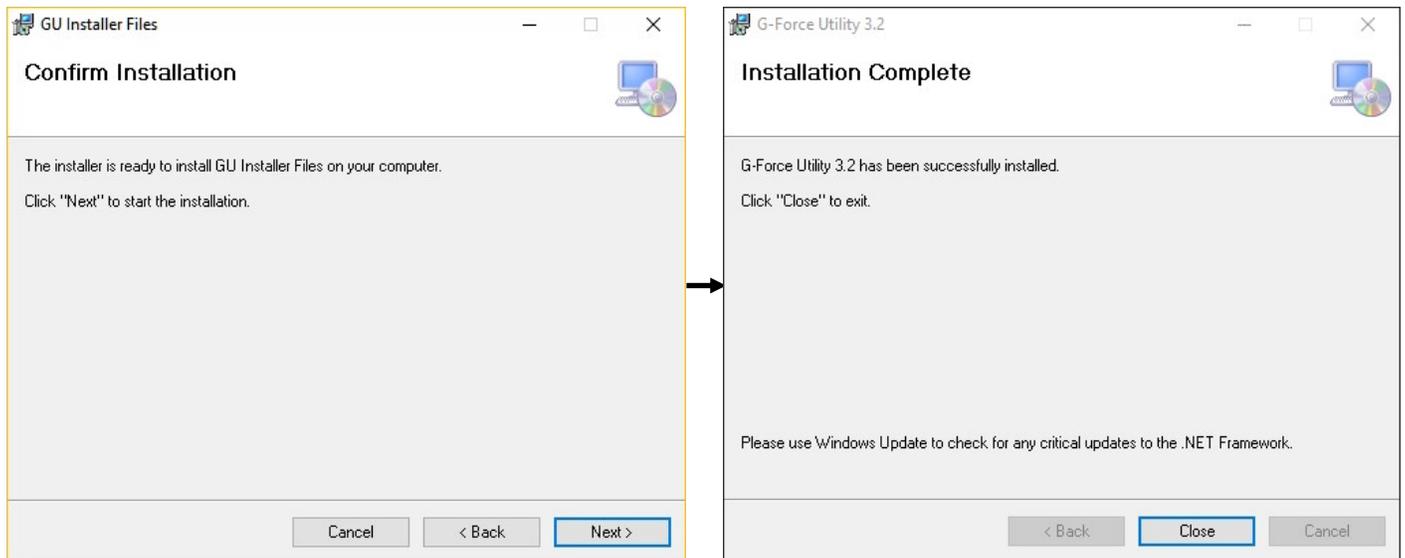
After the G-Force Utility is installed, either connect the G-Force to the PC via the included USB cable (recommended) or plug the LMI BLE dongle into a COM port on the PC.

4.4 G-Force Utility Operation

The G-Force Utility software allows the user to update models, download curves, and associate the G-Force to a LMI BLE dongle.

There are two ways connect to the G-Force Utility software: wireless via the LMI BLE dongle or through the included USB cable. **Settings updates, model updates, and chart downloads are only available when connected through the included USB cable.** When connected wirelessly through the LMI BLE dongle, the user has the ability to send readings to Excel and manage connections to the dongle (See Section 5 for more information on the using the BLE dongle).

Note: Before updating models, please ensure that you have rights access for the USB ports on the PC running the G-Force Utility.

4.5 Connecting the G-Force

To begin the connection process, plug the G-Force into the included USB type-C cable and a USB port on the computer running the software. *USB* should appear on the display of the G-Force. If the G-Force is off or asleep, press the center button to wake it up. It should be on the Test Start screen. Double-click the G-Force Utility icon to start the program.

The Wireless Base Information screen will pop up and display the serial number of the connected G-Force under the Gauge List:
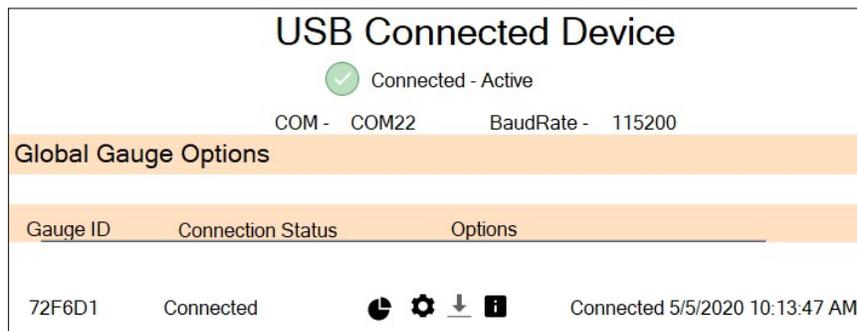
Gauge List displaying the connected G-Force

At the bottom of the screen, the following message will be displayed:

If the message is **not** displayed and/or the serial number does not show up under Gauge ID, verify that the display of the G-Force is on the Test Start screen and that *USB* is displayed on the screen. Hover over the Restart App button under Wireless Base Information. If it still does not display, press the Restart App button.

If the Gauge ID does not populate after this, unplug the G-Force and then plug it back in. The software will automatically scan the USB ports on the PC looking for the gauge.

4.6 Gauge Icon Menu

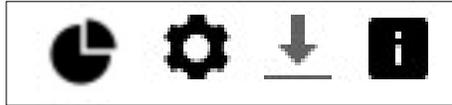When connected via USB cable, there are four icons that interact with the G-Force:

Chart Download: One-button download of a chart for velocity, force, distance, or acceleration.

Data Download: Allows the user to download any data collected when the G-Force is in Data Collection mode.

G-Force Settings: Allows the user to change global and per model/door settings within the G-Force.

Device Information: Provides connection and firmware information about the connected G-Force.

When connected via the BLE dongle, an additional three icons are available:

Refresh the Whitelist*: Used only with BLE Wireless Connection. Queries the Whitelist to find newly added devices.

Add G-Force to Whitelist*: Used only with BLE Wireless Connection. Adds a G-Force to the list of available devices.

Delete the Whitelist*: Used only with BLE Wireless Connection. Clears the list of available devices.

*For more information about using the wireless features of the G-Force, please consult Section 5.1 on page 19.

4.7 Chart Download

Charts can be downloaded by clicking on the Chart Download button under the Gauge List. Begin by taking a measurement and pressing the SEND (up arrow) button. The G-Force will store the data from the last measurement in temporary memory. Plug in the G-Force to the PC via the USB cable. After the software finds the G-Force, click the chart download icon. The curves will automatically download. If there is an issue with any of the charts, click on the download icon circled below:

The selected charts will then open up under their respective names. The user can then mouse over the chart to see the data at any point along the curve.
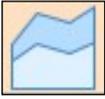
An overlay chart consisting of velocity and force over distance resides below the Velocity, Distance, and Force charts. This chart is automatically created when the Chart Download button is pressed.

G-Force Utility Chart Download Window

From the chart window, the user can also select from the following icons:

    Refreshes the chart data

    Opens the G-Force Configuration screen (see Appendix 3).

    Opens the G-Force Information screen.

    Minimizes the G-Force Charts window.

    Closes the G-Force Charts window.

4.8 Data Download

The G-Force can internally store up to 500 test results when in Data Collect mode. To download the data, place the G-Force in Data Collect mode and connect the device to the PC via the included USB cable. Open the G–Force Utility and click the Data Download icon. Choose to download the data as either a text file or an Excel file. The red number in the lower right hand corner of each icon displays the number of records the G-Force has collected. After downloading the data, click on the Erase Records icon to erase the data from the G-Force. This process takes around three minutes to complete.

Please Choose a Download Action:

TXT 7   X 7

☐ Erase Records

-
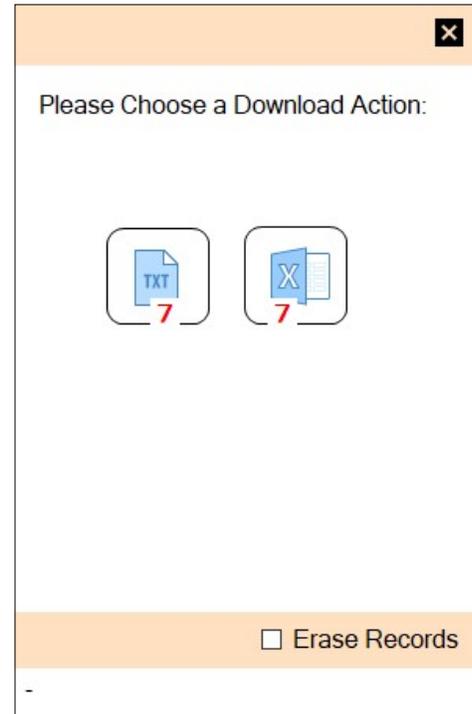
4.9 G-Force Settings

Click the Settings button to open the G-Force Settings page. Icons for gauge information, resetting the gauge information, and syncing the system clock to the G-Force are at the top of the window. Tabs for Gauge information, Gauge Settings, Models, and Options are on the left side of the window.

Gauge Information displays information about the currently connected G-Force:

G-Force Settings

Gauge Type: G-FORCE   **Measure Mode:** Metric   **Mode:** Data mode <OFF>   **Battery Status:** Full

| Gauge Information | Gauge Settings | Models | Options |

Device Info

Gauge Label	******
Gauge Model	72F726
Gauge Time	January 07, 2020 11:00:46 AM

Device Settings

Unit	m
Time Out	5
Gauge Mode	Data Collect
COM Mode	N/A
Work Label	j (joules)

Gauge ID: 72F726

Firmware Version	6.5
Firmware Date	Dec 11 2019
Radio Version	v1.0

✓ All Gauge Settings loaded correctly.

Gauge Settings allows the user to select global settings for the G-Force.
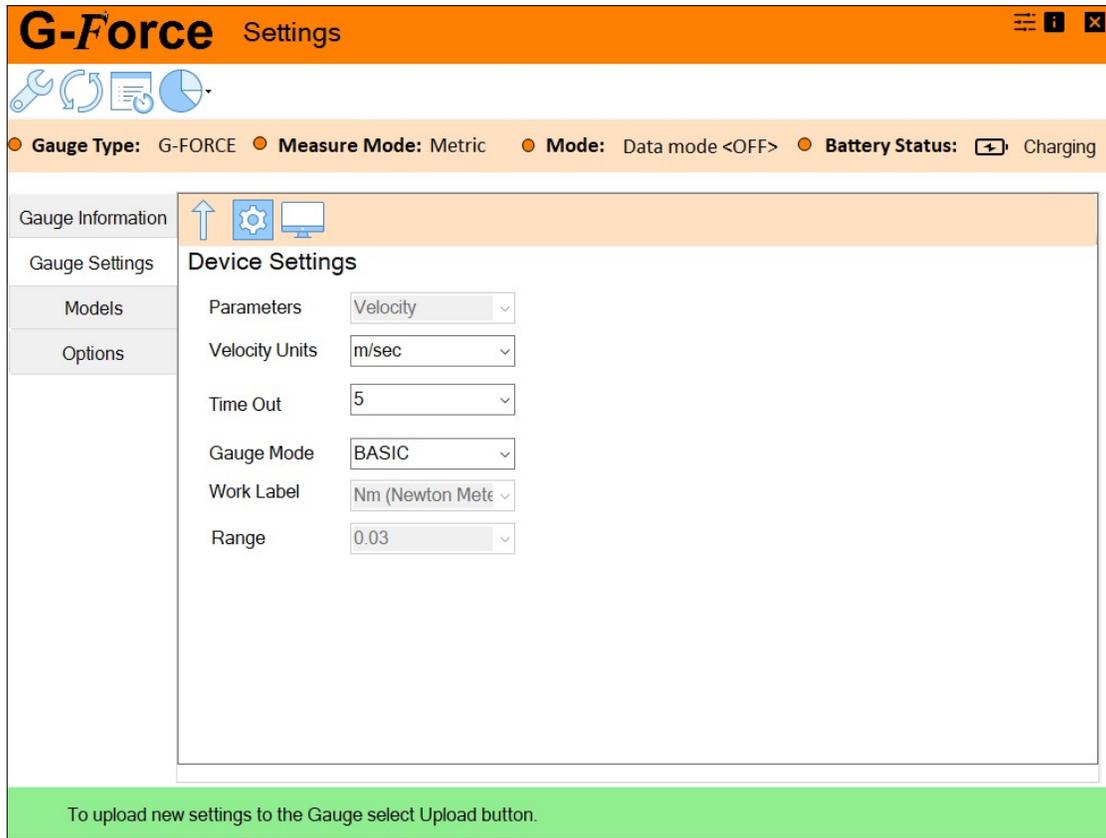
 Uploads settings to the G-Force.

 Loads factory default settings to the G-Force.

 Shows additional send and display options (see next page).

Parameters: Applies Upper Spec and Lower Specs to the chosen parameter. This will determine which algorithm the green/red (pass/fail) LED is applied to after a measurement is completed.

Velocity Units: Choose between meters per second or feet per second.

Time Out: Sets the amount of time before the G-Force will shut off if not used.

Gauge Mode: Allows the user to choose between one of four gauge modes within the G-Force. This can also be toggled from the menu screen on the G-Force.

Work Label: Chose between Joules (J) or Newton meters (Nm).

Range: Sets the acceptable difference between highest no close and lowest close for successful test when in Auditor Mode. See Appendix A for more information.

The following settings appear if the Display Options icon is activated.
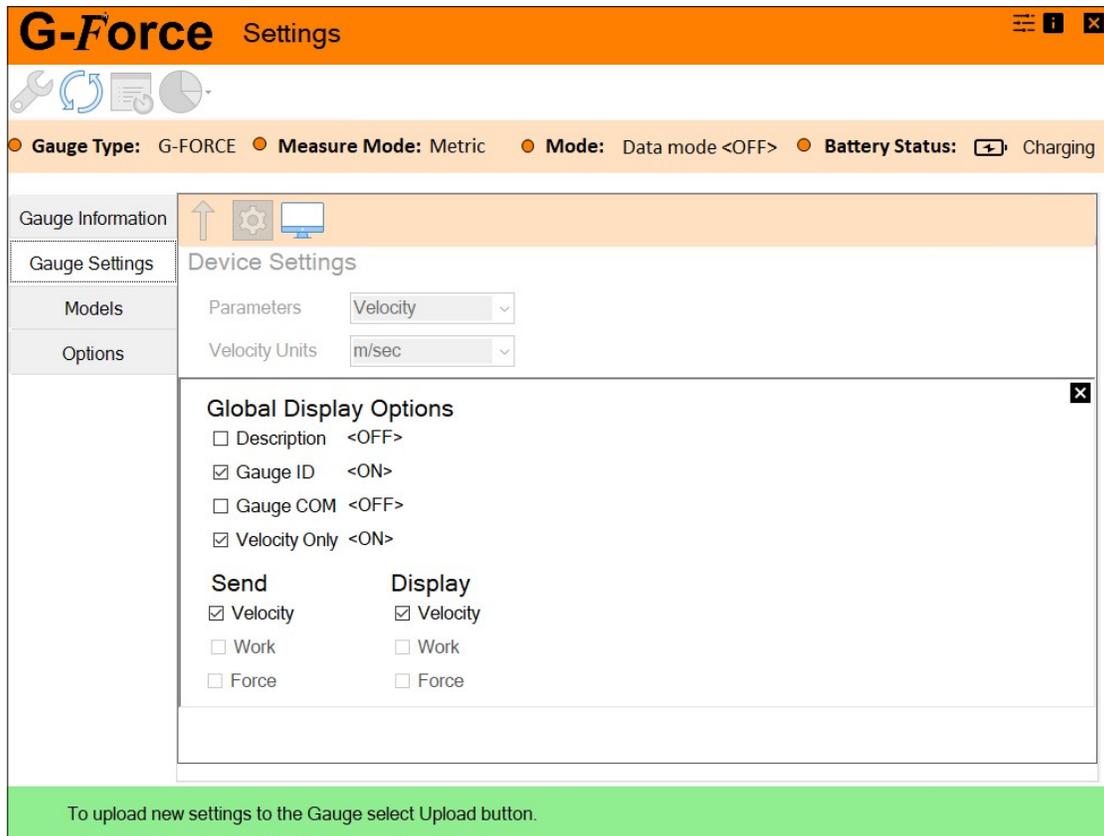
Description: Chose whether or not to send the Door Description (DF, DR, etc.) before the measurement value(s).

Gauge ID: Chose whether or not to send the Gauge ID after the measurement value(s).

Gauge COM: Used with UGI Lineside or Barcode Inline systems for two way communication between a line system/barcode system and the G-Force. Contact sales@lmicorporation.com for more information about inline mode.

Velocity Only: Toggles the velocity only feature on or off. See Section 3.1.

Send: Chose one or more values that will be transmitted when the user presses the SEND button at the end of a test. All three are displayed by default.

Display: Chose one or more values to display at the end of a test. All three are displayed by default.

The desired settings can then be uploaded to the gauge by closing the Global Display Options window and pressing the up arrow icon. To restore the default G-Force settings, click on the gear icon.

The **Models** section allows users to rename, reconfigure, and set spec limits for the G-Force.
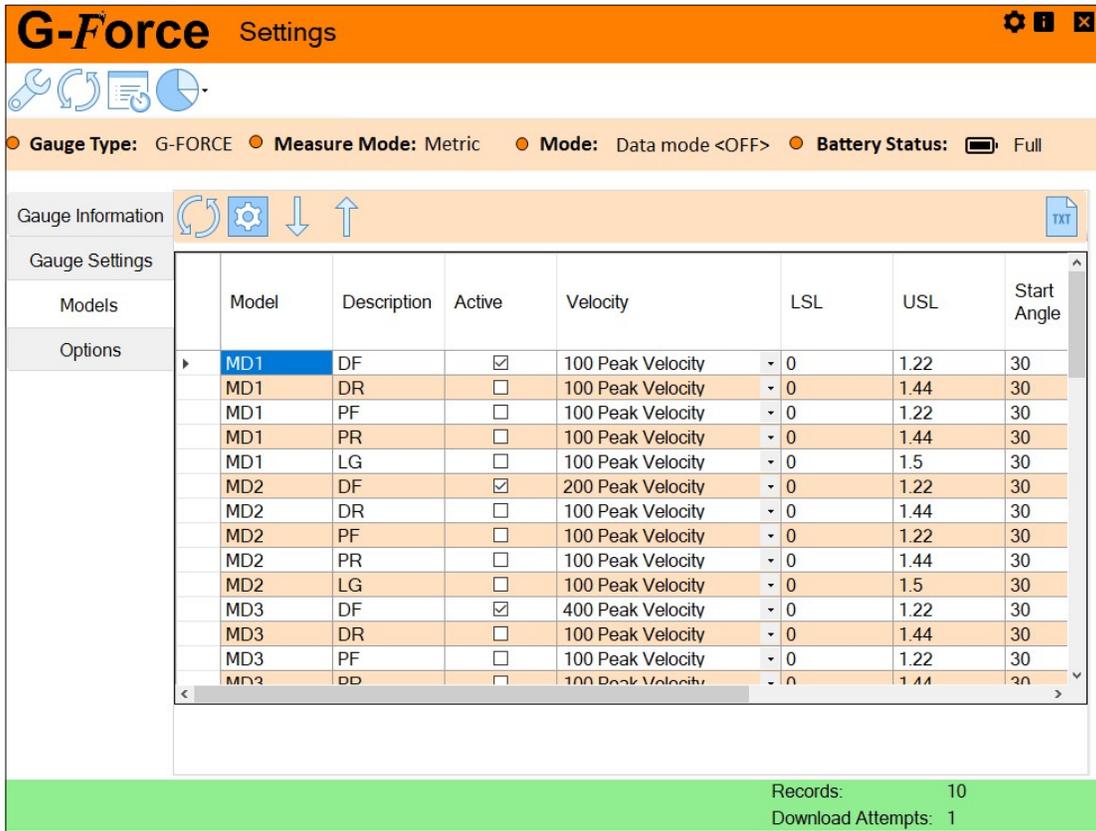
Model: Allows the user to change the model name (up to five characters) for any (or all) of the ten models within the G-Force.

Description: Four-character door name. To place the door in slider mode (used for sliding doors on vans), the door needs to be named SLDR. To set up a door as a liftgate, the door description must begin with the characters LG.

Active: Selects whether or not a door is included in the model. By default, the first door of each model must be activated.

Velocity: Provides choices between 50Hz, 100Hz, 200Hz, or 400Hz sampling rates for both peak and closing velocity. *Peak* reports the peak velocity achieved when performing the test. *Closing* reports the velocity at a distance from closed, set in the Velocity @ Distance column.

LSL/USL: Sets the spec limits for each door. Any reading that falls between the upper and lower spec limits will trigger a solid green LED at the end of the test. Any reading falling outside the spec limits will trigger a solid red LED at the end of the test.

Start Angle: Sets the angle at which liftgate test will automatically start. Only used in liftgate or deck lid tests. If manual start of the test is desired, set the angle to 180. The test will then begin when the user presses the start button.

Velocity @ Distance: When using a closing velocity algorithm, this reports the velocity at a distance from the full door closure to report the measurement. For example, if this field is set to 50, the G-Force will report the velocity when the gauge was 50mm from the fully closed position of the door.

Distance to Hinge: Input for the distance from the hinge to the G-Force.

The **Options** tab allows user name configuration when in Data Collection Mode. See Appendix B for details.

Section 5: Wireless BLE Connection to G-Force Utility

While setup and chart transfer require a wired USB connection between the G-Force and G-Force Utility software, there are a few things the user can do when connected via the BLE dongle.

Please note that when using the BLE dongle to communicate wirelessly, the G-Force should <u>not</u> be connected to the PC via the USB cable at the same time. Doing so can create communication issues between the software and G-Force. Begin by plugging the included LMI BLE dongle into a USB port on the PC and double-click the G-Force Utility icon to start the software.

The G-Force comes pre-paired to the BLE dongle, which should automatically appear under the Gauge List.

Once the G-Force appears in the list, it needs to be connected. To connect the G-Force, place the gauge in Setup Mode by pressing down the center button for three seconds (the LED will briefly go out) and then press the down arrow. From the menu, press the center button again to get into Setup Mode. The LED will begin flashing blue. The software should now indicate the gauge as Connected instead of Paired, as shown below:

The G-Force should still be in Setup Mode with a flashing blue LED. Press and hold the center button to exit from Setup Mode. From here, the user can download chart data and view the charts themselves.

5.1: Gauge Icon Menu for BLE Connection

Refresh Whitelist: Used only with BLE Wireless Connection. Queries the Whitelist to find newly added devices.

Add G-Force to Whitelist: Used only with BLE Wireless Connection. Adds a G-Force to the list of available devices.

Deletes Whitelist: Used only with BLE Wireless Connection. Deletes any saved G-Force IDs within the dongle.

Connection Status: One-button download of a chart for velocity, force, distance, or acceleration.

G-Force Settings: Allows the user to view the information from the connected G-Force. **<u>Note:</u>** The user cannot upload global parameters or update models via the wireless connection.

Section 6: Data Collection with Universal Gauge Interface

Preface: This section only covers the most basic partfile a user can create in UGI. If trace fields, a customized export, two-way communication, etc. are required, please consult the UGI Manual that shipped with the UGI software. **NOTE:** The Door Description on the G-Force must be turned OFF in order to send readings into UGI.

There are five required steps that must be completed to create a partfile for use with the G-Force. Begin by plugging in the dongle and then double-clicking the UGI icon and then click the **Create a Partfile** button.

Step 1: Partfile Name and Save:

In this screen, the user must give the partfile a name under the **Partfile Name** field and choose a location for the partfile to be stored by clicking the Browse button to the side of the **Partfile Location** field. A new window will open up asking the user to select a location for the partfile. To store the partfile in the default location, simply click OK on the browse window. While the user has the choice to store the partfile anywhere on the PC or network location, LMI strongly recommends leaving it in the default folder. Press the Next button in the upper left hand corner of the window to move to Partfile Gauges.

Note: The fields shown in the columns below are specific to the G-Force. The additional columns to the right of the COM Port column will need to be set up as well. Please reference the UGI manual for addition information and setup of the USL/LSL, UCL/LCL, HR/LR, and active columns. Mux Port, Span, Invert, and Frequency columns do not apply to the setup of a G-Force partfile.

Note 2: The number of outputs chosen in UGI **MUST** match the number of outputs on the G-Force. For example, if the user wants to see only force and energy, but the G-Force is set to transmit velocity, force, and energy, it will not work.

In this step, the user sets up how many doors will be measured per vehicle and how many of the three outputs will be collected. For example, if the user only wants to capture Work (energy) for one door, the setup would look like the following:

Navigation

Required Steps:
Partfile Name and Save
Partfile Gauges
Partfile Graphics
Partfile Inputs
Partfile Exports

Number of Gage Points: 1

	Characteristic	Description	Component	Gauge Type	Association	Calculation	Mux Port	COM Port
1	DS	72F726		G-Force-1			N/A	5

If collecting both Velocity and Work on the driver's side front door, the setup would look like the following:

Navigation

Required Steps:
Partfile Name and Save
Partfile Gauges
Partfile Graphics
Partfile Inputs
Partfile Exports

Number of Gage Points: 2

	Characteristic	WGID	Component	Gauge Type	Association	Calculation	Mux Port	COM Port
1	DS V	72F726		G-Force-1	Row 2		N/A	5
2	DS W	72F726		G-Force-2	Row 1		N/A	5

Note that if collecting two output types from the G-Force, the first row will use the **G-Force-1** Gauge Type and the second row will use the **G-Force-2** Gauge Type. The Association column must also be filled out, connecting the first output row (velocity) with the second output row (work).

If collecting velocity, force, and work, then all three rows must use the **G-Force-All** Gauge Type. Note that the order of transmission will be velocity, force, and work if sending over all three readings. The Association column will be left blank:

Navigation

Required Steps:
Partfile Name and Save
Partfile Gauges
Partfile Graphics
Partfile Inputs
Partfile Exports

Number of Gage Points: 3

	Characteristic	Description	Component	Gauge Type	Association	Calculation	Mux Port	COM Port
1	DS V	72F726		G-Force-All			N/A	5
2	DS F	72F726		G-Force-All			N/A	5
3	DS W	72F726		G-Force-All			N/A	5

Additional doors should be added in the order in which the operator will collect the data (e.g., DF, DR, LG, PR, PF). Press the Next button in the upper left hand corner of the window to move to Partfile Graphics. Below is an example of a coupe routine, where DS denotes *driver side* and PS denotes *passenger side*:

Number of Gage Points: 6

	Characteristic	Description	Component	Gauge Type	Association	Calculation	Mux Port	COM Port
1	DS V	72F726		G-Force-All			N/A	5
2	DS F	72F726		G-Force-All			N/A	5
3	DS W	72F726		G-Force-All			N/A	5
4	PS V	72F726		G-Force-All			N/A	5
5	PS F	72F726		G-Force-All			N/A	5
6	PS W	72F726		G-Force-All			N/A	5

Step 3: Partfile Graphics

Place the graphic(s) that best represent the vehicle to be measured in the **C:\Program Data\LMI Corporation\Graphics** folder. Click on the Image Icon in the menu bar and then select the graphic to use in the routine. The font size can also be increased for ease of viewing by clicking on the Font Icon in the menu bar.

Click and drag the white boxes onto the image. To switch the places of the box and characteristic name, double-click on the box. Below is an example of a coupe that will have velocity, force, and work collected for the driver and passenger doors.
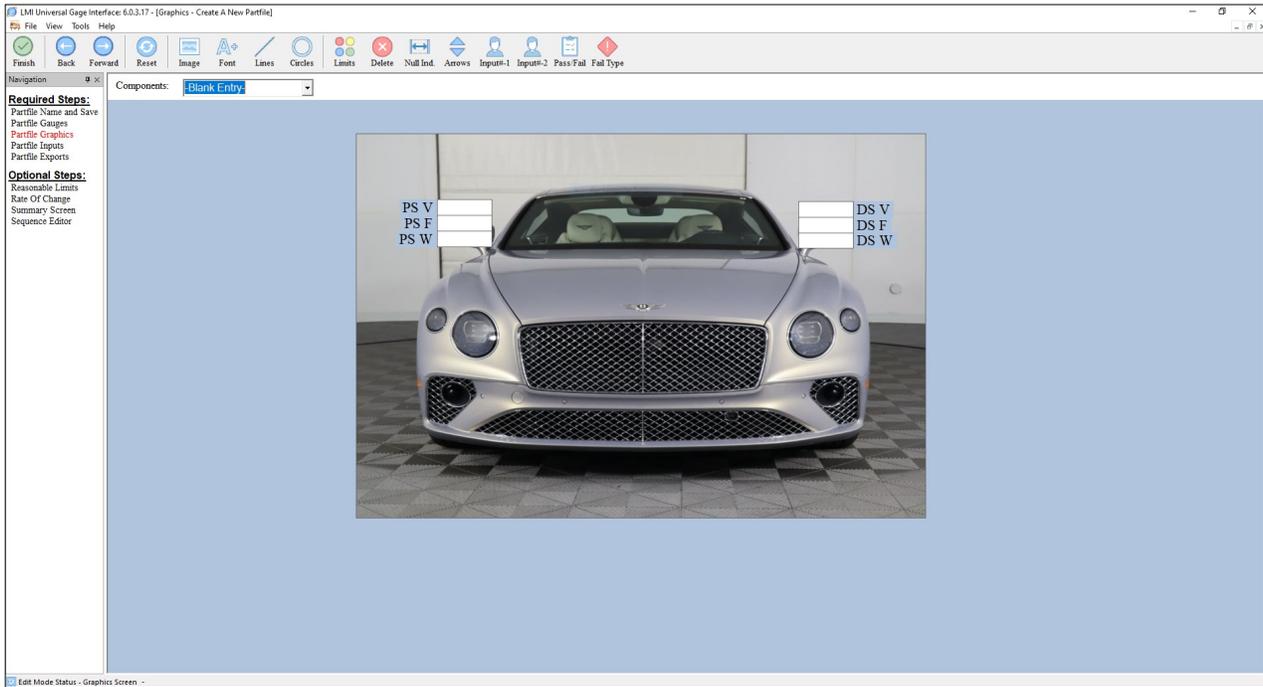
Click on the Next icon in the upper left hand corner to continue to Partfile Inputs.

Step 4: Partfile Inputs:

The Partfile Inputs page is where trace inputs (non-measurement data such as operator name and shift) can be added to the partfile. This routine will not have any trace inputs, but full instructions for adding inputs can be found in the UGI manual that shipped with the software. Click on the Next icon in the upper left hand corner to continue to Partfile Export.

Step 5: Partfile Export:

The Partfile Export page is used to configure the data export format for all trace and measurement data. In this example, a pre-configured .txt output will be selected. Additional information for customizing an export can be found in the UGI manual that shipped with the software.

Choose a location on the PC where the data file will be written by clicking on the ellipsis (…) to the right of the Export Location field. Next, enter a name for the data export in the Export Name box (e.g., Coupe Closure Data). After that, click on the drop down to the right of the Export Name box and choose .TXT as the export format.
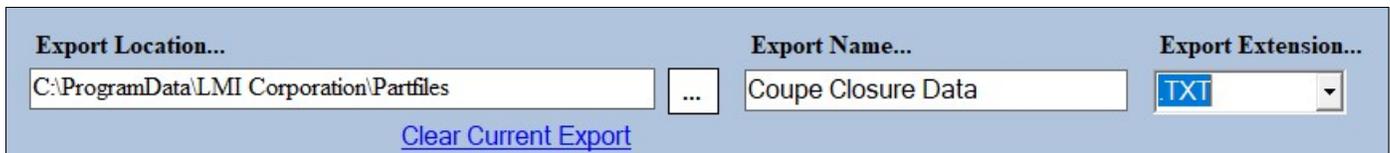
Step 5: Partfile Export: (...continued)

If a separate export file is needed for each vehicle, a checkmark can be placed in the Export Unique File box; otherwise, newly collected data will append to the same file.

To complete the partfile, click on the Add Export button in the lower right hand corner of the partfile and then click on the Finish button in the upper left hand corner of the window. Choose Yes to Save the partfile.

Running the Partfile

Check to make sure the LMI BLE dongle is plugged into the COM Port selected in Step 3. If it is not, close down UGI, plug in the dongle, and then restart UGI.

From the main menu, choose **Run A Partfile**. Click on the Browse button to navigate to the location where you saved the partfile in Step 1. Double-click on the partfile to select it, then click the Run button at the bottom of the page.

Place the G-Force in Setup mode by pushing and holding the center button on the G-Force down for four seconds, then push the down arrow. From the SETUP MODE in the Selction Menu, push the center button. The green flashing LED should now be flashing blue. Press and hold down the center button to exit setup mode.

Note: If Setup Mode is not entered before the first measurement is taken, the G-Force will connect when the up arrow is pressed to send the first reading. The first reading, however, will not populate the box in UGI and must be retested.

Place the G-Force on the vehicle door, open the door, and press the center button (labeled onscreen as START) then push the center load button to take the test. Press the up arrow to send the reading(s) to UGI or press the down arrow to retake the test.

Section 7: Barcode-Driven Inline Data Collection System

This section covers the use of a barcode scanner to drive data collection on moving assembly lines. Inline systems require a minimum of **G-Force firmware 10.1 or higher** and **UGI version 6.3.1.30 or higher**. Contact LMI Corporation to integrate the Barcode-Drive Inline Data Collection System.

7.1 Setup of G-Force Gauge in the G-Utility Software

The G-Force should be in Basic mode with the Description, Gauge ID, and Gauge COM boxes checked. If just one parameter is being collected, only check the box for the desired parameter. In this example, UGI is collecting both Velocity and Work results.
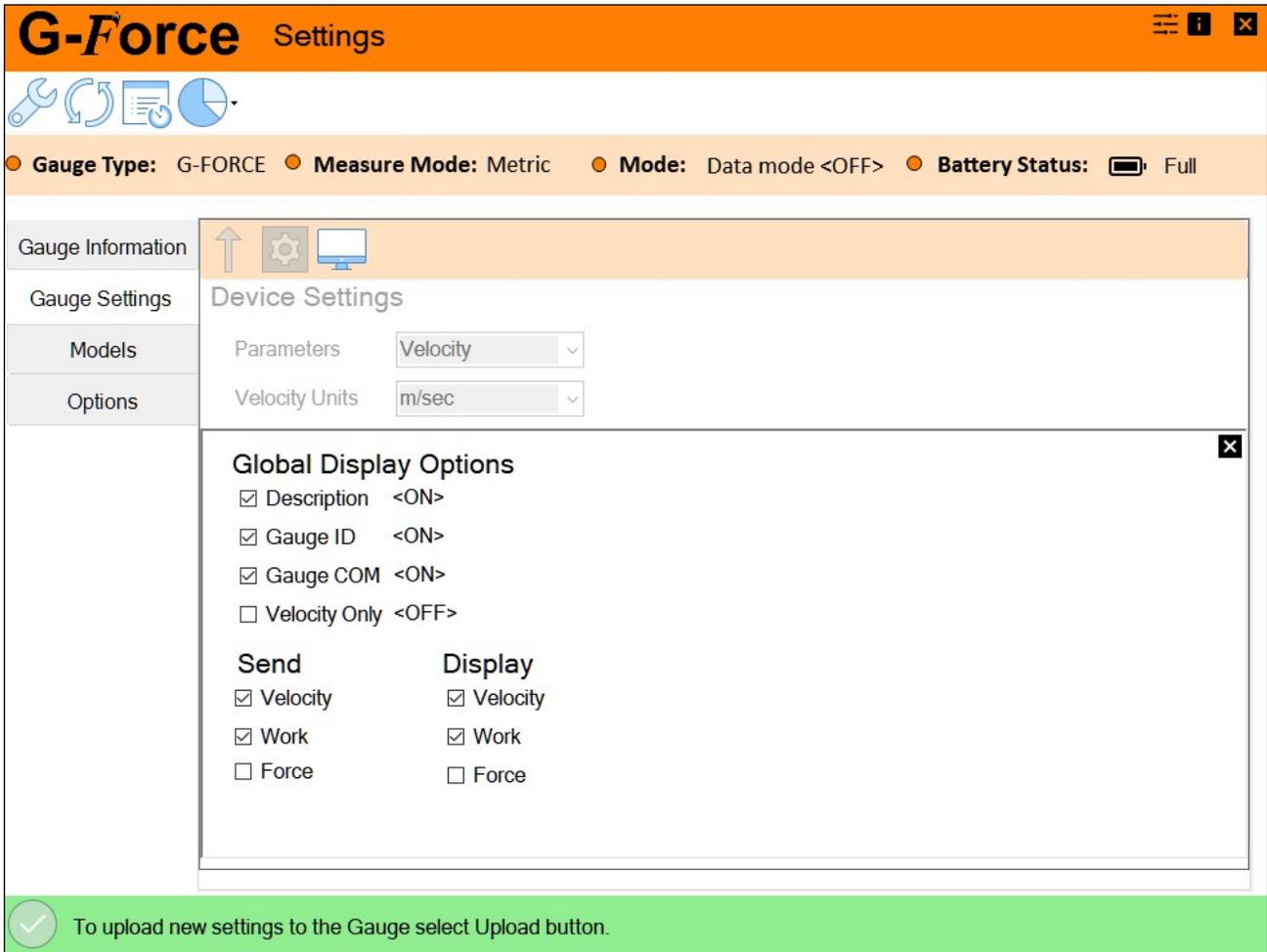
Once the boxes have been checked, close out the Global Display Options window and press the update icon in the Device Settings window. After the update completes, close down the G-Force Utility software.

7.2 Setup of UGI Masterfile—Gauge Settings

The Inline system will not work if UGI's Masterfile is set up incorrectly. To enter the Masterfile, open UGI and click on Tools > Preferences. When a prompt to enter a password appears, enter the password *admin* and click Enter on the keyboard.

Click on the Gauge settings tab and place checkmarks in ONLY the following boxes:

- Show Description Column/WID

- Show Component

- Show Association

- Show Test Speed and Type

- Show Start Angle

- Show V@D

- Show Distance from Hinge

- Active Gauge Door

Once checked, click on the blue checkmark in the bottom right-hand corner of the window and restart UGI. The user will now be able to create partfiles for inline application.

7.3 Setup of UGI Partfile(s)

After making the changes in the Gauge Settings tab of the Masterfile, the partfiles for the system can be created. Five steps are required to create a partfile: Partfile Name and Save, Partfile Gauges, Partfile Graphics, Partfile Input, and Partfile Export. Be sure to plug in the USB dongle before opening UGI. The dongle must always be present in order to collect data in UGI.

Partfile Name and Save

In this section, users must give the partfile a name and folder location. LMI recommends leaving the Partfile Location set to the default folder location at C:\Program Data\LMI Corporation\Partfiles.

Partfile Gauges

This section is where the individual doors to be measured are configured. Each row and column should be filled in with information pertinent to the particular door to be measured.

Characteristic: Four character max name of a door. LMI recommends using the first three characters to describe the door location and the last character to describe the measurement parameter. **Examples:** *LFDV* would translate to Left Front Door, Velocity; *RRDW* would translate to Right Rear Door, Work.

WGID: The Gauge ID of the G-Force that will be used with the system.

Component: Not applicable. Leave blank.

Gauge Type: If measuring only one parameter (e.g., velocity), choose G-Force-1. If measuring two parameters (e.g., velocity and work), choose G-Force-1 for the first row (velocity) and G-Force-2 for the second row (work). G-Force-All, G-Force-High, and G-Force-Low are not used with this system setup.

Association: If measuring two parameters, each row must be associated with the other to bind both readings to one button push on the G-Force. In the above example, LFDV and LFDW are collected at the same time, so Row 2 is selected for Row 1 and Row 1 is Selected for Row 2.

COM Port: This is the COM port the dongle is plugged into. If the dongle is plugged into a different port after the initial setup, this column will need to be updated to reflect that change.

USL/LSL: This determines the upper and lower spec limits for each door. Generally, the lower spec limit is left at 0.01.

Velocity: Chooses the algorithm to apply to the measurement. LMI recommends using 100Hz Peak for all doors, as it offers the greatest amount of time to complete the door test.

Order: The order in which the doors will be updated to the G-Force. The rows should be created in the order the doors will be measured. If capturing two readings, the rows that are associated must have the same order number.

Start Angle: If measuring a deck lid or liftgate, this is the angle at which the test will automatically start. This field can be left alone if only measuring standard vehicle doors.

V@D: When using Closing Velocity as an algorithm, this determines how far away from the latch the measurement will be reported. For example, to request the velocity at 100mm from fully closed, enter 100 in this field.

D to H: If measuring a deck lid or liftgate, this is the distance from the striker to the hinge.

Door Active: Determines whether or not the door will be uploaded to the G-Force for data collection.
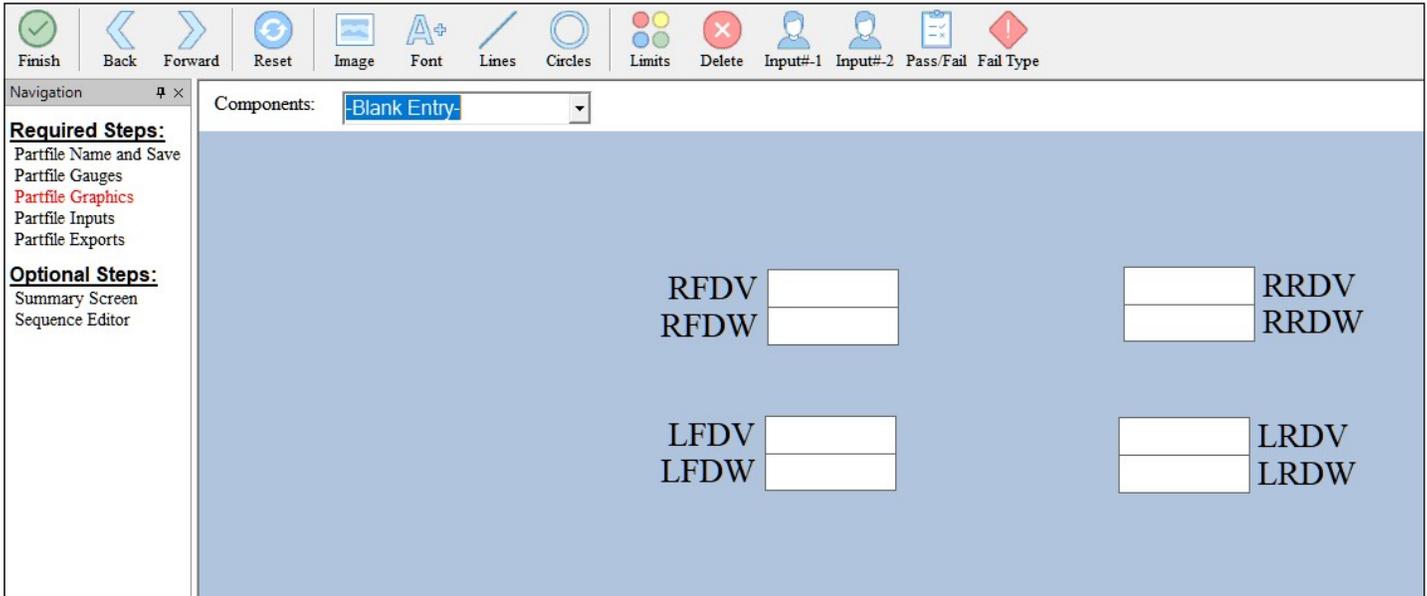
Partfile Graphics

This section allows users to lay out images and measurement boxes operators see when running the program.

Images should be placed in C:\Program Data\LMI Corporation\Graphics in .jpg or .png format.

Graphics Setup Walkthrough:

1. Move the image file into the Graphics folder found at C:\Program Data\LMICorporation\Graphics.

2. Click on the Image icon, select the graphic you wish to use, and click Open.

3. Double-click the image. When a thin black frame is around the image, users can resize it by clicking and dragging the corners. Clicking and dragging on the center of the image will allow you to reposition the image on the screen.

4. When you have the image sized and placed in the middle of the screen, click and drag one of the measurement point boxes to the corresponding point on your graphic. Double-clicking the box will flip the characteristic name from one side of the box to the other. Alternatively, if a particular area on the graphic is congested with several measurement points, use the Lines tool to extend more precise points to the boxes. With the Lines tool activated, click and hold on the point to be measured, and drag your mouse to the corresponding measurement box. When the cursor touches the measurement box, it will turn brown and the characteristic name will be italicized. Double-click the box to anchor the line to the box. After you do this, the line will follow the box.
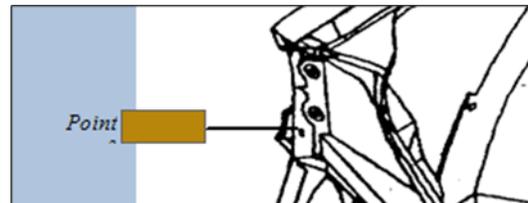
To remove an unwanted line, de-select the Lines tool, then click and drag to make a "box" around the line you wish to delete. The line should become dotted. Press Delete to permanently remove the line from the image.
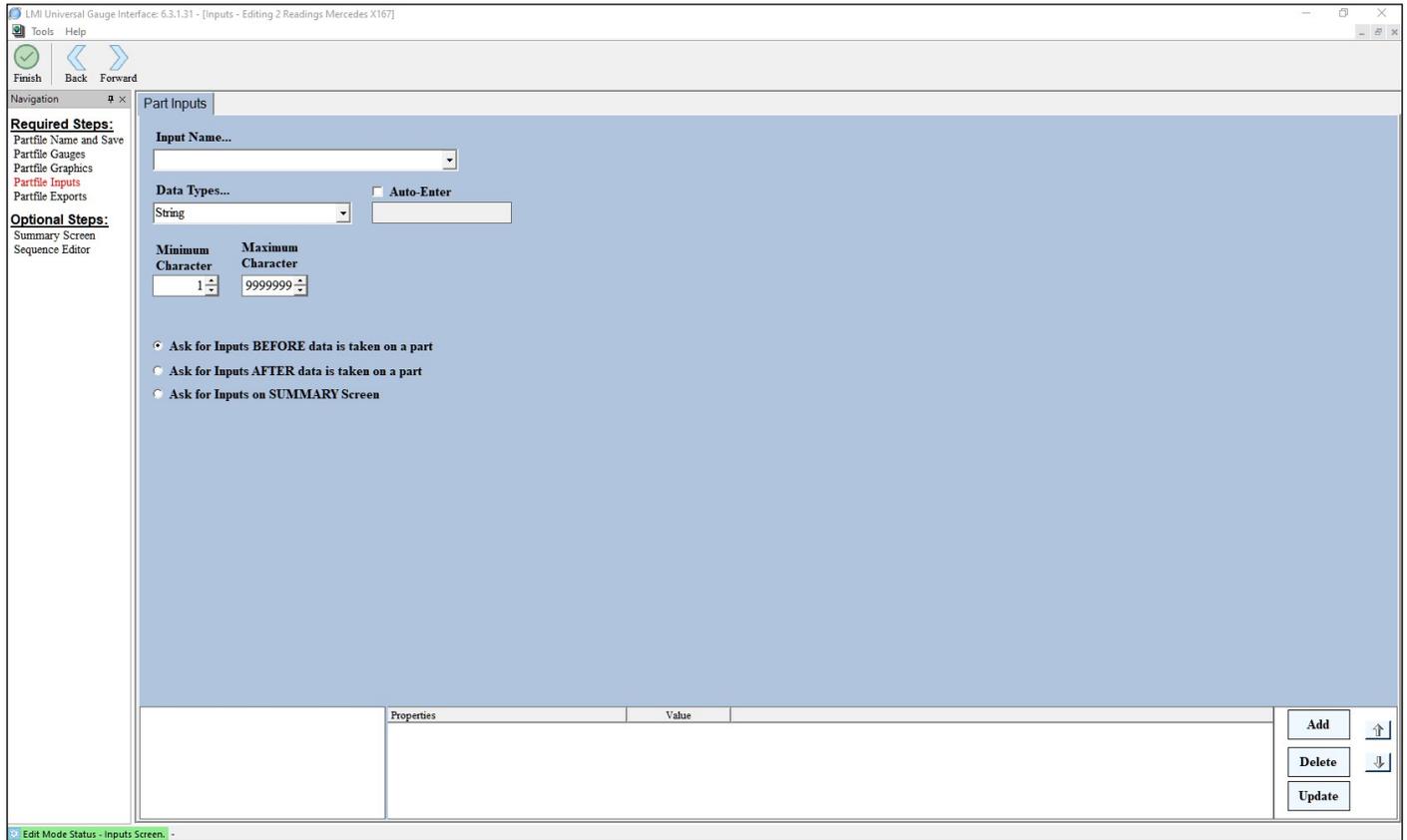
Partfile Inputs

Unless the user needs auto-entered fields for a particular export, Partfile Inputs are used for an Barcode-Driven Inline system.

To create an auto-entered input, click on the Input Name… field and then type in what needs to be added to the export. Click on the Auto-Enter box to check it, then click the Add button in the lower right hand corner. This input will now be selectable under the Field dropdown menu of the Partfile Exports page.

Partfile Exports

In this section, users set up the data export captured by the G-Force and UGI software. **Export Location**…, **Export Name**…, and **Export Extension**…, set up the data's storage location, the name of the data file, and the type of extension added to the data file.

Fixed Label – Any input entered as a Fixed Label will be static in the export, such as header information. Type the name of the attribute in the white box.

Field – Most items in the Field dropdown are dynamic, such as readings, trace input data, and date/time. Trace input data (set up on the Partfile Input page) will be prefixed with the word INPUT (e.g. – INPUT – Operator ID)

Delimiter – The delimiter separates each field and fixed label from one another. If you are using .CSV as your export, your primary delimiter should be a comma. If you are using any type of Excel-specific extension (.XLS, .XLM, .XLSX), use tab as your primary delimiter.

**Append Date to File** – Adds the date to end of Export Name.

Append Month to File – Adds the month to the end of the Export Name, which allows for a new data file to be created each month.

Export Unique File – Adds the Julian date to the end of the Export Name. This is based off the "system time" on the PC.

Export Only Valid Data – Will only write data to the file if all fields have been entered during the data collection process.

Save Copy of File – Will save a copy of the export file.

When finished creating the export, click on the Automatically Write Data checkbox and then click on Add Export. Click on the Finish icon in the upper left-hand corner and select Yes to save the partfile.
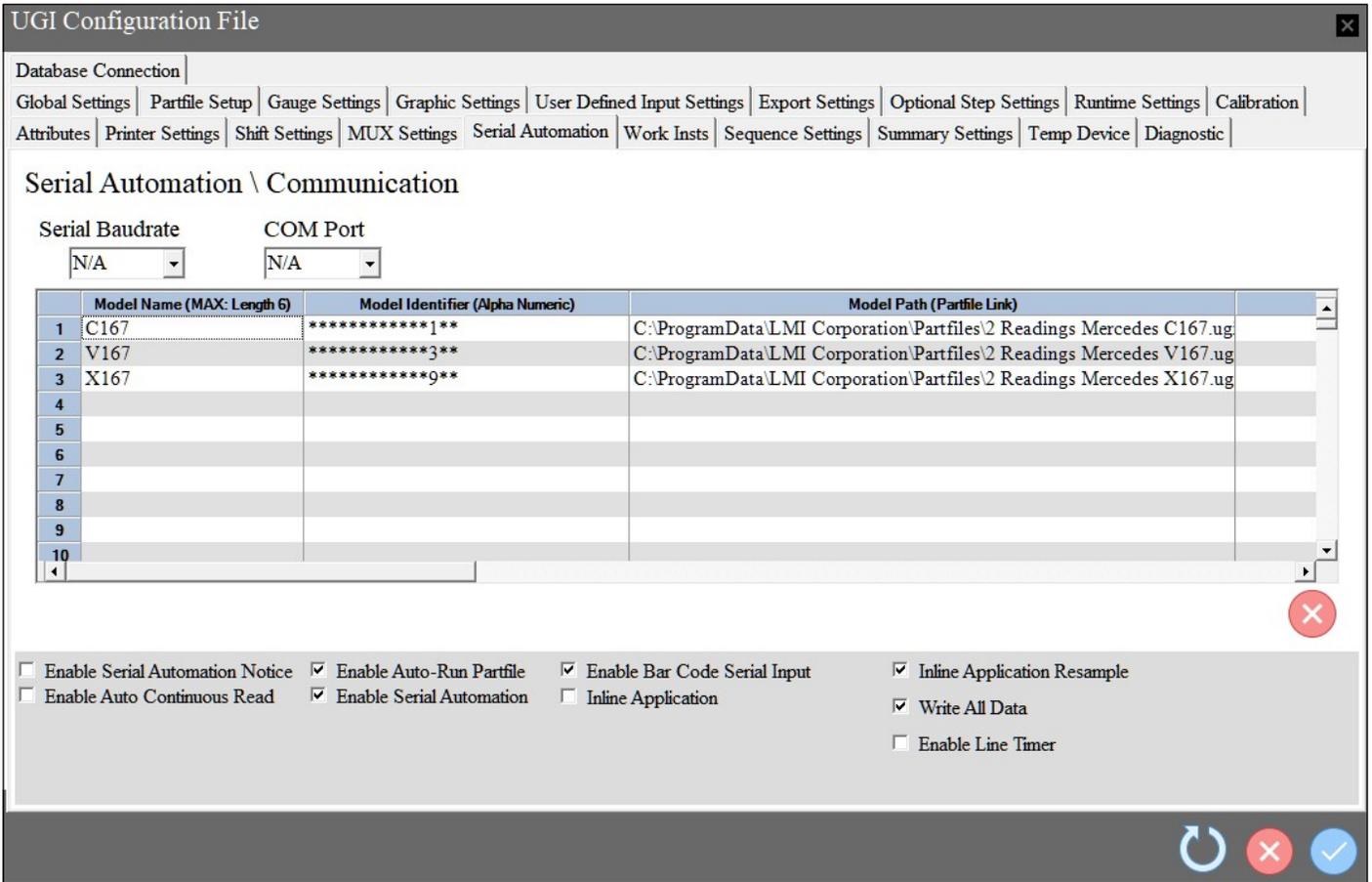
7.4 Masterfile—Serial Automation

Once partfiles are created, they need to be linked to a barcode mask in the Serial Automation tab of the Masterfile. To enter the Masterfile, open UGI and click on Tools > Preferences. When a prompt to enter a password appears, enter the password *admin* and click the Enter key on your keyboard. Click on the Serial Automation tab. There are three columns that must be filled out:

Model Name: Name of the model that will be uploaded to the G-Force when the barcode is read into the software. This field has a maximum of six alpha-numeric characters.

Model Identifier: This is where VIN masking is set up. Leave the digit(s) that call the model as a static number. All other variable numbers in the barcode should be replaced with asterisks. In the example above a 1, 3, or 9 in the 13th place will call the C167, V167, or X167 model respectively.

Model Path: Allows users to path to specific partfiles based on the Model Identifier. Each row should be pathed directly to the partfile that will be opened when the software reads the barcode.

Enable Auto-Run Partfile, **Enable Serial Automation**, **Enable Bar Code Serial Input**, **Inline Application Resample**, and **Write All Data** checkboxes must be checked.

Save Masterfile changes by clicking on the blue checkmark and then shut down the software.

7.5 Runtime

After the partfiles have been masked to barcodes, the system is ready for data collection. Double-click the UGI icon on the desktop. The home screen will appear with a barcode entry box in front of it:
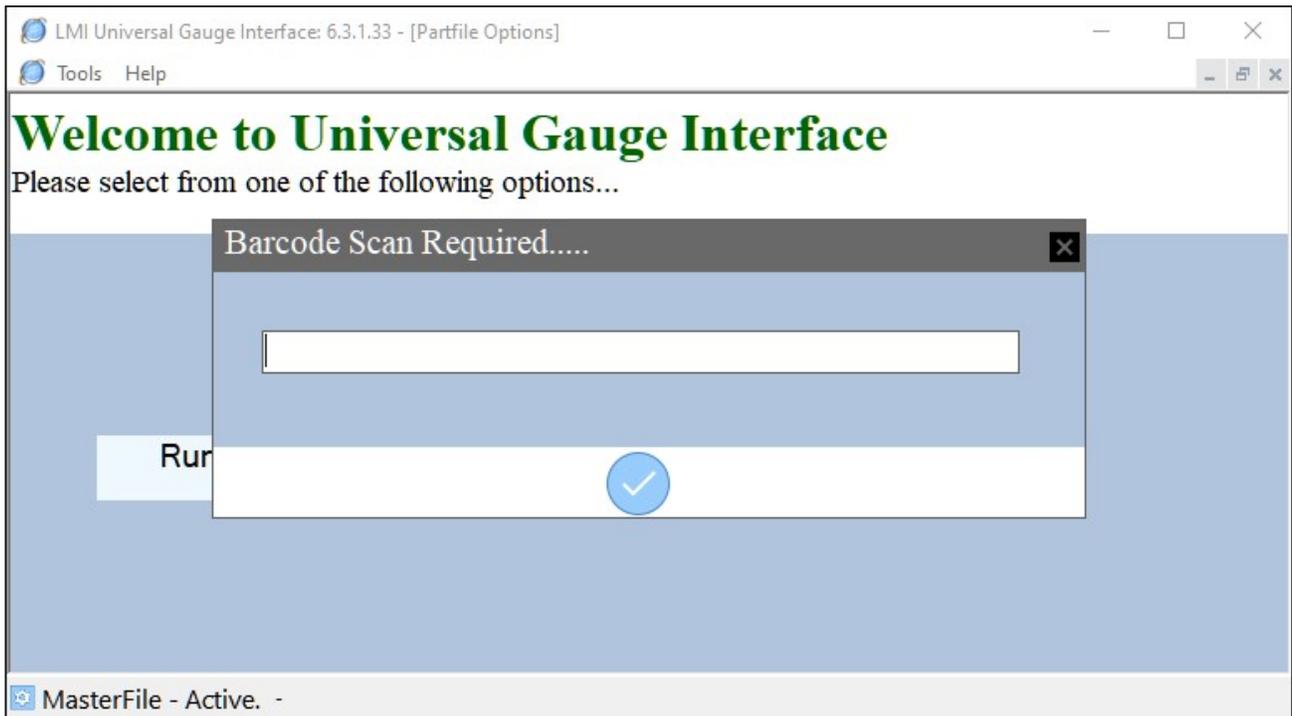
Scan the VIN/production code to pull up the partfile. After the partfile loads, UGI will send the model name and specs to the G-Force. Users can begin taking measurements when the model name changes on the G-Force.
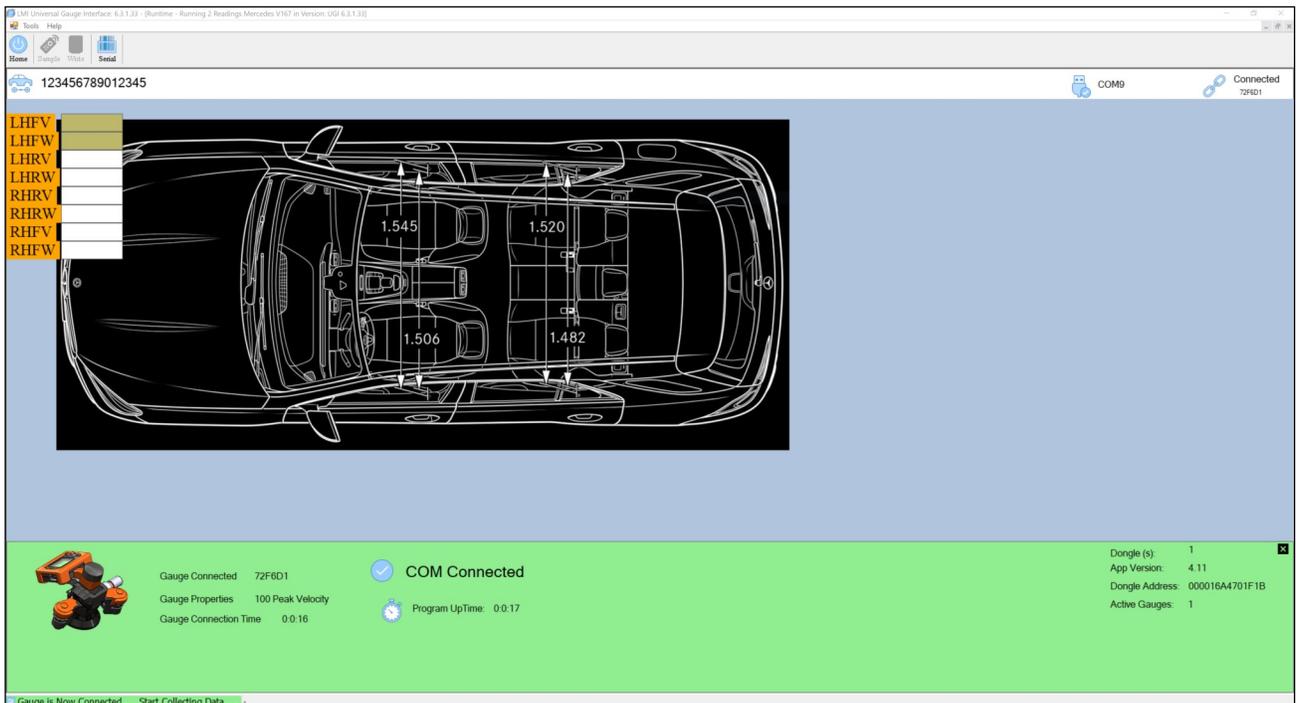
When the user sends the data from the last door, the barcode entry box will pop up on the screen, ready to accept the next VIN/ production code.
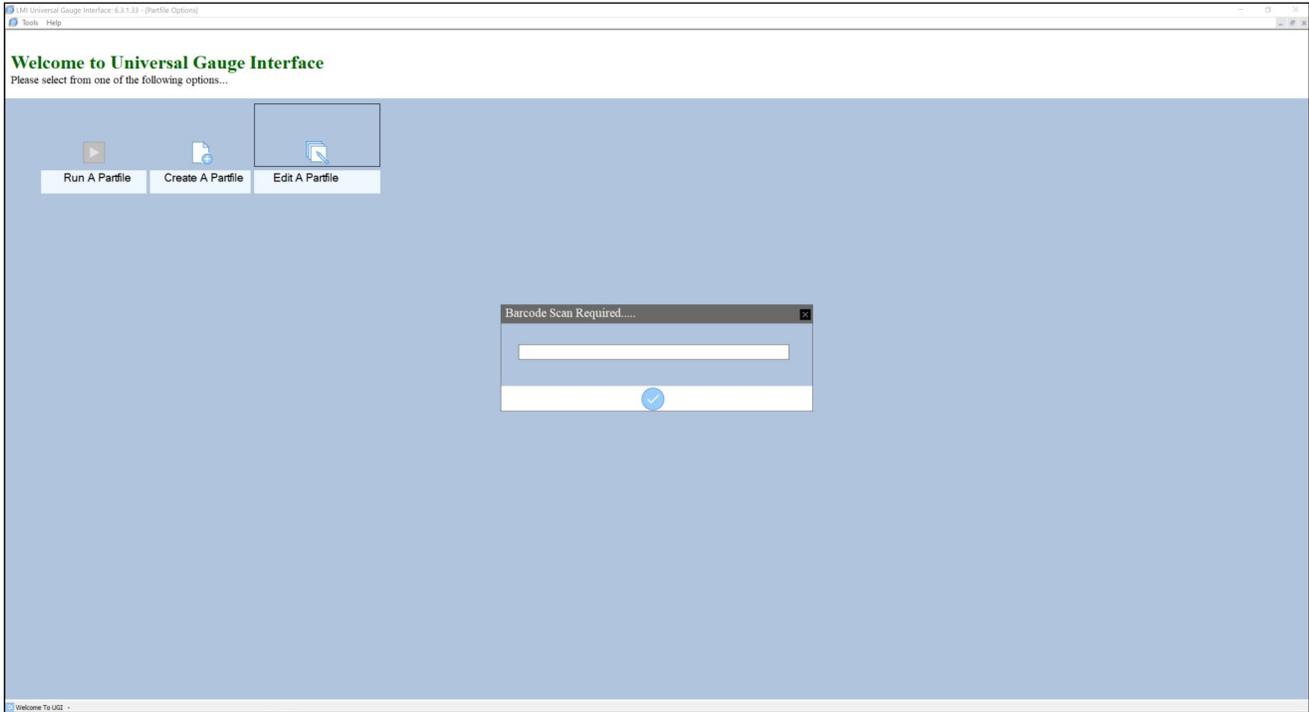
Hotswapping Capability

If the battery in the G-Force happens to die mid-routine, users can remove the dongle and insert a new dongle that is paired with a fully-charged G-Force. UGI will return to the barcode entry box and the user will need to scan the VIN/production code of the vehicle they were measuring when the battery died. After the new G-Force is turned on, it will automatically connect to UGI within 15 seconds or after a reading is sent.

Section 8: Troubleshooting

1. The G-Force Utility isn't showing the G-Force is connected to USB: Make sure that USB is displayed on the screen of the G-Force. If it is not, unplug the G-Force from the cable and then plug it back in, making sure it is firmly inserted in the jack.

2. The G-Force Utility has become unresponsive: Unplug the USB cable from the G-Force if in a wired connection. Unplug the BLE dongle if in a wireless connection. In either case, close out the G-Force Utility, reconnect the G-Force (if cabled) and restart the software.

3. Angle of display cannot be adjusted: Make sure the angle adjustment lever is fully unlatched. Hold the G-Force in the orientation shown below and push the upper assembly towards the adjustment lever. After doing this, rock the display back and forth to the desired angle and then fully close the adjustment lever.

Fully unlatch adjustment lever

Push upper assembly toward adjustment lever
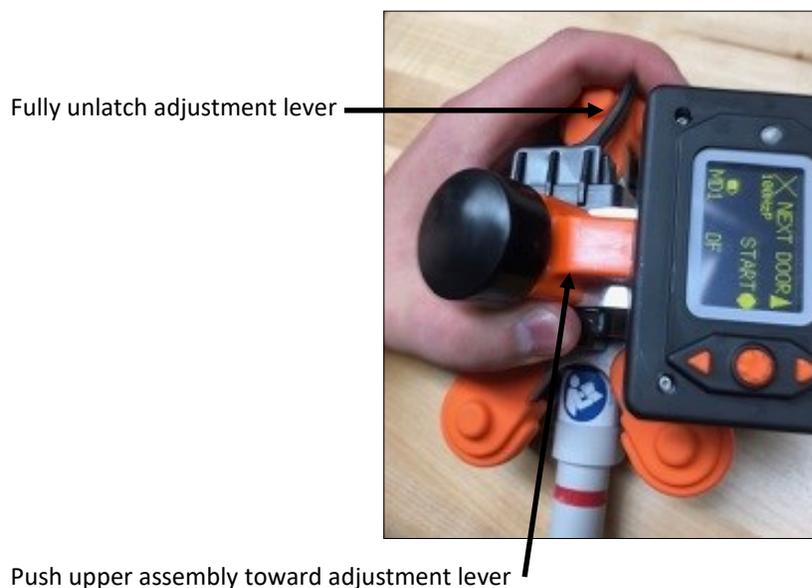
Appendix A: Auditor Mode Setup

Auditor Mode allows users to take a G-Force to a lot or down the assembly line without a PC and perform lowest closing velocity tests on a vehicle without needing to remember the highest non-latch closure and the lowest latched closure. The G-Force will retain both of these in a temporary memory file until the user chooses to SEND the data after the measurements fall within a predetermined threshold setup using the G-Force Utility.
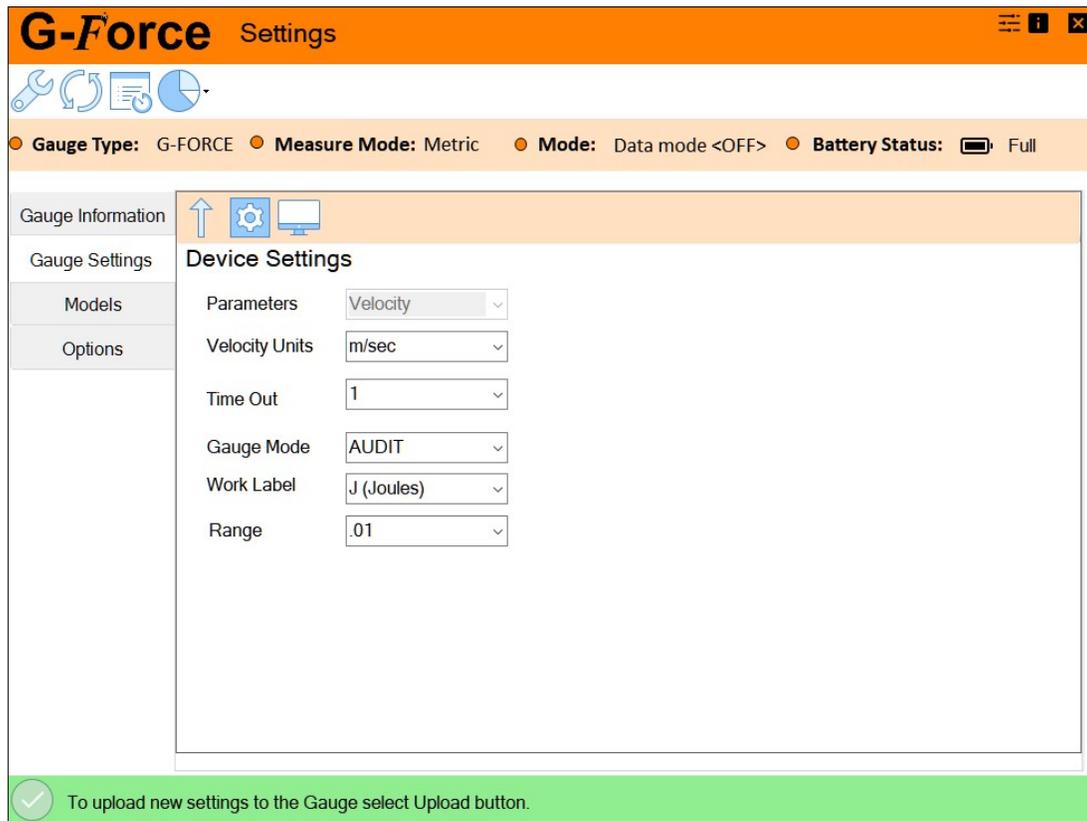
To set the threshold, connect the G-Force to the PC using the included USB Type-C cable and double-click the G-Force Utility icon to start the program.

Once the program has found the G-Force, click on the Gauge Settings icon:

Click on the Gauge Settings tab and choose an acceptable threshold range between a latched and no-latched closure.


In this example, the threshold (Range) is set to 0.1 m, meaning that when the lowest latched push is within 0.1 m of the highest non-latched push, the LED will flash green to let the user know they have reached the threshold and the test is complete. The G-Force screen displays both the lowest latched and highest unlatched results and users can then choose to REDO the test or SEND the data to a data collection program or simply write the values down using paper and pen.

To upload these settings to the G-Force, press the upload arrow icon and then close down G-Force Utility, unplug the G-Force, and begin closing doors.

Again, the purpose of this mode is to find the lowest *latched* closing velocity. Here's an example of how it works:

The user takes a test and gets a no-latch value of 0.54 m/s. The left image below shows the display of the G-Force.
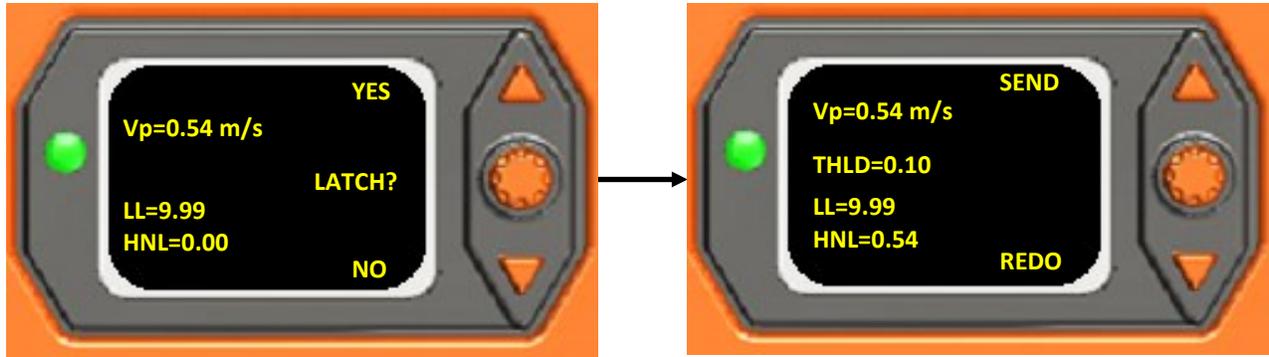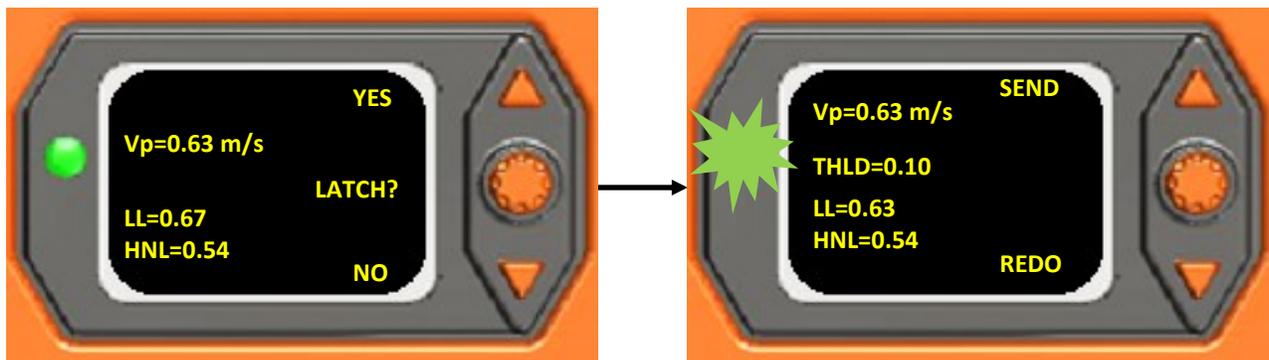

The user answers the question LATCH? with NO by pressing the down arrow. The user presses the down arrow again to REDO the test, as shown in the right image, above.

The user closes the door again, and this time gets a latched value of 0.67 m/s. The G-Force screen will display the following:
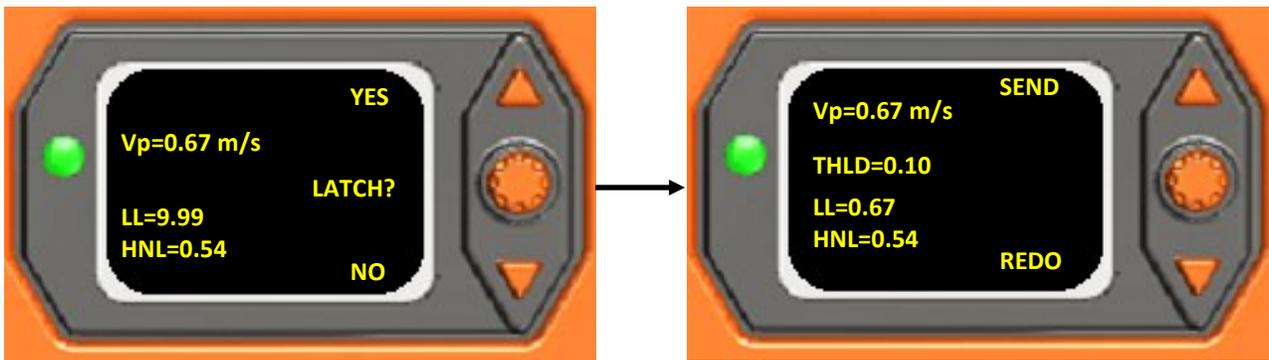
The user answers the question LATCH? with YES by pressing on the up arrow. The Lowest Latched (LL) reading changes from the default 9.99 to 0.67 (above right). As the 0.1 m/s threshold has not been met, the user presses the down arrow to REDO the test.


The user closes the door again, this time getting a latched value of .0.63. The user answers the question YES and then the green LED begins to flash, indicating that the threshold has been met. The user can now choose to REDO the test again using the down arrow or end the test by pressing the up arrow (labeled SEND).

Appendix B: Data Collection Mode Setup

Data Collection Mode allows the G-Force to act as a simple data collection device capable of holding up to 500 records that can then be downloaded to a text or Excel file through the G-Force Utility.

To set up Data Collection mode, press and hold down the center button on the G-Force until the red LED stops flashing, then press the down arrow to enter the Selection Menu. Use the down arrow to scroll down to USER MODE, then press the center button. Use the down arrow again to select DATA COLLECT then press the center button. Press the up arrow to turn on the Data Collect mode, then press the center button again. The screen of the G-Force will now display a D on the left hand side of the screen to denote Data Collection Mode has been turned on and data will be saved to the internal memory of the G-Force.

G-Force in Data Collection Mode
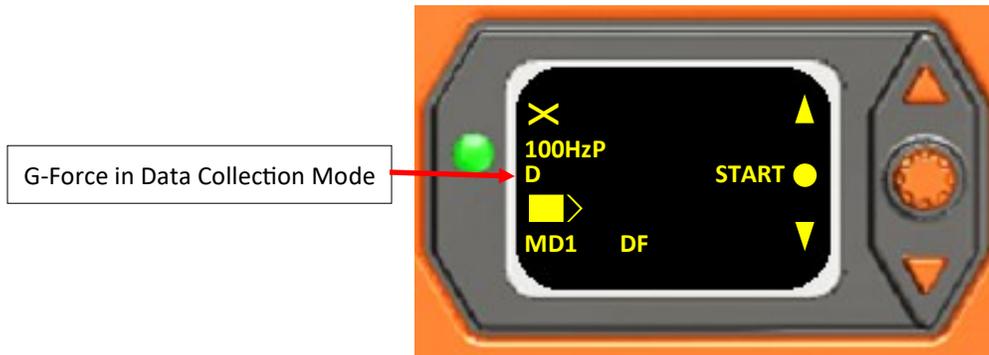
Before data collection begins, the user will press and hold the center button down again until the red LED quits flashing, and then press the center button on the G-Force. Using the down arrow to select USER, the user will be prompted to select:

User number (or name if configured): User 1 / User 2 /User3 / User 4

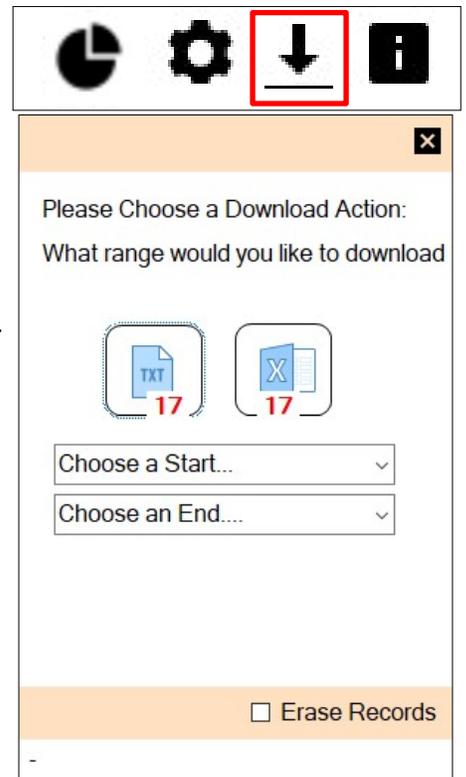**Shift:** First / Second / Third

Line: 1 / 2 / 3 / A / B / C

This information will be tagged along with the readings captured by the user. When the shift is over or another user begins testing with the same G-Force, they will need to select their user number, shift, and line.

Once the data has been collected, connect the G-Force to the PC using the included USB Type-C cable. Open the G-Force Utility Software. The software should automatically find the G-Force. When it does, click on the Download Data icon shown to the right.
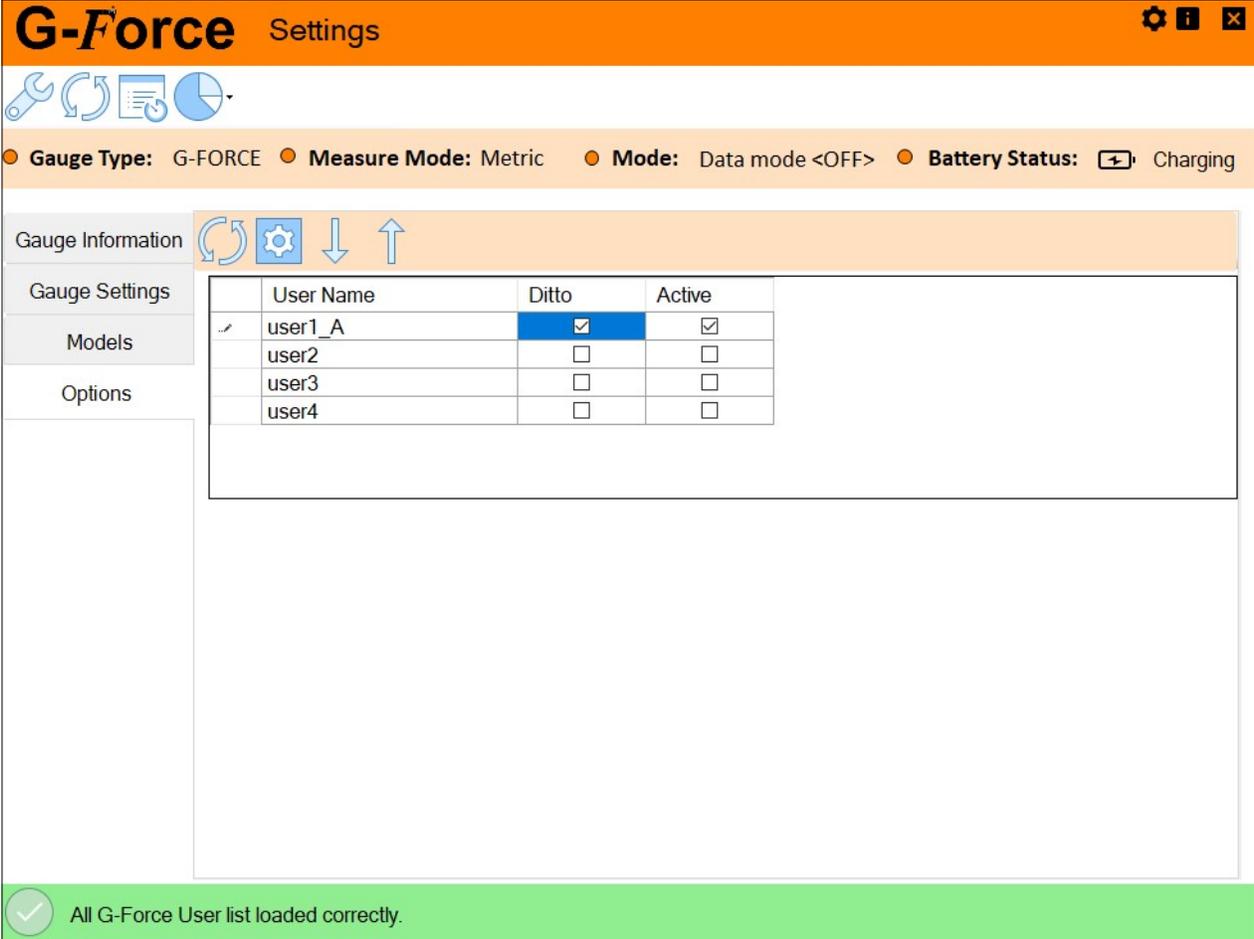
A separate window will appear. The user has a choice between downloading the collected data as a simple .txt file or a .csv file that will be opened in Excel upon completion of the download.

Once the download has completed, the user can click on the Erase Records button to remove the data from the G-Force, freeing up the memory for additional data collection. The G-Force will display FORMATTING EEPROM. This process may take up to four minutes.

Please Choose a Download Action:

What range would you like to download

Choose a Start...

Choose an End....

☐ Erase Records

Configuring User Names

Usernames 1-4 can be replaced with operator names through the Options tab of the G-Force Utility. Connect the G-Force to the PC through the USB Cable, click on the Gauge Settings icon, and then click on the Options tab. Click the downward arrow icon to recall the user names from the G-Force. The user can replace the default user names with the names of the auditors, with a five character limit for each name. When finished, click on the upward arrow to load the names into the G-Force. Ditto will recall the selected name each time the operator completes a test. Active shows the current user within the G-Force.

Appendix C: Optional Settings and Configuration

By clicking on [icon] the icon at the top of the G-Utility home screen, users can access additional program, export, and charting options.

Start-Up Tab

Show COM Window: Displays button for COM Window access from the home screen. Allows the user to send commands to the gauge or send readings to the COM window. See graphic below.

Show Whitelist: When connected wirelessly, this will show all gauges on the BLE dongle's whitelist.

Show Edit Top Panel: Shows/Hides top panel buttons on home screen.

Show Messages: Shows connection status messages when connected via BLE dongle. Only changeable when connected wirelessly.

Export Options

Excel Data Collection: Toggles the ability to send readings directly to Excel via the G-Utility software.

Excel Data Dump: Toggles the ability to dump collected data to an Excel sheet when in Data Collect mode.

Show Excel Options: Toggles the ability to see the header fields available when sending data directly to Excel.

Appendix D: G-Force FW Update 20.60—Angle Enable Functionality

***NOTE:** **All features in this section require G-Force Firmware 20.60 or greater.** To check the version of firmware on your G-Force, press and hold the center button until the LED stops flashing, and then press the down arrow. From the Menu, select SETUP MODE. The firmware version and date are displayed at the bottom of the Menu screen. If your G-Force has a version number less than 20.60 and Angle Enable is desired, please contact LMI for information on how to upgrade your existing G-Force device(s).*

Firmware 20.60 adds a feature that allows the user to test regular driver and passenger doors the same way liftgates are tested today. Instead of relying on a detent as a repeatable starting point for each test, the user can open the door to a specified angle and auto-start the test from there. This is useful for doors that do not have a natural detent in their design, and allows all users to start from the same location, greatly increasing repeatability on "detent-less" doors. In addition to this, the user has the ability to automatically retest the door from the closed position of the previous test. To activate the angle enable feature, begin by connecting your G-Force to the PC running G-Utility using the included USB cable. Turn on the G-Force and start the G-Utility software. Click on the Gear (Settings) icon, then click on the Gauge Settings tab. The user can then place a checkmark in the box to turn on Enable Angle. Once the Enable Angle box is checked, the user then has the option check Auto Re-Test if desired.
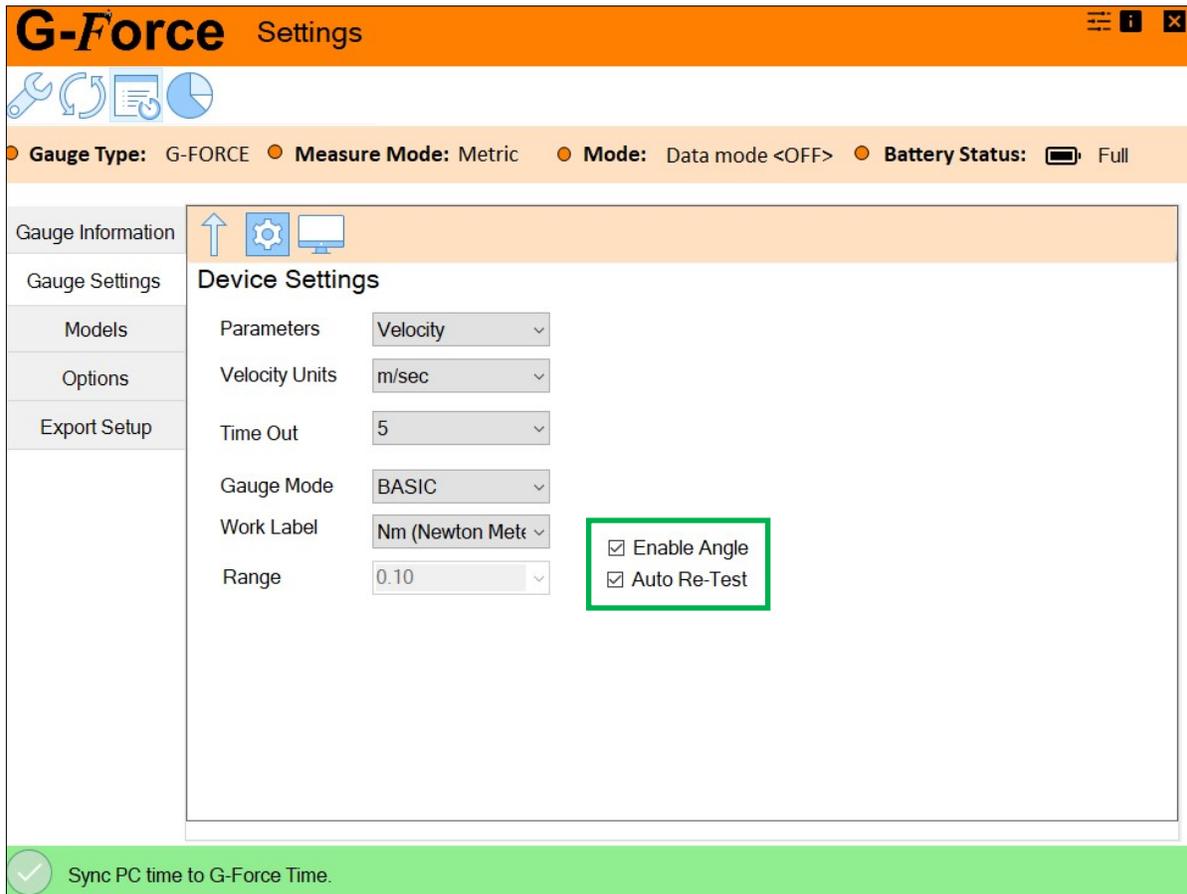

Click on the upload arrow to save the changes to the G-Force, then click the X in the upper right-hand side on both windows to shut down the software.

Note: To change the angle for each door, see Section 4.9, pg. 20. Enter the desired angle under the Start Angle column of the Models section in the G-Force Utility software. Press the Up Arrow icon to save the changes to the G-Force.

Let's take a look at how to use this new feature in auditor mode (continued on next page).

Using Angle Enabled Measurement in Auditor Mode

1. If the G-Force is not currently in Auditor Mode, press and hold the center button until the LED stops flashing, then press the down arrow to enter the Menu screen. Use the down arrow to highlight User Mode, then press the center button. Use the down arrow to choose AUDITOR mode. Press the center button.

2. Place the G-force on the door as shown in Section 2.3 (page 7); however, before opening the door, push the center button on the G-Force to start the test. It will perform a quick "zero start" calibration.
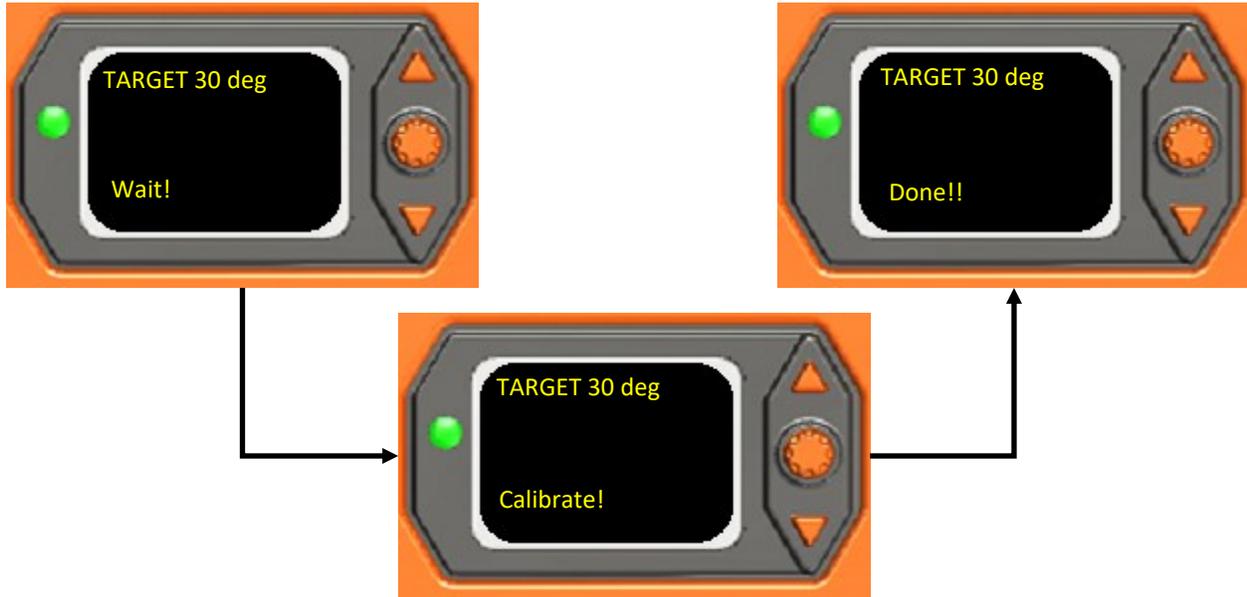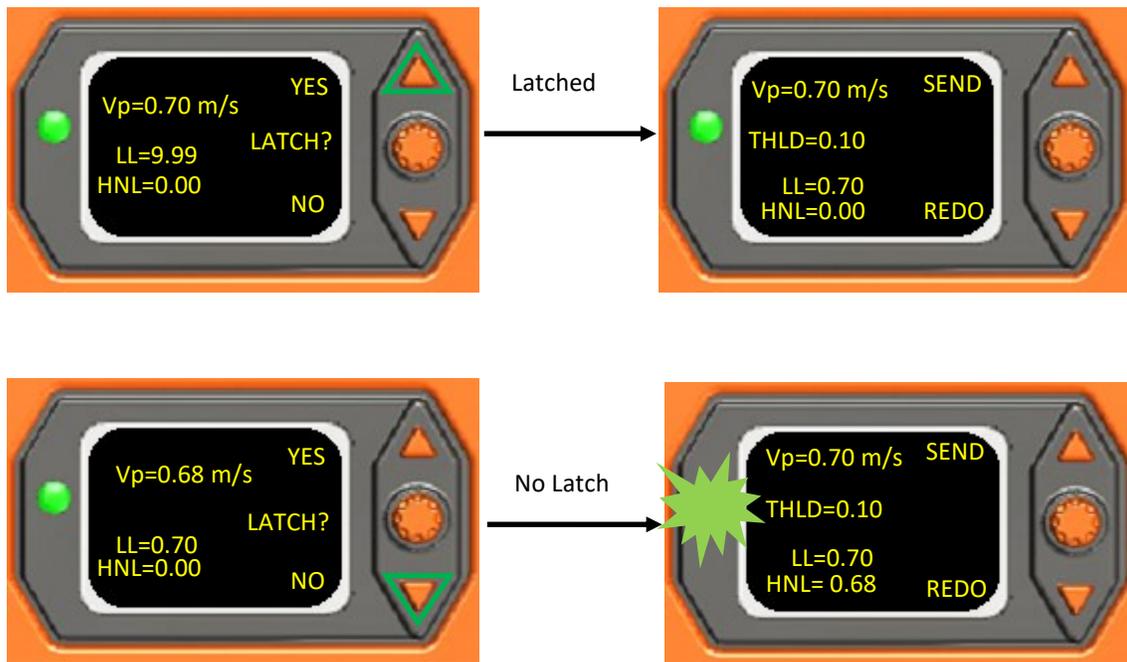

Once the gauge has finished the zero start calibration, the angle will show at the bottom of the screen and the operator may begin the test.

3. In a fluid motion, open the door and pull back to the target angle. Once the target angle is met, the screen will display "angle reached" then "start." Push on the load cell to close the door.
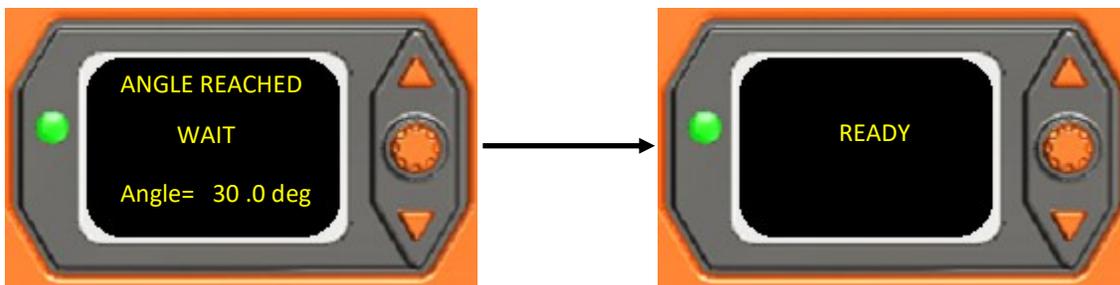
4. After the door is closed, the results will display on the screen. If the door latched, press the up arrow button to select YES. If the door did not latch, press the down arrow to select NO. Hit the down arrow to repeat the test until the lowest latched value (LL) and highest non-latched value (HNL) meet the threshold (THLD) requirements. Once the threshold has been met, press the top button to send the data to Excel or UGI and begin the next test.

Latched

No Latch

User Notes