LABA7 Shock Dyno
User Manual

Lithuania 2022

Table of Contents

1. Introduction

Dear Customer,

Thank you for purchasing this product.

To ensure this condition and ensure safe operation, you must observe these operating instructions!

Read the entire operating instructions before using the machine for the first time. Observe all operating instructions and safety instructions!

All company names and product names are trademarks of their respective owners. All rights reserved.

UAB LABA7
Giluzio st. 15
Vilnius
Lithuania

2. Safety Information

- This manual is designed to be used in conjunction with the service manual and documentation provided by the shock absorber's manufacturer.
- Make sure to read and understand the whole user manual before using the Shock Dyno (further – device).
- The device works under excessive force, therefore, wear protective eyewear and take all cautions required to work in a safe environment.
- Connect the Shock Dyno to a grounded power socket.
- Only use the electric cord provided with the device.
- Do not use the power cord if it is pinched, sheared or cut.
- Do not use any power adapters if the plug doesn't fit your wall socket.
- Do not use an extension cord.
- The power socket to which you are connecting the Shock Dyno needs to be easily accessible to be able to unplug it in an emergency easily.
- Do not operate nearby an open flame or heat source.
- Place on a flat and level surface.
- Do not place in a highly corrosive or humid environment.
- Do not use the device or any of its components if they have been damaged.
- Do not perform any maintenance while the device is plugged into the mains.
- Make sure that the safety doors are closed adequately before running a test.
- Do not open or tamper with the safety lid or any other machinery parts during live operation.

3. Highlights

Congratulations on your purchase of the LABA7 Shock Dyno!

- Our fully automatic dynamometer allows you to test the mechanical force transmitted through any shock absorber as well as measure a multitude of variable factors pertaining to velocity, displacement, and other impacts, such as bump stops and even gas pressure. It does not matter which discipline you are working with – MTB, Motorcycles, Cars, 4X4, ATVs – all shocks can be tested. This machine is straightforward to use, and you can get the most accurate results immediately on your complimentary software/monitoring app.
- Shock absorber testing – Check if you have the right shock for the right use case or performance. Additionally, you can test whether the same shock is being kept throughout the travel. The device can also be used to compare two different shock absorbers.
- Test bump stops – Check the shock rate of your bump stops to develop an accurate quality estimate of different factors such as suspension sag, body roll, and cushioning for the driver.
- Parts tested – Shock springs/Fork springs/Air springs/Bump stops/Seal drag/Gas pressure.
- High-accuracy force/pressure sensors.

4. Technical Specifications

Below are the specifications of each individual Shock Dyno model:

Featherlight Shock Dyno:

- Speed 8 - 1900mm/s
- 10000N load cell
- Adjustable stroke 25 - 100mm
- 3HP-230V electric motor (110V available on request).
- Scotch-yoke system for accurate linear motion
- Mast length 130cm

Light Shock Dyno:

- Speed 7 - 2600mm/s
- 10000N load cell
- Adjustable stroke 25 - 150mm
- 4HP-230V electric motor (110V available on request).
- Scotch-yoke system for accurate linear motion
- Mast length 130cm

Mid Shock Dyno:

- Speed 7 - 2600mm/s
- 15000N load cell
- Adjustable stroke 25 - 150mm
- 5HP-380V electric motor
- Scotch-yoke system for accurate linear motion
- Mast length 130cm

Heavy Shock Dyno:

- Speed 8 - 3000mm/s
- 15000N load cell
- Adjustable stroke 25 - 150mm
- 10HP-380V electric motor
- Scotch-yoke system for accurate linear motion
- Mast length 130cm

5. Know Your Shock Dyno

5.1. Overview

The overview of the LABA7 Shock Dyno Feather and Light models is presented in the image (Figure 1) below:

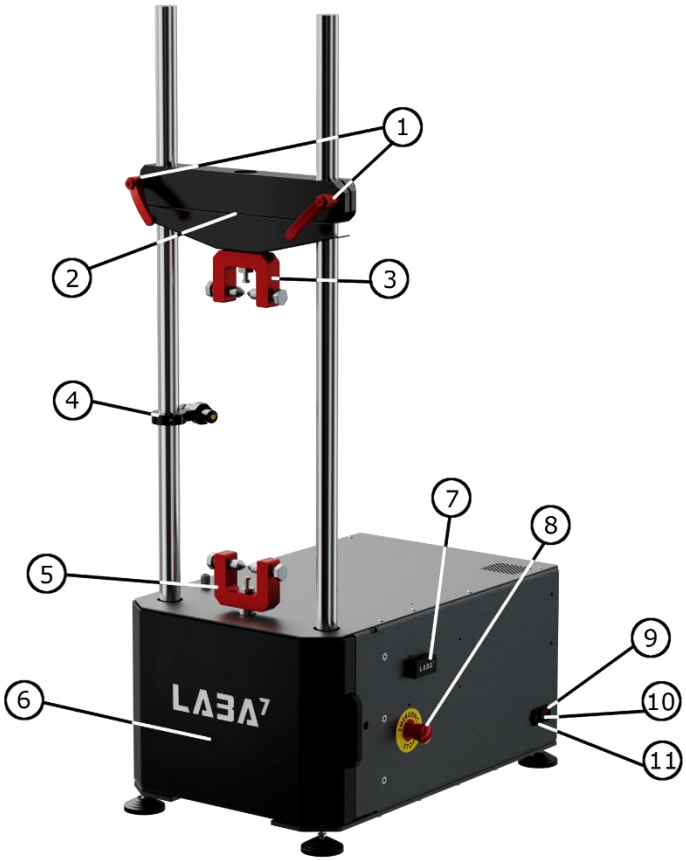

Figure 1

1. Crossbar handles.
2. Preload crossbar.
3. Top mounting bracket.
4. Temperature sensor.
5. Bottom mounting bracket.
6. Safety cover.
7. USB connector.
8. Emergency stop button.
9. Power switch.
10. Fuse.
11. Power cable connector.

The overview of the LABA7 Shock Dyno Mid and Heavy models is presented in the image (Figure 2) below:

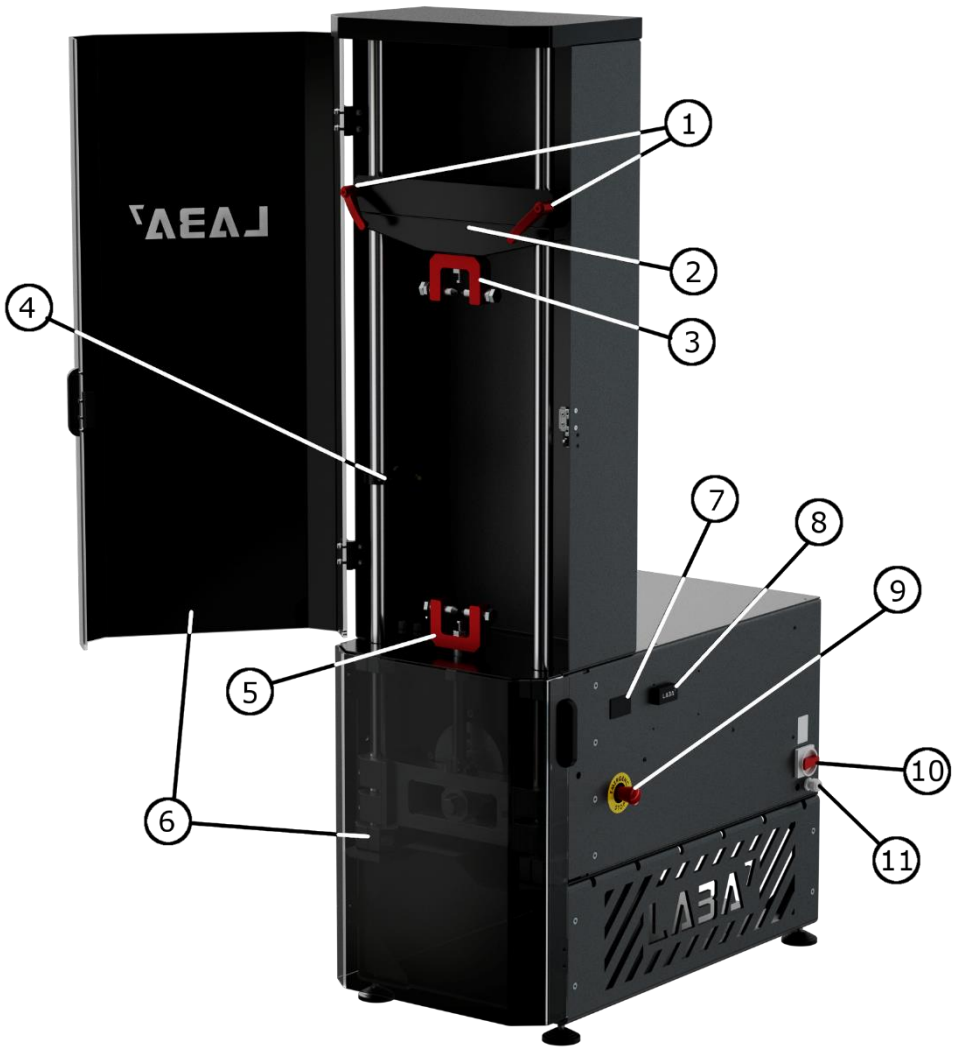

Figure 2

1. Crossbar handles.
2. Preload crossbar.
3. Top mounting bracket.
4. Temperature sensor.
5. Bottom mounting bracket.
6. Safety covers.
7. Manual Dyno controller.
8. USB connector.
9. Emergency stop button.
10. Power switch.
11. Power cable.

5.2. Emergency Stop Button Control

The Emergency Stop button can be activated anytime during operation. To activate the emergency button:

1. Press the button to stop any operation.
2. Rotate the Emergency Stop button to the right to release it and deactivate the emergency state.

5.3. Manual Control

Shock Dyno Mid and Heavy models can be controlled via a manual dyno controller:

1. Adjust the motor frequency by rotating the knob on the manual display.
2. Press the RUN button to start the Dyno.
3. Motor frequency can be adjusted while the Dyno is running.
4. Press the STOP button to stop the Dyno.

ATTENTION: Use the emergency stop button to engage the safety mechanism before opening the protective lid or removing shocks or forks to disable the Dyno from running by accident and prevent the risk of injury.

6. Accessories

6.1. Adapters

Here you will find various adapters compatible with the Shock Dyno.

Universal Clamp Assembly

- Fits many different shock absorbers
- 74mm clearance
- Can be used for both top and bottom mount
- 3-way locking bolts for extra stiffness

Figure 3

Self-Preload Assembly

- Fits shock absorbers with the external gas chamber
- 30mm clearance
- Easy preload mechanism
- Can be used together with a universal clamp
- 9.8mm mounting axis

Figure 4

Moto Fork Assembly

- One or two forks can be tested
- Adjustable offset
- Fits 20mm and 26mm axles
- Standard axle mount
- Stock inserts 54mm and 56mm
- Different size inserts on request

Figure 5

MTB Fork Assembly

- Fits steerer tube of 28.6mm
- Adjustable offset
- Fits 20mm and 26mm axles
- Standard axle mount
- Fits universal clamp

Figure 6

MTB Cartridge Assembly

- Fits universal clamp
- Fox 34/36/40 adapters
- Öhlins 36/38 adapters
- RockShox adapters
- Different size adapters on request

Figure 7

Trunnion Assembly

- Fits Trunnion shock absorbers
- Can be used with self-preload clevis
- Automatic alignment
- 2 locking bolts for extra stiffness

Figure 8

6.2. Adapter Installation

Whenever installing a new adapter into the Dyno or replacing an existing one, follow the steps below:

1. Make sure the Shock Dyno is powered off, or the Emergency Stop Button is engaged before changing the adapters.
2. Use a wrench tool to unscrew both vertical bolts to release the clamp heads. (Figure 9 – Step 1)
3. Switch to another adapter and use the same method to secure the bolts in place.
4. Release the Emergency Stop Button if previously engaged.

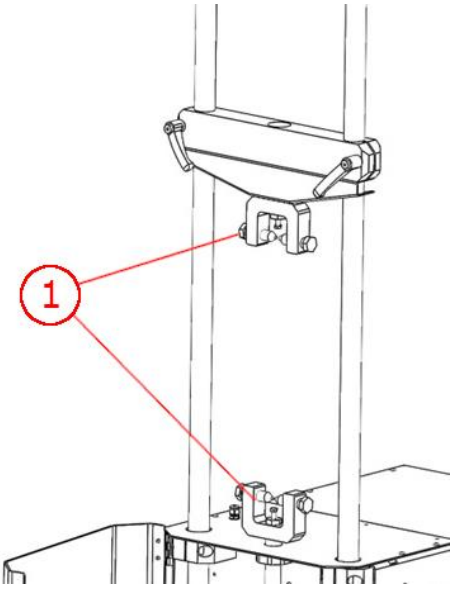

Figure 9

7. First Launch

This section provides information associated with the first use of the LABA7 Shock Dyno.

Follow the steps below to launch the Shock Dyno for the first time:

1. Plug the power cable provided with the device into the power connector and plug into the mains.
2. Turn the Shock power switch on. The green light on the switch will light up, or the manual dyno controller will light up.
3. If powering on the Shock Dyno results in the shortening of an earth leakage circuit breaker, follow the instructions of RFI Jumper Removal (Section 7.2) to solve the issue.
4. Press the Emergency Stop Button to disengage the Shock Dyno before mounting the damper.
5. Open the safety doors by pulling from the cover side handle.
6. Place the damper within the top or bottom adapter and secure it.
7. Adjust the handlebars of a preload crossbar and lower or raise it to align the damper with the other unsecured adapter and secure it in place.
8. Before tightening the preload crossbar, ensure the motor is in a bottom position (use a socket or spanner wrench to adjust the motor so it is placed bottom-wise during the start of rotation).
9. If your damper requires a different stroke on the Shock Dyno, follow Changing the Stroke (Section 7.1) instructions.
10. Preload the crossbar by pushing it downwards and tightening the handlebars.
11. Release the Emergency Stop Button.
12. Power off the Shock Dyno to configure the software.

7.1. Changing the stroke

Follow the steps below to change the stroke on the Shock Dyno. These steps apply to all the Shock Dyno models.

1. Press the Emergency Stop Button to disengage the Shock Dyno and prevent the motor from moving.
2. Rotate the roller bolt using a wrench (Figure 10 – Step 1) and insert the locking pin to lock the roller in place (Figure 10 – Step 2).
3. Unscrew the rolling bolt until it is loose.
4. Slide the roller to the side to mount it into a different hole on the flywheel.
5. Tighten the bolt and remove the locking pin to complete the stroke adjustment.

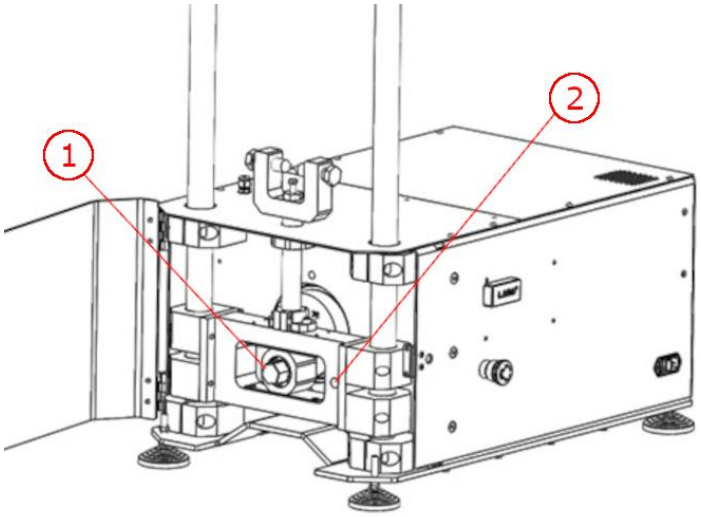

Figure 10

7.2. RFI Jumper Removal

If a power system that powers the Dyno has an earth leakage circuit breaker (RCBO), with the power on, it can break. In such cases, an RFI jumper must be removed from inside the Dyno.

The purpose of using the RFI jumper is to isolate the main power from the ground. If the AC motor drive is supplied from an IT or TN power system, the RFI jumper must be removed. This disconnects the RFI capacities (filter capacitors) from the ground to prevent circuit damage and reduce current leakage to the ground.

RFI Jumper is located on the AC Motor Driver:

Figure 11

This guide applies to all models of LABA7 Shock Dyno; however, there are two possible modifications of the AC Motor driver. This can result in a different RFI jumper, nonetheless the location and steps to remove it are similar.

The motor driver can be found inside the Shock Dyno. Remove the top cover using 4-6 screws (depending on the different Shock Dyno model).

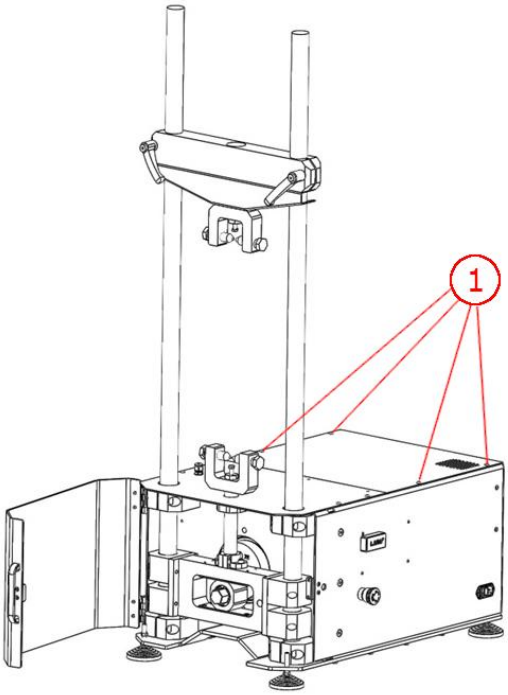

Figure 12

Once the cover is open, you should see the AC Motor driver on the side of the Dyno towards the back, next to the motor.

It is likely that the RFI pin (jumper) is located on the left side of the AC Driver. In that case, you will have to remove the 2 screws from the side of the Dyno that hold the plate on which the AC Driver is mounted.

Configuration 1:

The RFI jumper is on the side of the AC Driver and is held by a bolt.

To remove the RFI jumper, release the bolt holding the jumper. Remove the jumper. Tighten the bolt back.

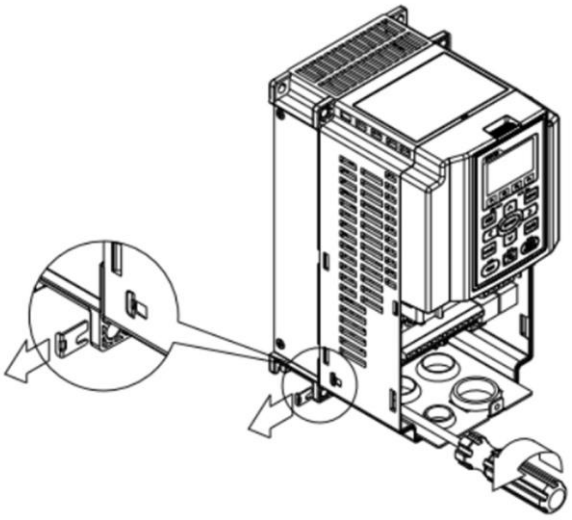

Figure 13

Assemble everything back and close the Dyno cover before powering on the device.

Configuration 2:

The RFI jumper is on the side of the AC Driver in a small hole. It looks like a small wire. To remove the RFI jumper, use pliers to cut the wire or pull it out.

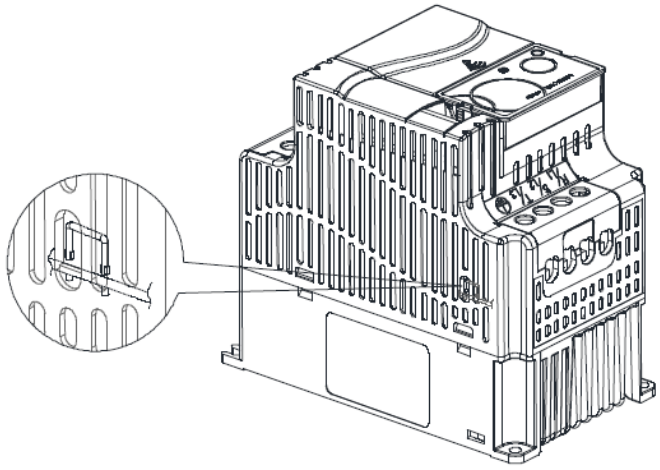

Figure 14

Assemble everything back and close the Dyno cover before powering on the device.

In case of any other questions regarding the wiring, please get in touch with LABA7 team.

8. Software Setup

8.1. System requirements

These are the minimum requirements for the app to function in conjunction with Dyno:

- Windows 7 (SP1), 8, 10, 11
- NET Framework 4.7.2
- 4 GB of RAM
- 1 GB of free disk space

8.2. Installation

Contact LABA7 support to receive the latest Shock Dyno software version.

1. Open the Shock Dyno software folder.
2. Locate the “Setup.exe” executable file and double-click to run the installation.
3. Once the setup panel has launched, click “Install” to continue.
4. Setup will install the program and automatically launch the software once the installation is done (a shortcut will be created on your desktop).

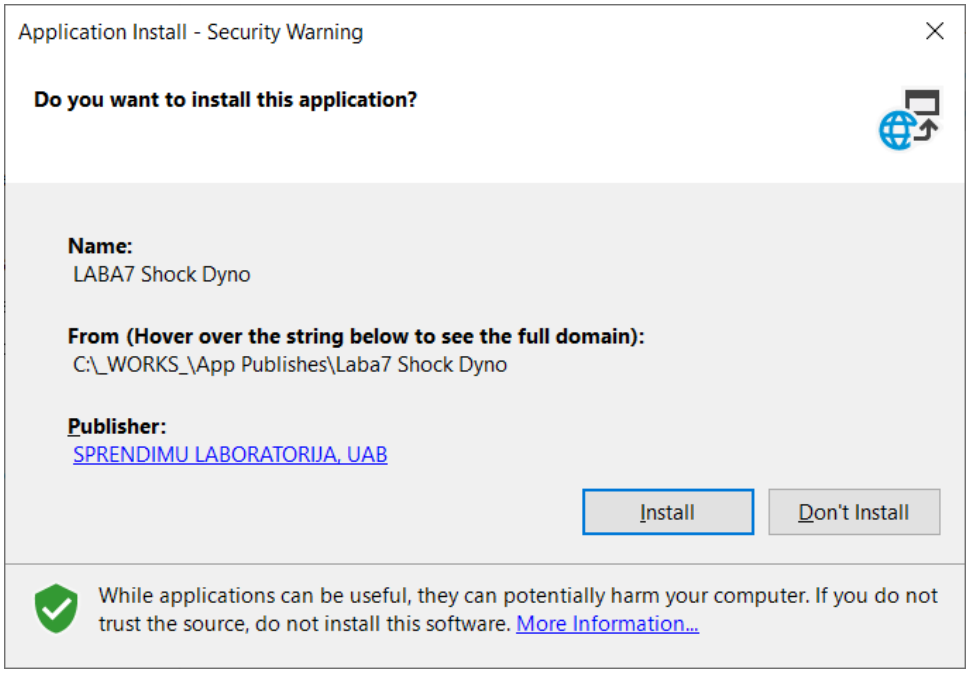

Figure 15

8.3. Configuration

After launching the application for the very first time, follow the steps below to configure the initial settings:

1. Keep the Dyno powered off.
2. Launch the application and go to the Settings page.
3. In the General Settings tab, select the Default Data Catalog by clicking on the Select button (Figure 16 – Step 1). This catalog will be used to store test data files.

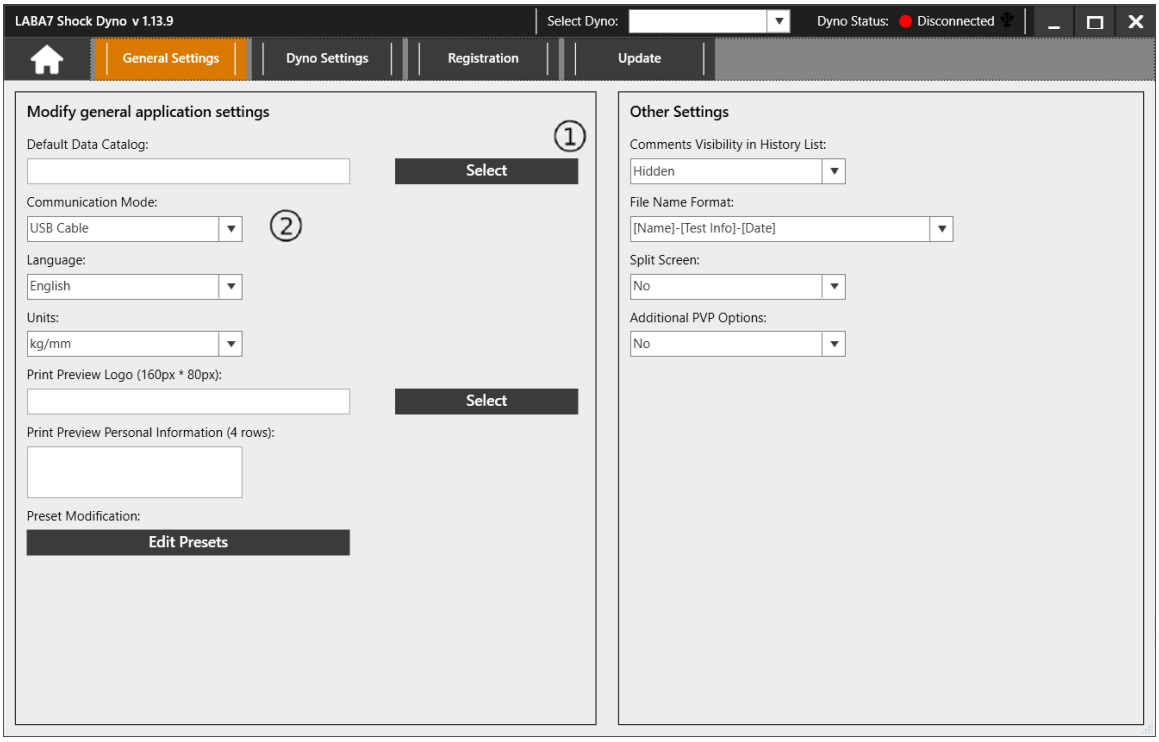

Figure 16

4. Select Communication Mode by clicking on the drop-down menu (Figure 16 – Step 2):
    a. Wireless communication—Wi-Fi network is required in the workshop (no LAN connection is needed). Make sure the router is relatively close to the Dyno, and there are no obstacles to cause interference to the signal.
    b. USB cable—the cable will have to be connected at all times during operation with the Dyno.
5. Go to the Dyno Settings tab.

6. Add a new Dyno model by clicking Add button (Figure 17 – Step 1).
    a. You can rename the model by double-clicking on the model's name in the Dyno list.
    b. Multiple models are used to switch between them during the operation quickly.

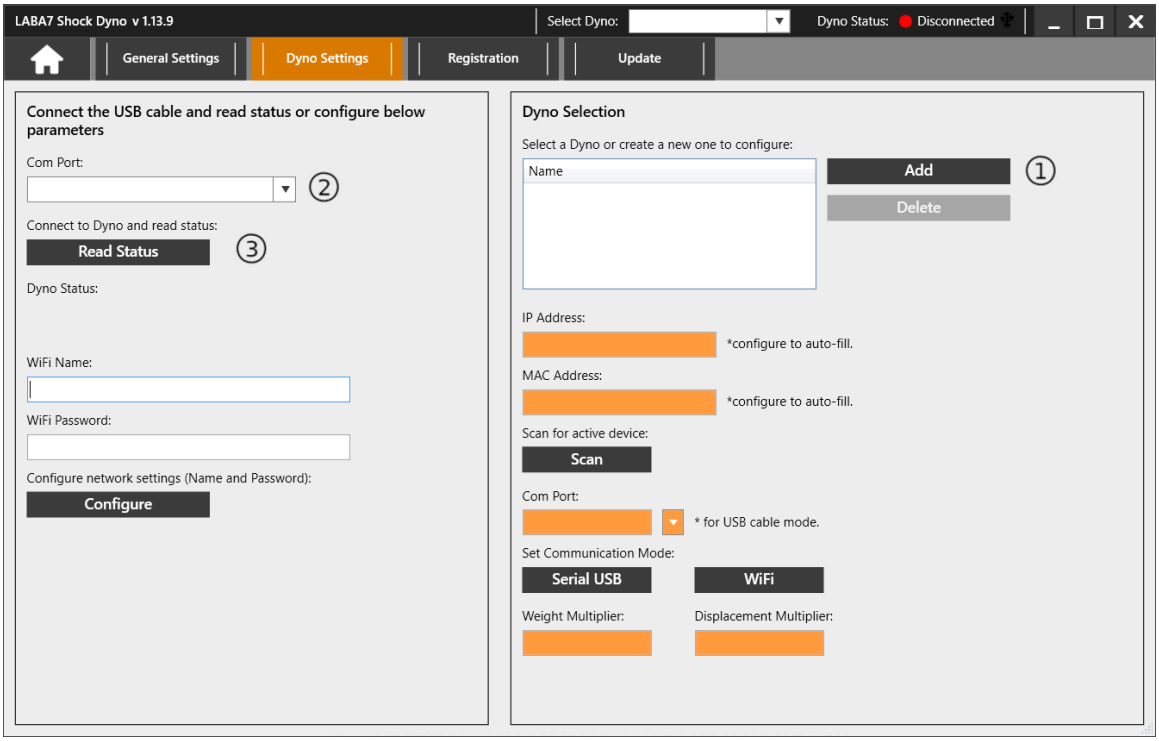

Figure 17

7. Turn off the Dyno if it was previously turned on.
8. Connect the USB cable to the LABA7 Dyno and the computer.
9. Wait 15-20 seconds for the Dyno to initialize.
10. Select the newly appeared Com Port of the connected Dyno from the drop-down menu (Figure 17 – Step 2).
11. Click the Read Status button (Figure 17 – Step 3).
12. One of the following statuses will appear:
    a. Serial communication enabled—Dyno is configured for the USB communication mode.
    b. Wi-Fi settings are not set up—Dyno is configured for the wireless communication mode, but the settings of a local wireless network are not configured.

ATTENTION: Based on your preference, go to the next section for either wireless or USB communication setup.

8.4. Wireless Communication

This section indicates how to set up wireless communication between the Dyno and the computer. The following items should be considered when choosing this communication type:

- Up-to-date Wireless Router in the workshop to ensure a stable and fast connection for data transfer during the Dyno operation.
- Open area for a Dyno to operate with a router placed in a line-of-sight from the Dyno. Any object between the Dyno and the wireless router can negatively impact the wireless signal, resulting in poor signal quality and lost data packets.

Follow the steps below to configure the wireless communication:

1. Keep the Dyno powered off.
2. Launch the application and go to the Settings page.
3. In the General Settings tab, select Wireless Communication Mode by clicking on the drop-down menu.
4. Go to the Dyno Settings tab.
5. Turn off the Dyno if it was previously turned on.
6. Connect the USB cable to the LABA7 Dyno and to the computer.
7. Wait 15-20 seconds for Dyno to initialize.
8. Select the newly appeared Com Port of the connected Dyno from the drop-down menu.
9. Click on the Read Status button.
10. Note the Status that was received from Dyno (Figure 18 – Step 1).
11. Check the Status that was received from the Dyno:
    a. Connected to Wi-Fi—Dyno is already configured to wireless connection mode and connected to the router; no further action is required.
    b. Wi-Fi settings are not set up—Dyno is already configured to wireless connection mode, but the settings for connecting to the router are not set up. Skip to step 14.
    c. Serial communication enabled—proceed with the next step to switch to wireless connection mode.
12. Select the Com Port of the connected Dyno from the drop-down menu in the Dyno Selection area (Figure 18 – Step 2).
13. Click on the Wi-Fi button in order to enable wireless communication mode in the Dyno (Figure 18 – Step 3).
14. Enter Wi-Fi name and password into the corresponding fields (Figure 18 – Step 4).
15. Click on Configure button (Figure 18 – Step 5).

16. Wait up to 1 minute for the application status to refresh.

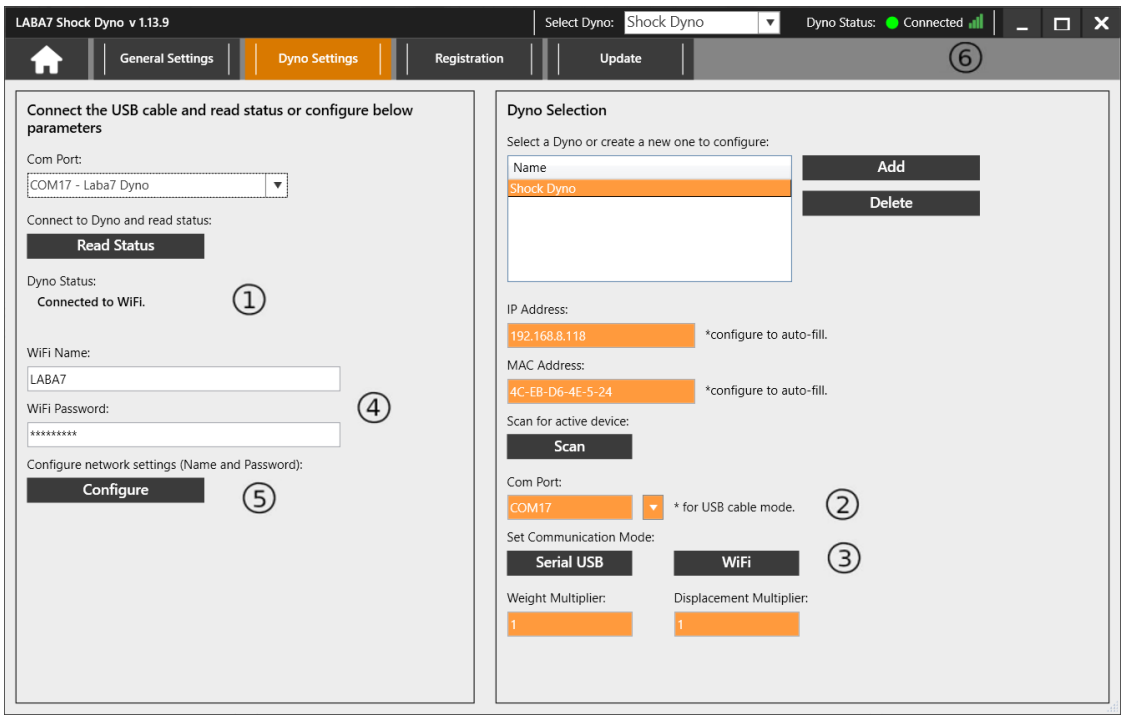

Figure 18

After a successful connection to the router, Dyno status should indicate connected to WIFI with a green indicator in the upper right application corner.

ATTENTION: If any of the steps fail or the Dyno is still not connected to the application, go to the troubleshooting section.

8.5. USB Communication

This section indicates how to set up a USB communication between the Dyno and a computer.

Follow the steps below to configure the USB communication:

1. Keep the Dyno powered off.
2. Launch the application and go to the Settings page.
3. In the General Settings tab, select USB Communication Mode by clicking on the drop-down menu.
4. Go to the Dyno Settings tab.
5. Turn off the Dyno if it was previously turned on.
6. Connect the USB cable to the LABA7 Dyno and to the computer.
7. Wait 15-20 seconds for the Dyno to initialize.
8. Select the newly appeared Com Port of the connected Dyno from the drop-down menu.
9. Click on the Read Status button.
10. Note the Status that was received from Dyno (Figure 19 – Step 1).
11. Check the Status that was received from Dyno:
    a. Connected to Wi-Fi—Dyno is configured to wireless connection mode and connected to the router. Proceed with the next step to switch to a USB connection.
    b. Wi-Fi settings are not set up—Dyno is configured to wireless connection mode but the settings for connecting to the router are not set up. Proceed switching to USB connection.
    c. Serial communication enabled—skip to step 14.
12. Select the Com Port of the connected the Dyno from the drop-down menu in Dyno Selection area (Figure 19 – Step 2).
13. Click the Serial USB button to enable USB communication mode in the Dyno (Figure 19 – Step 3).

14. Wait up to 1 minute for the application status to refresh.

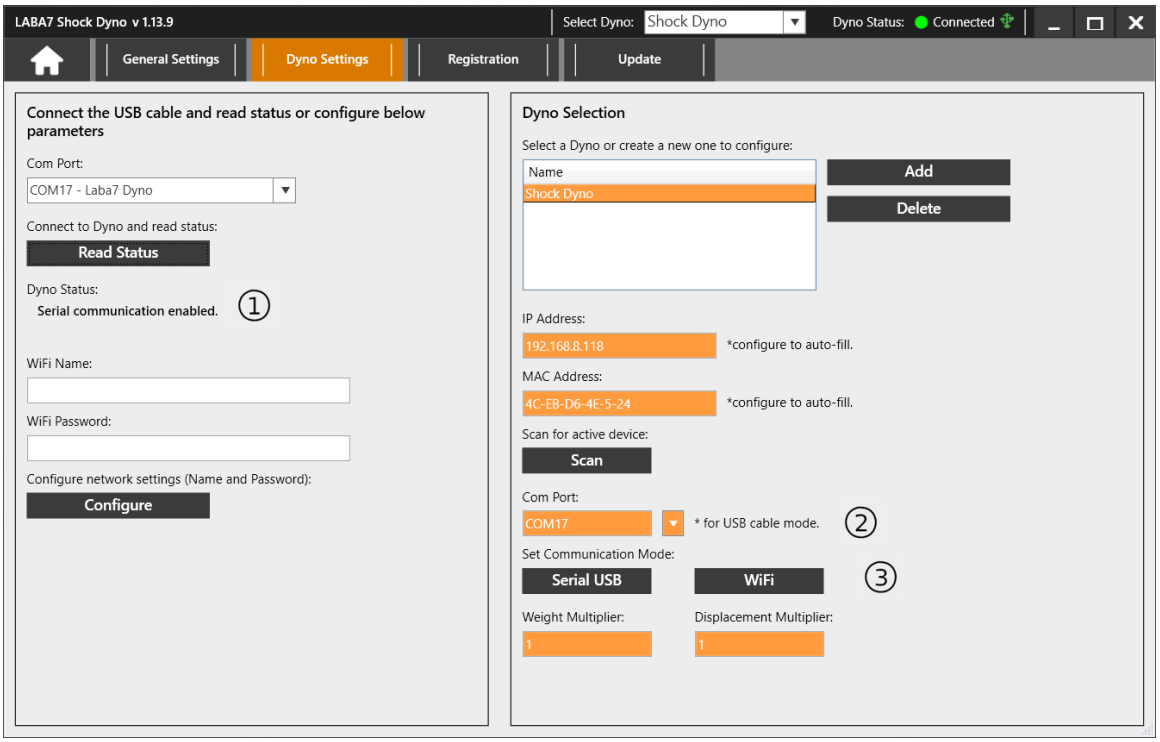

Figure 19

ATTENTION: If any of the steps fail or the Dyno is still not connected to the application, go to the troubleshooting section.

9. Software Operation

9.1. Main Menu

Once the application is launched, you will see the main menu with three available options:

- New project – create and manage new tests.
- Open – Import existing projects and compare different tests.
- Settings – options panel containing general settings and a configuration menu for managing Dyno connectivity.

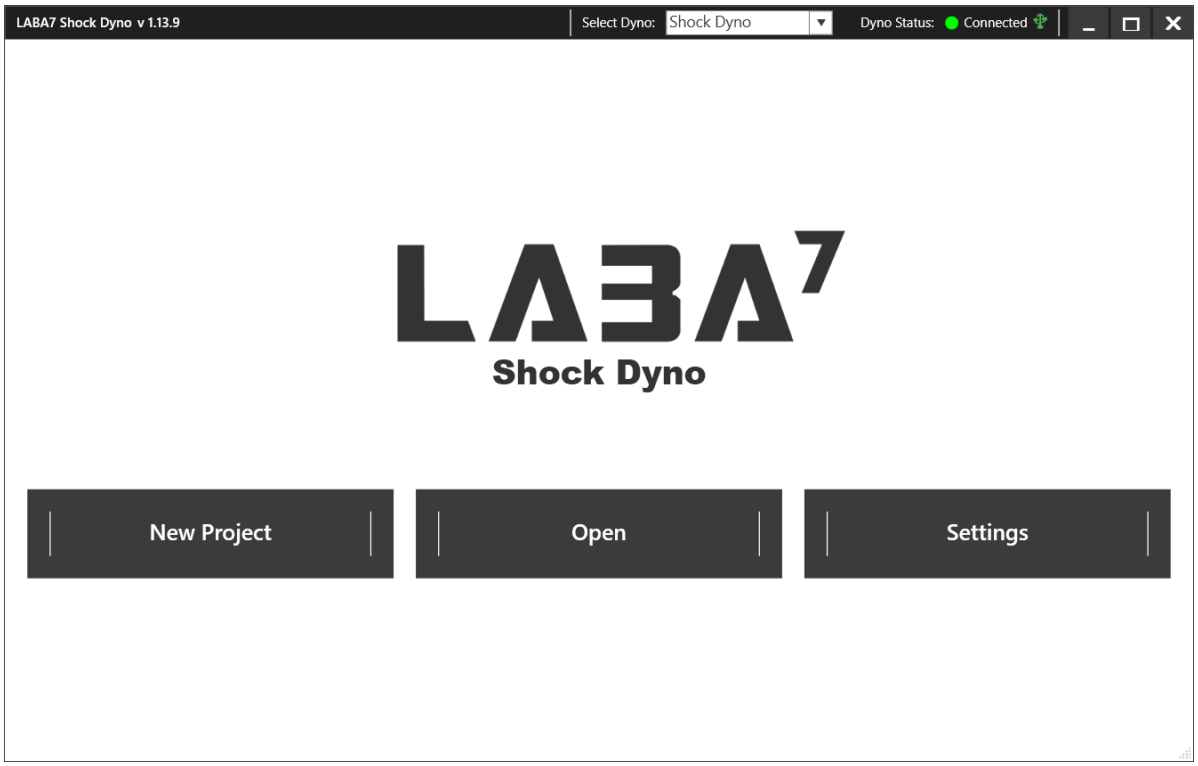

Figure 20

Additionally, you can check your software version, select a configured Dyno from the drop-down menu, and monitor your Dyno connectivity at the top menu from any window in the application.

9.2. New Project

Whenever a new damper is inserted into the Dyno, it is recommended to start a New Project. A calibration window will appear when a “New Project” button is clicked.

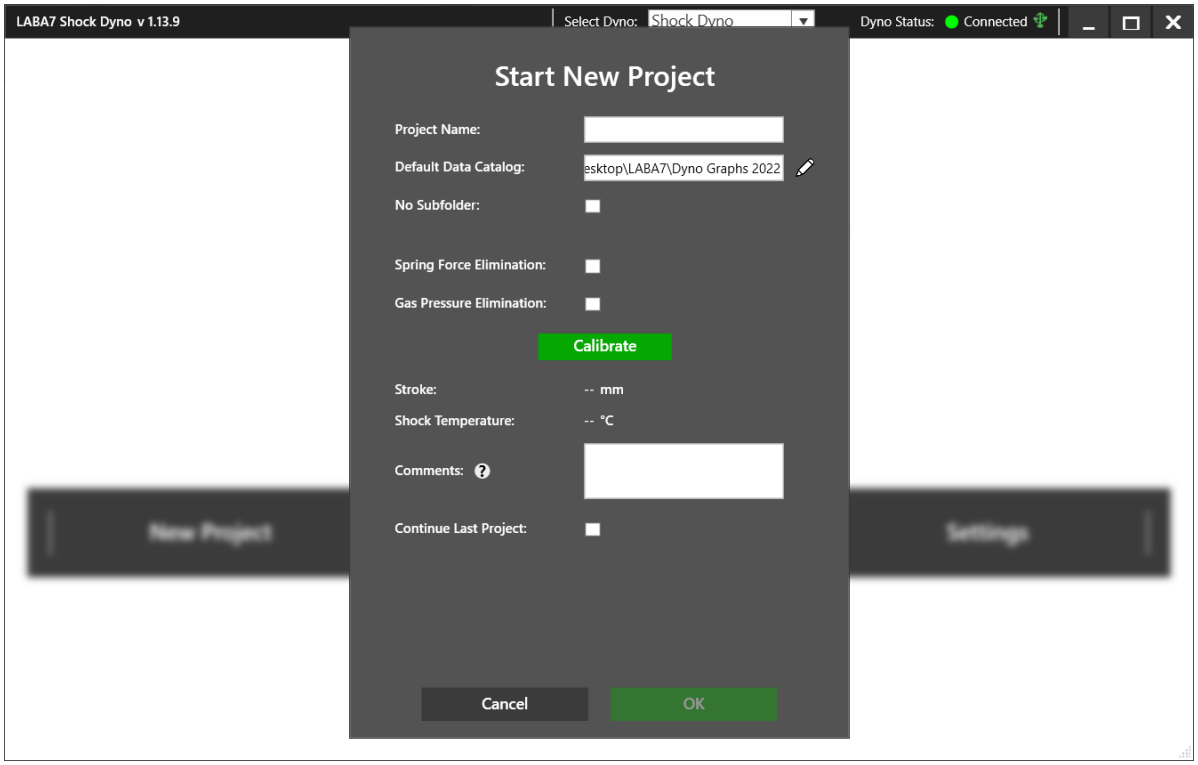

Figure 21

Enter the following information to proceed to the testing area:

- Project Name – the name of the project that will be tied to all the tests within this project
- Default Data Catalog – where your project files will be saved. By clicking the edit icon, this location can be changed.
- No Subfolder – If checked, no sub-folder will be created for the project, and all the tests will be saved inside the selected data catalog.
- Spring Force Elimination – if checked, allows the elimination of the spring effect from the dyno graphs. For more details, see section 9.3 Calibration.
- Gas Pressure Elimination – if checked, allows the elimination of the gas pressure from the dyno graphs. For more details, see section 9.3 Calibration.
- Calibrate – Press the Calibrate button to perform the initial calibration of the damper. For more details, see section 9.3 Calibration.
- Stroke – a read-only field that displays the stroke currently set in the Dyno after a successful calibration.

- Shock Temperature – a read-only field that displays the measured temperature of the damper after a successful calibration.
- Comments – enter comments that apply to all tests within the project.
- Continue Last Project – if checked, allows proceeding to the testing area without performing a new calibration if a calibration has already been done previously.

9.3. Calibration

This section describes three different calibrations that can be performed when starting a new project.

Regular

Without checking any elimination check-boxes, press Calibrate button. The Dyno will perform a regular calibration. During this calibration, Dyno makes a few slow rotations to calculate and read the following data:

- Stroke – measures and displays the actual stroke that is set in the Dyno
- Zero Tare – measures and displays the preload force and weight of the damper to eliminate it from the Dyno graphs
- Temperature – measures and displays the temperature of the damper

ATTENTION: Make sure the temperature sensor that is located on the Dyno (see section 5.1 Overview) is pointing directly to the body of a shock absorber. For reflective surfaces such as chrome, apply a piece of electric tape.

Gas Pressure Elimination

If the Gas Pressure Elimination check-box is selected, the Dyno, during the calibration run, will measure and read the same data as in regular calibration. In addition, the Dyno will make 2 additional stops to measure the Gas Pressure when the damper is in extended and compressed positions. This gas pressure difference for the current stroke will be eliminated from the Dyno graphs.

Spring Force Elimination

If the Spring Force Elimination check-box is selected, the Dyno, during the calibration run, will measure and read the same data as in regular calibration. In addition, a Spring Rate will need to be entered. This spring rate will be eliminated from the Dyno graphs.

9.4. Warmup

The first test, once entering the testing area after the calibration, is a warmup. It is designed to heat the damper to its working temperature.

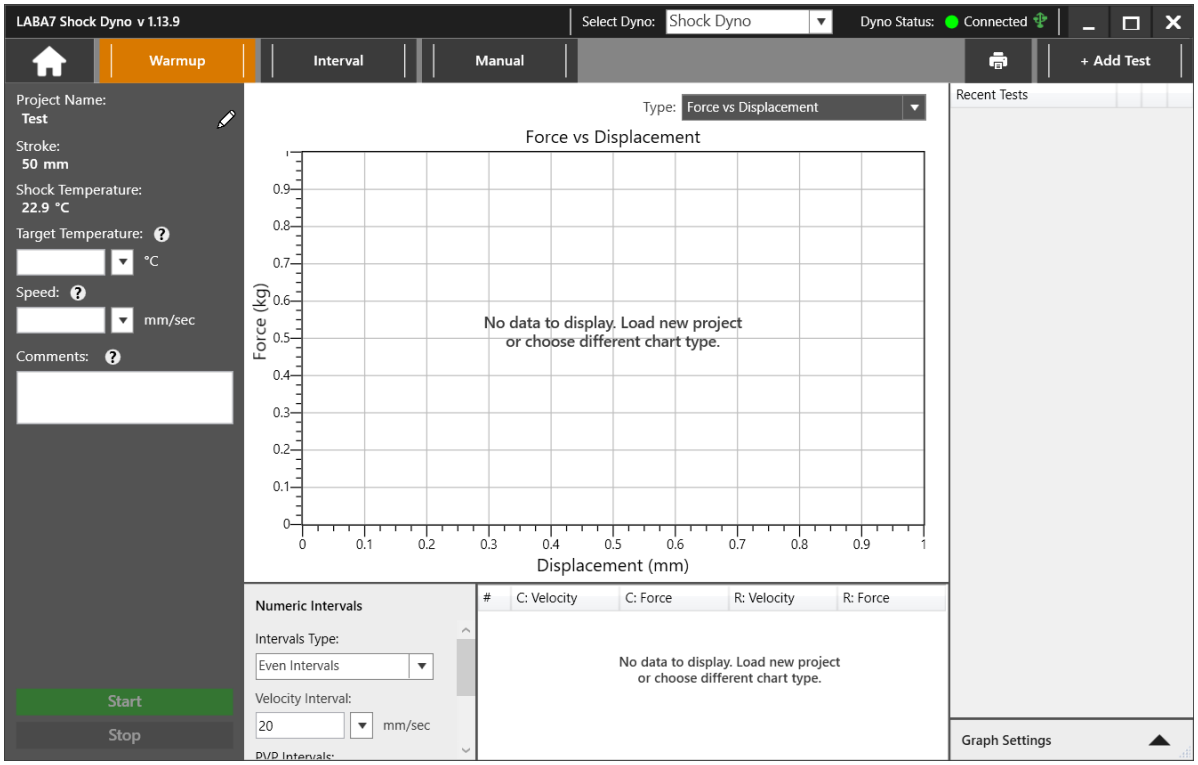

Figure 22

Enter the following information before starting a test:

- Target Shock Temperature – select from the drop-down menu or manually enter the damper's target temperature.
- Speed – select from the drop-down menu or manually enter warmup test's speed.
- Comments – enter any comment that is specific to the test.

Once the Start button is clicked, the Dyno will perform a warmup test. If the measured temperature is already higher than the target temperature, the test will not be performed. The temperature limit of warmup test is 70°C.

ATTENTION: Make sure the temperature sensor that is located on the Dyno (see section 5.1 Overview) is pointing directly to the body of a shock absorber. For reflective surfaces such as chrome, apply a piece of electric tape.

9.5. Interval

The second test, once entering the testing area after the calibration, is an interval. It is the main testing area and is designed to perform single and multiple (PVP) speed tests.

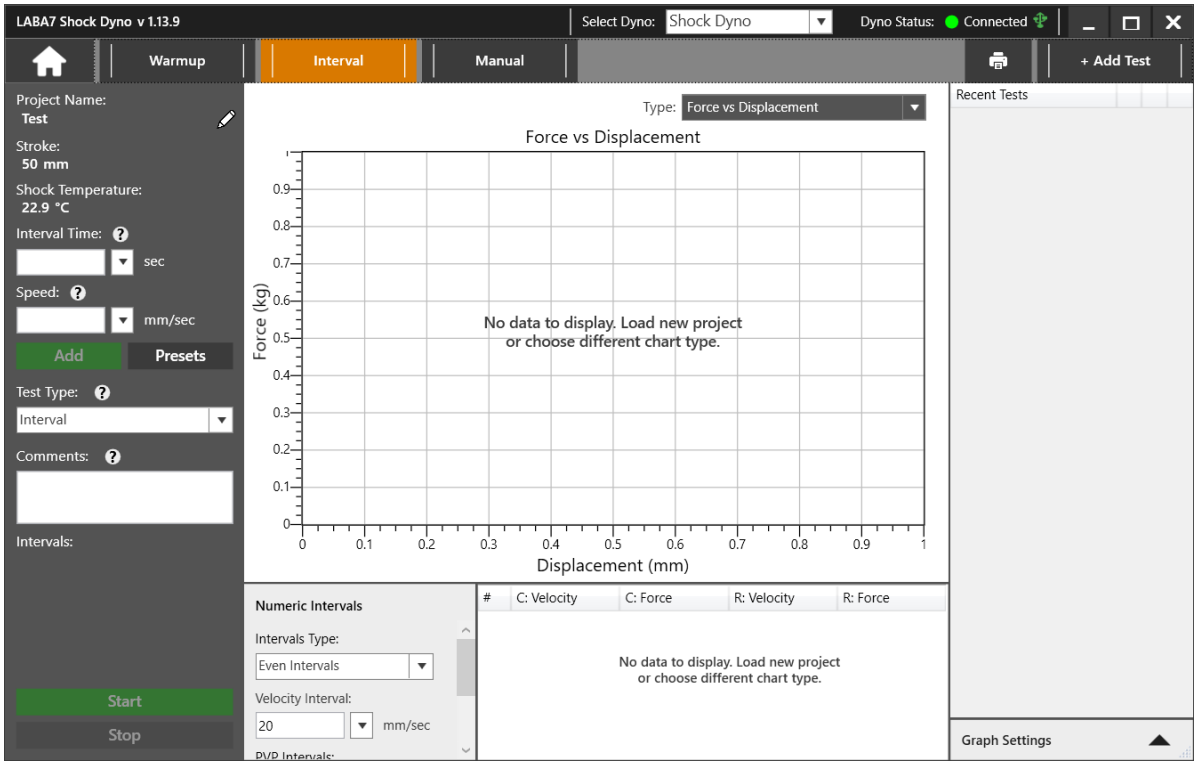

Figure 23

Enter the following information before starting a test:

- Interval Time – select from the drop-down menu or manually the interval test's time.
- Speed – select from the drop-down menu or manually the interval test's speed.
- Add – Click add button to add the interval to the Intervals list.
- Presets – select an already created preset or create a new one. See the next section for more details.
- Test Type – there are 2 available test types:
    - Interval – a simple single-speed test where a new test file will be created after each interval.
    - PVP – a multiple-speed test where a single test file will be created after all the intervals are completed.
- Comments – enter any comment that is specific to the test.

Once the Start button is clicked, the Dyno will perform an interval test. All the intervals that are added to the Intervals List will be performed in sequence.

ATTENTION: In order to create a successful test, Dyno needs to make 3 rotations to gather enough data to calculate all the graphs. If the time speed and stroke combination would result in a test that is not long enough to make 3 rotations, the software will display a warning and increase the required time automatically.

Interval Presets

A new dialog for editing the Presets will be shown by clicking the Presets button. Presets allow the user to quickly select an already defined testing preset and save time by not needing to create intervals each time.

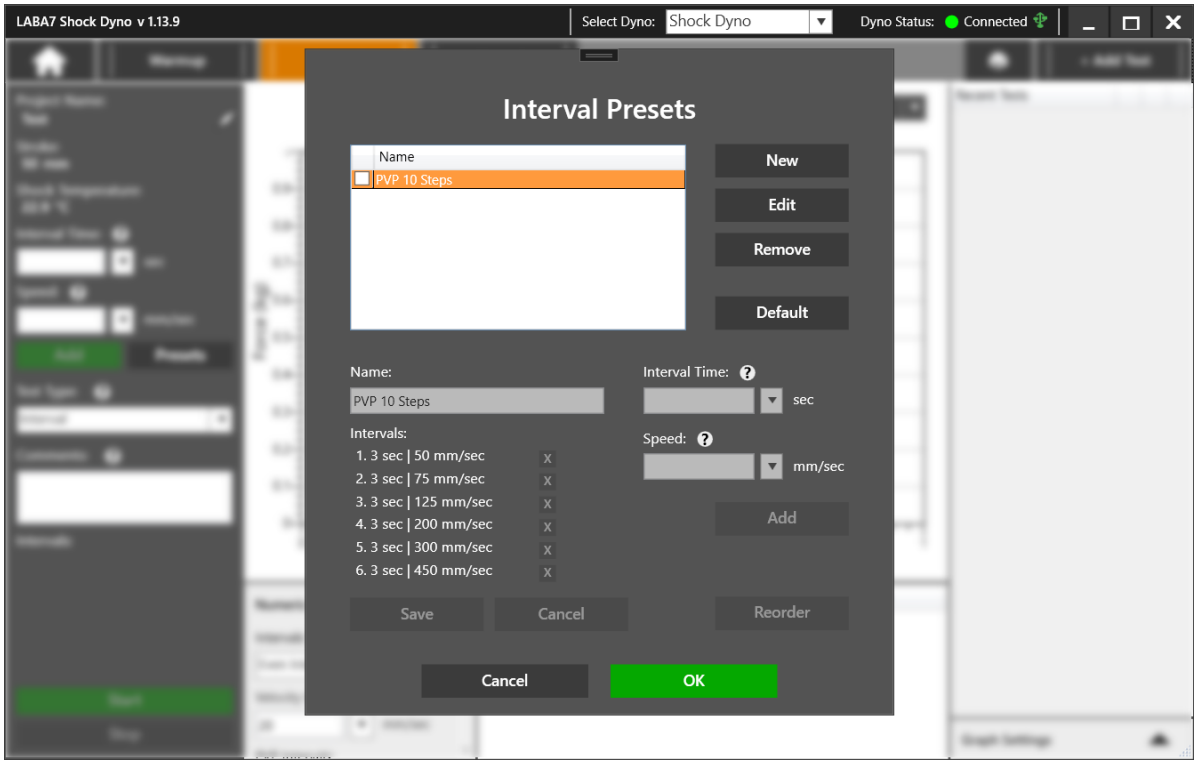

Figure 24

In order to add a new preset, click on the “New” button. Adjust interval times and speed and click on the “Add” button to insert a new interval into the preset.

Once the preset modification is done, click on the “Save” button.

By clicking the “OK” button, the intervals from the selected preset will be inserted into the Interval test.

9.6. Manual

The third test, once entering the testing area after the calibration, is a manual. It is designed for Shock Dyno MID and HEAVY models with a manual control display.

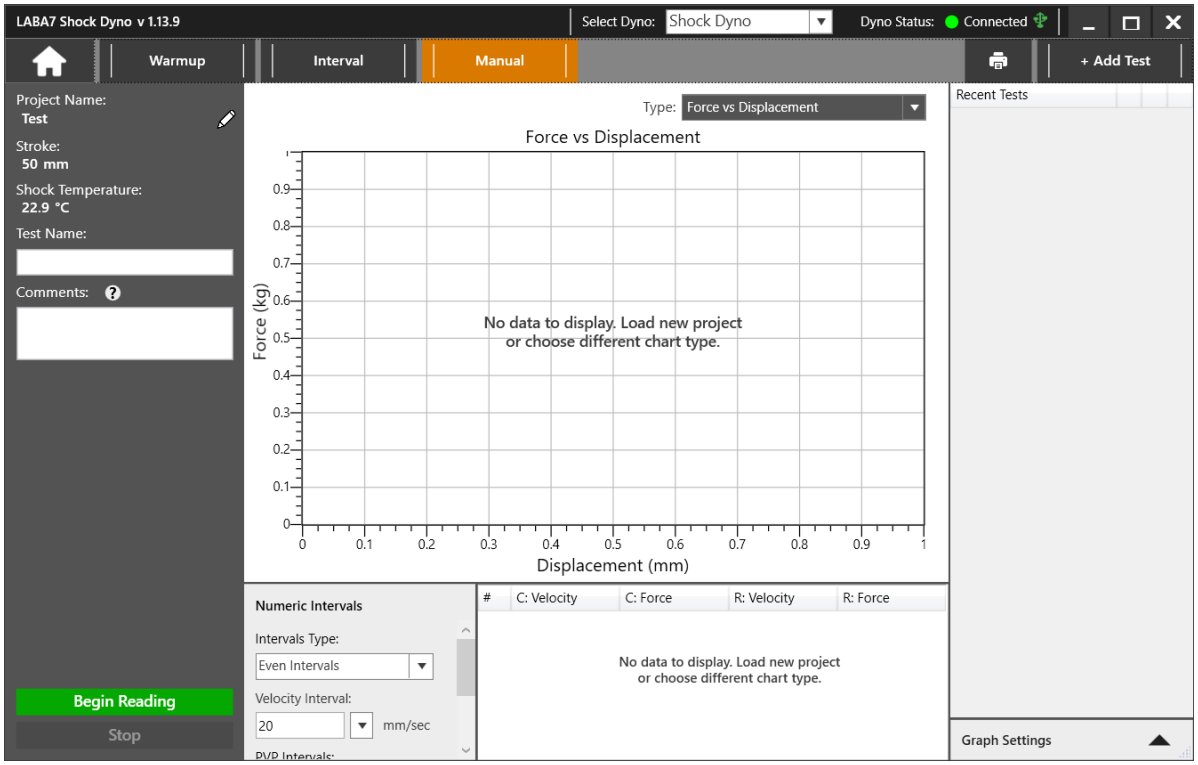

Figure 25

Enter the following information before starting a test:

- Test Name – enter the name of the test.
- Comments – enter any comment that is specific to the test.

Once the Begin Reading button is clicked, the software will read the Dyno data without affecting the motor's control. In order to stop the test, click the "Stop" button.

ATTENTION: Make sure the temperature sensor that is located on the Dyno (see section 5.1 Overview) is pointing directly to the body of a shock absorber. For reflective surfaces such as chrome, apply a piece of electric tape.

9.7. Graph Comparison

In order to compare different graphs together, use the Recent Tests menu on the right side of the application and click on the check-box of the test you want to compare. Up to 20 different tests can be selected for comparison.

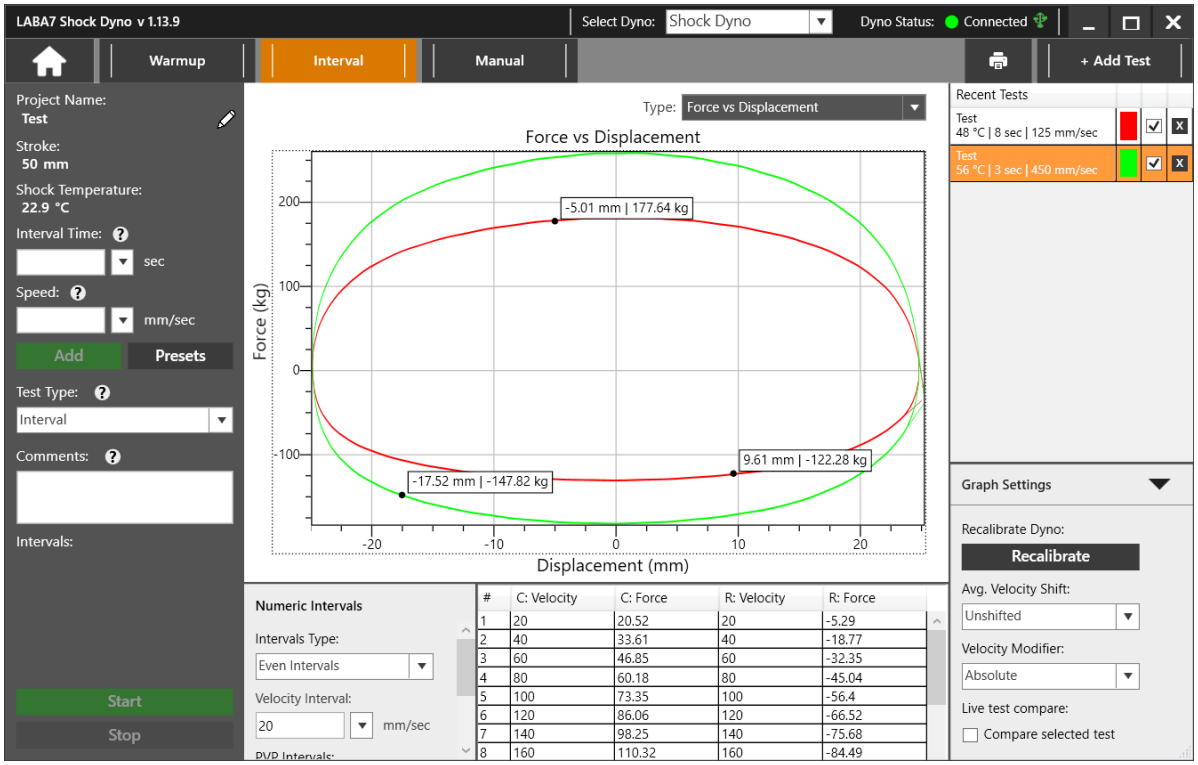

Figure 26

By clicking on the color of the checked test in the Recent Tests list, it is possible to change the color of the graph.

In order to add a visual data point in the graph view, use the left mouse button. There is no limit to the number of data points. Use the right mouse button to clear the data points.

By using the mouse scroll wheel, a user can zoom in or zoom out the displayed graphs. Double-clicking the left mouse button on the graph area will restore the default zoom. It is possible to scroll only on one axis by using the scroll wheel directly over the horizontal or vertical axis label.

9.8. Graph Types

This section describes the different graph types available for each test.

Force vs Displacement

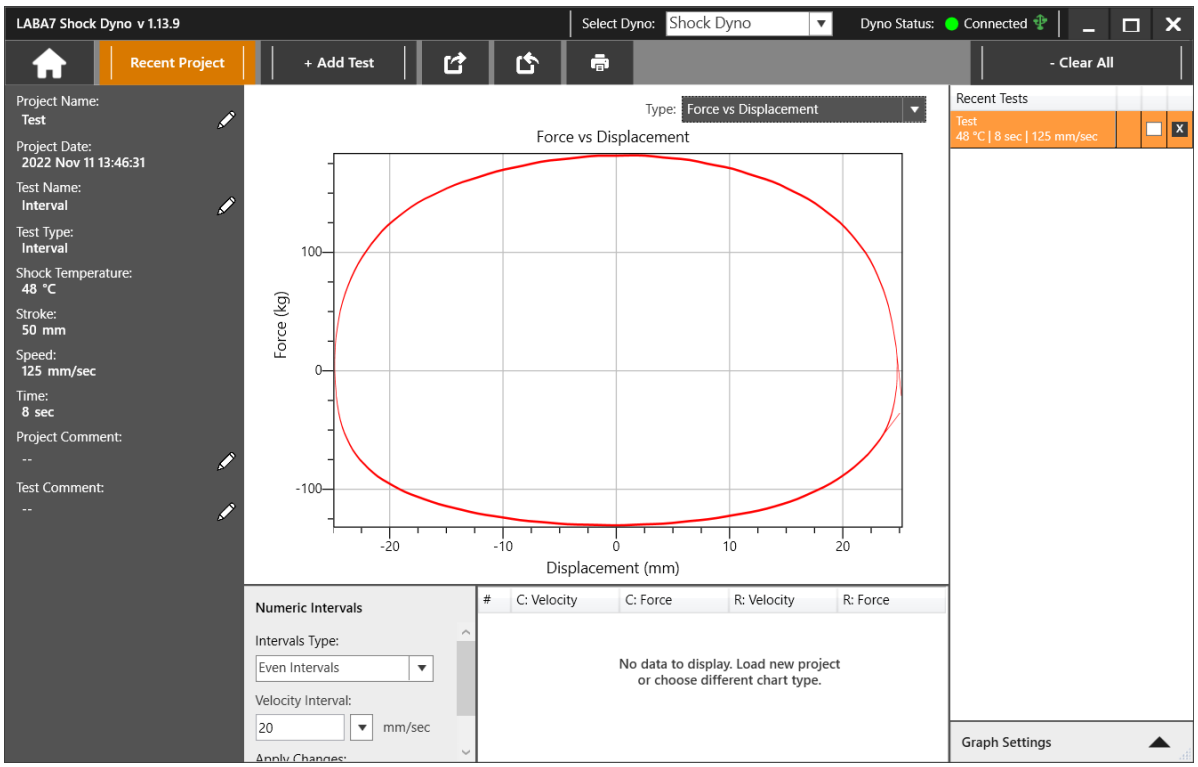

Figure 27

Force vs Displacement is a default graph presented upon launching the application. It is also used for the live test preview whenever a test is being performed.

The horizontal axis represents the displacement. 0 indicates the middle position of the stroke.

The vertical axis represents the force. The positive force in the upper half of the graph represents the compression cycle, and the negative force in the bottom half of the graph represents the rebound cycle.

The left side of the compression and the right side of the rebound represents the speed-up, and the right side of compression and the left side represents the slow-down of corresponding cycles.

Avg. Force vs Displacement

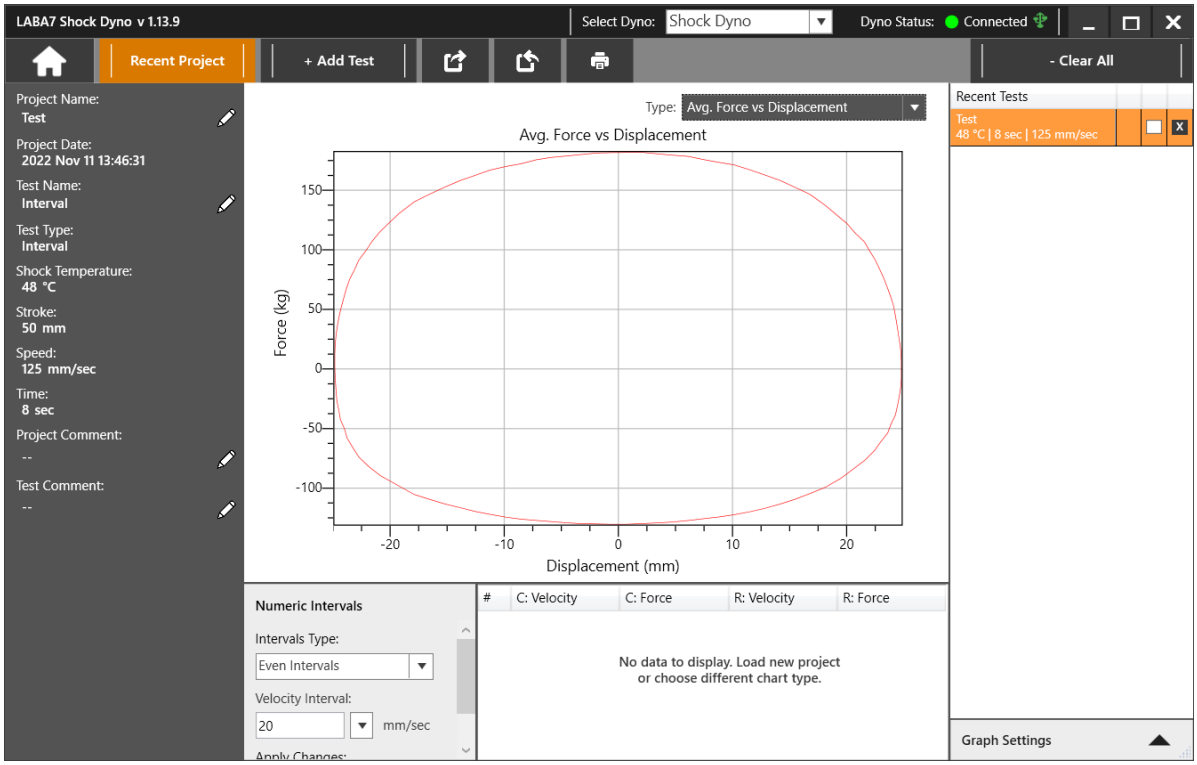

Figure 28

This graph is similar to Force vs Displacement graph; however, it averages the test into a single line, resulting in a graph without the hysteresis.

For details about the axes and compression/rebound cycles, see the section above.

Force vs Velocity

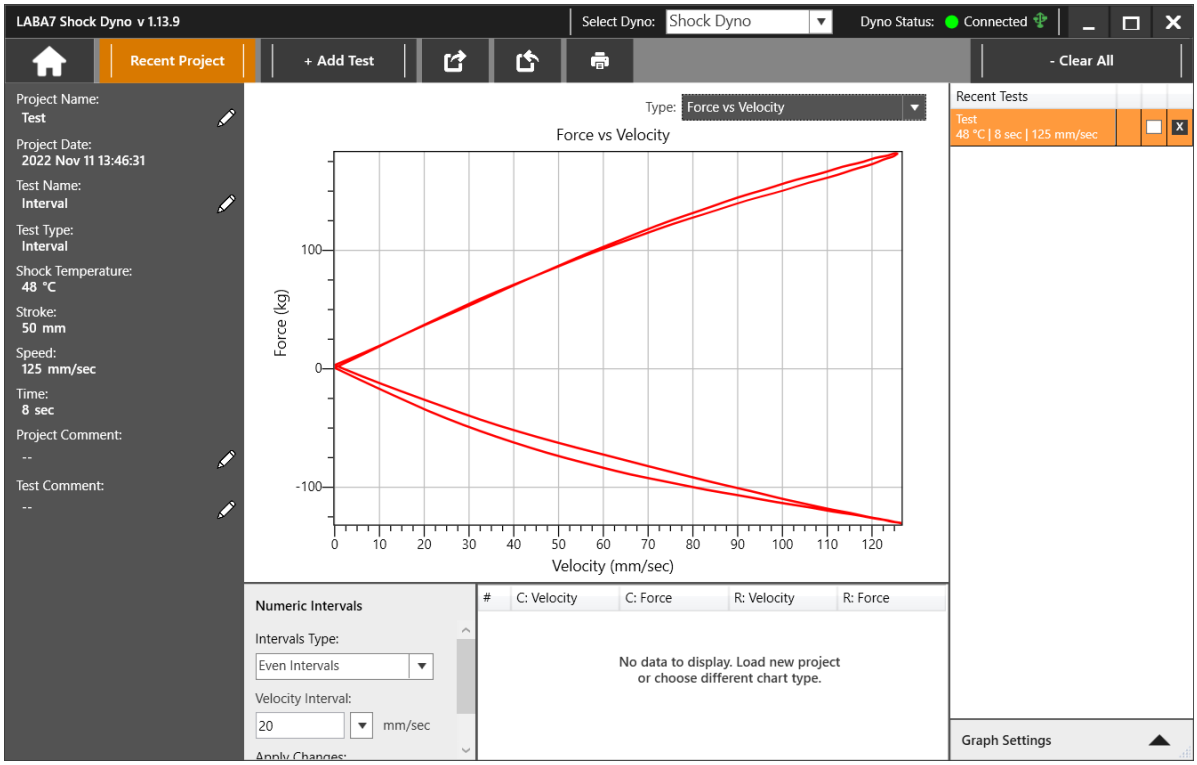

Figure 29

Force vs Velocity graph represents the change in force when the damper is compressed or released at a variable speed.

The horizontal axis indicates the linear speed of the damper, and the vertical axis indicates the resulting force.

The positive force at the top half of the graph represents the compression cycle and the negative force at the bottom half of the graph represents the rebound cycle.

Force vs Avg. Velocity

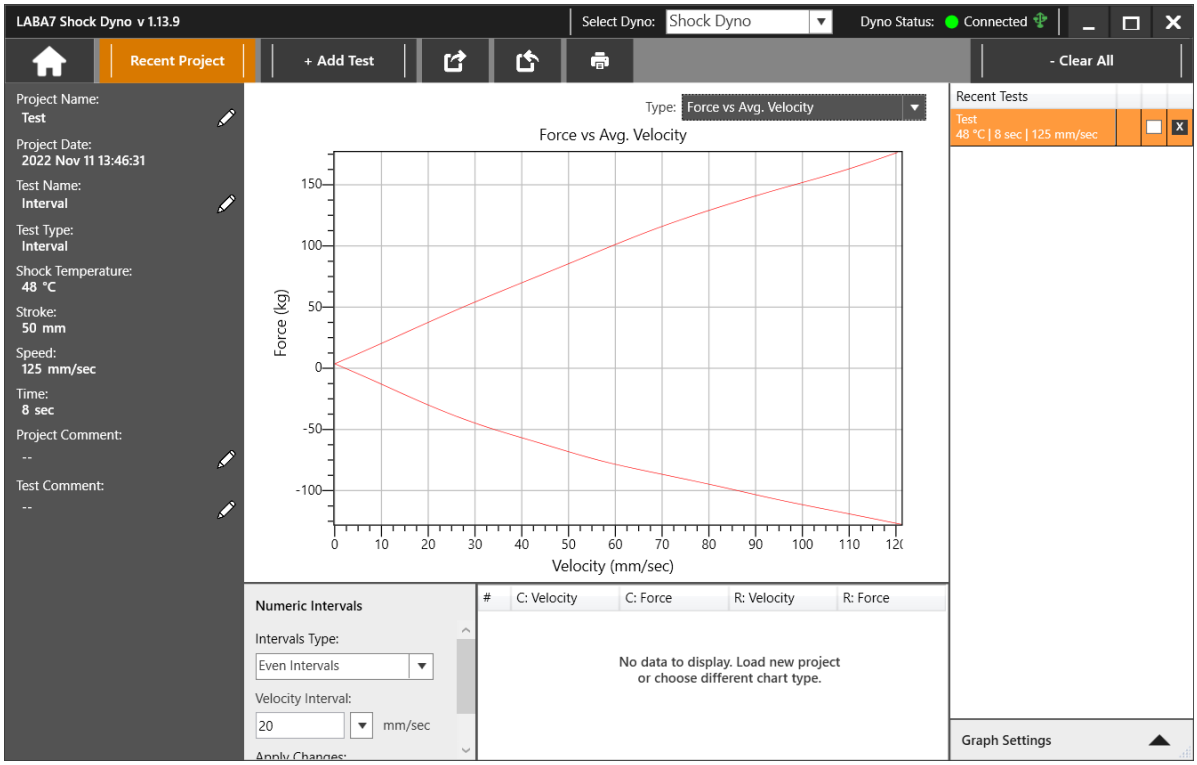

Figure 30

Force vs Avg. Velocity graph represents the average change in force for variable velocity. This graph is similar to Force vs Velocity; however, it shows the graph without the hysteresis. Furthermore, the speed-up and the slow-down of both compression and rebound cycles also averaged into a single line.

For details about the axes and compression/rebound cycles, see the section above.

Force vs Combined Velocity

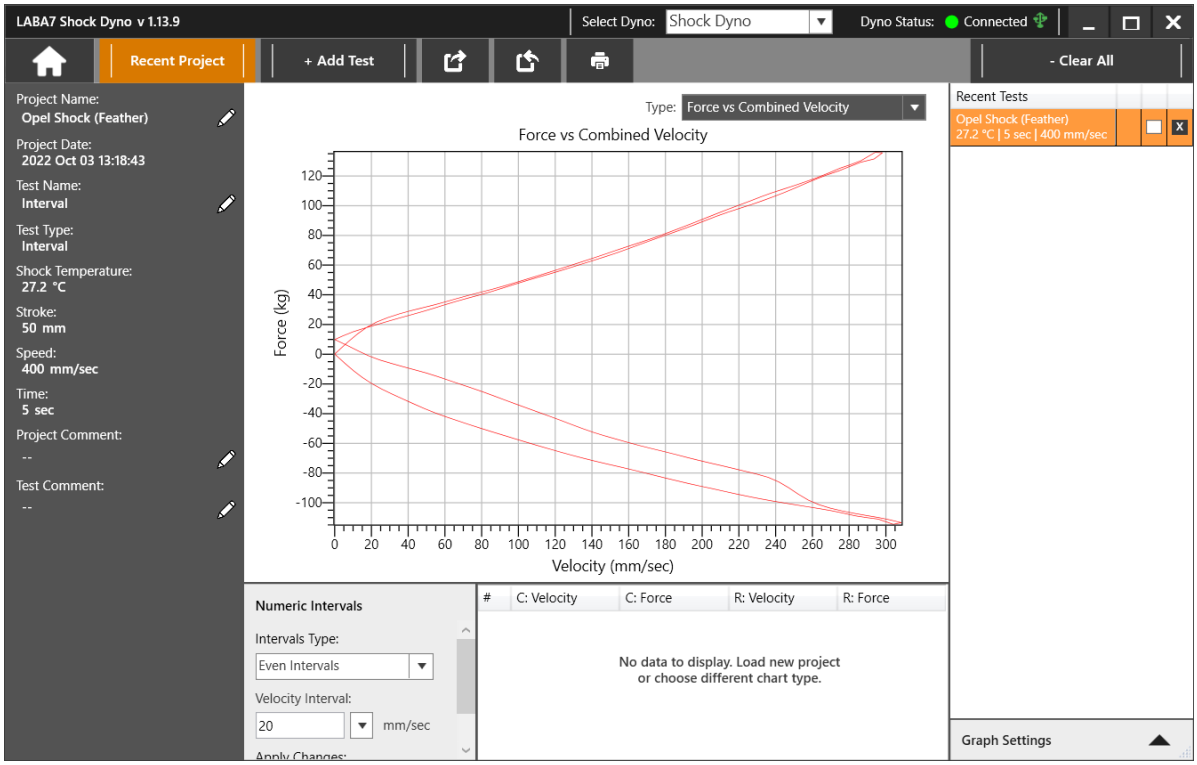

Figure 31

Force vs Combined Velocity graph represents the average change in force for variable velocity. This graph is similar to Force vs Velocity; however, it shows the graph without the hysteresis. The main difference between this graph and Force vs Avg. Velocity is that the speed-up and the slow-down of both compression and rebound cycles are shown as separate lines rather than being collided into a single one.

For details about the axes and compression/rebound cycles, see the section above.

Force vs Displacement (PVP)

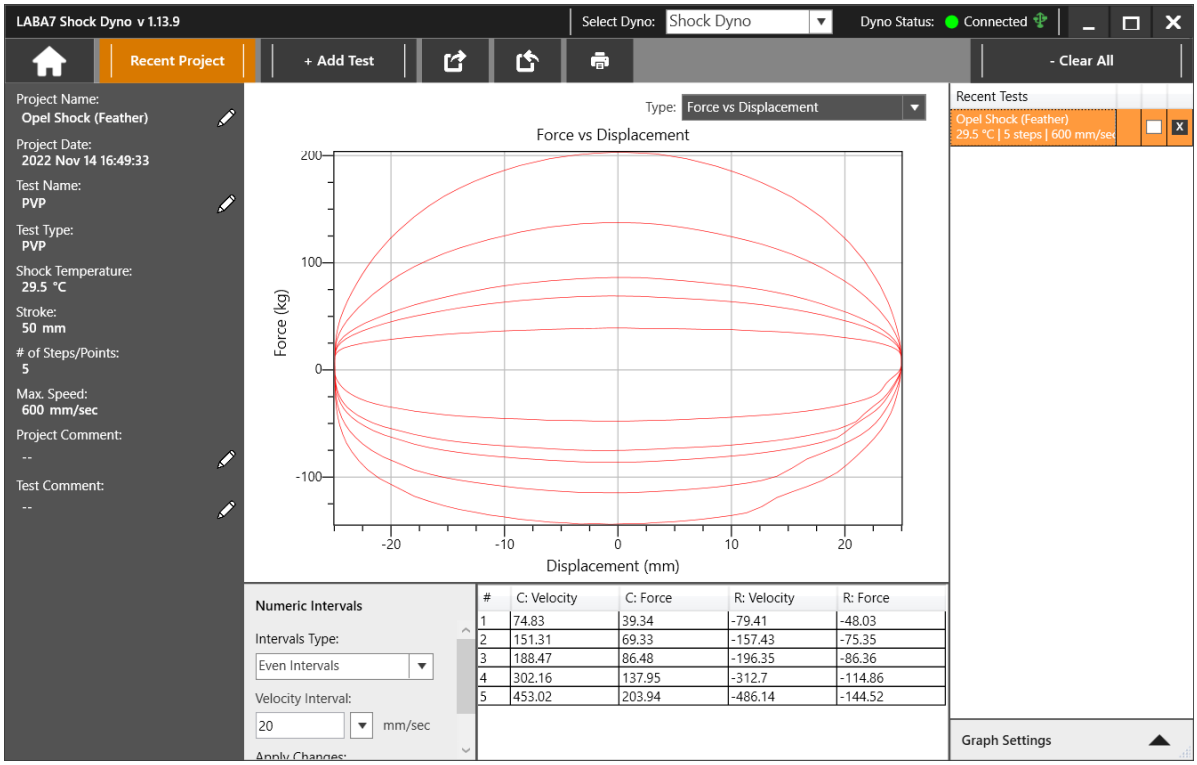

Figure 32

Force vs Displacement graph for peak velocity plot tests represents the average change in force for a variable displacement, however, it is a multiple speed test (see section 9.5 Interval), and the graphs from different individual intervals are combined into a single test.

For details about the axes and compression/rebound cycles, see the section above.

Force vs Peak Velocity

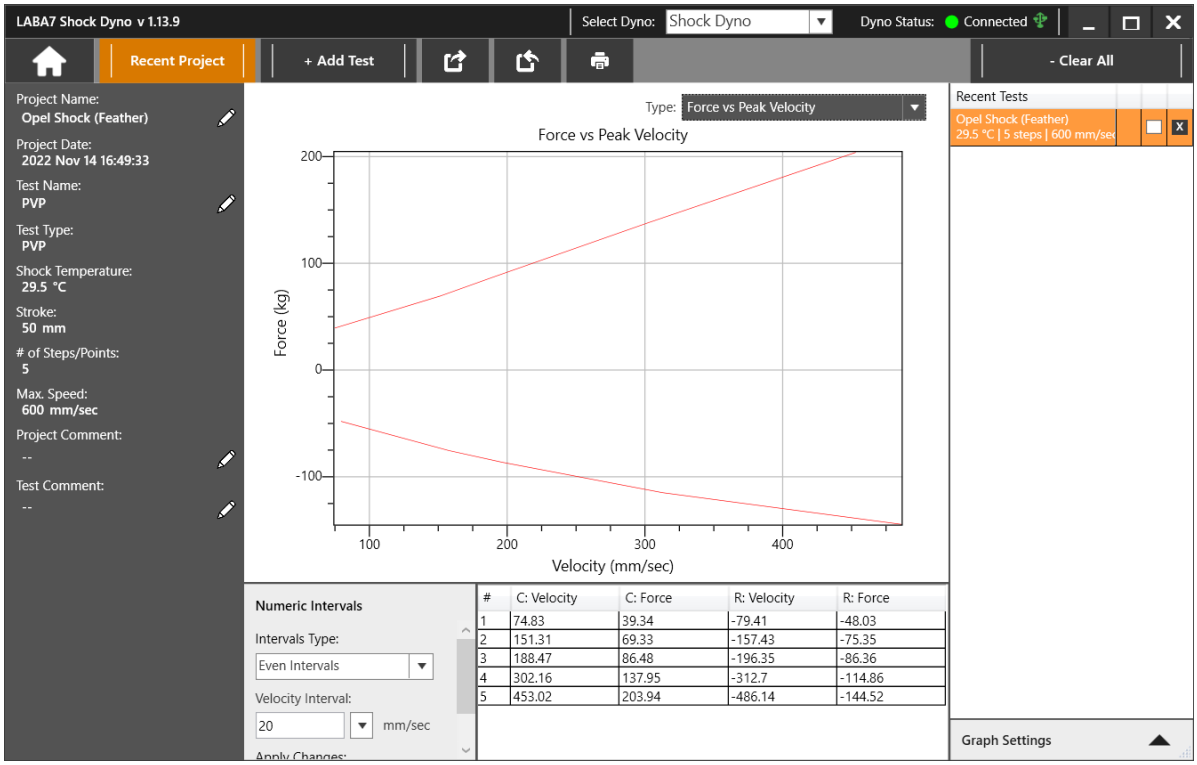

Figure 33

Force vs Peak Velocity graph is available only for multiple speed (PVP) test types.

The horizontal axis indicates the linear speed of the damper, and the vertical axis indicates the resulting force.

The graphs consist of a limited number of data points equal to the number of different speed intervals for both compression and rebound cycles. Each point represents a force at peak velocity for each interval.

Force vs Time

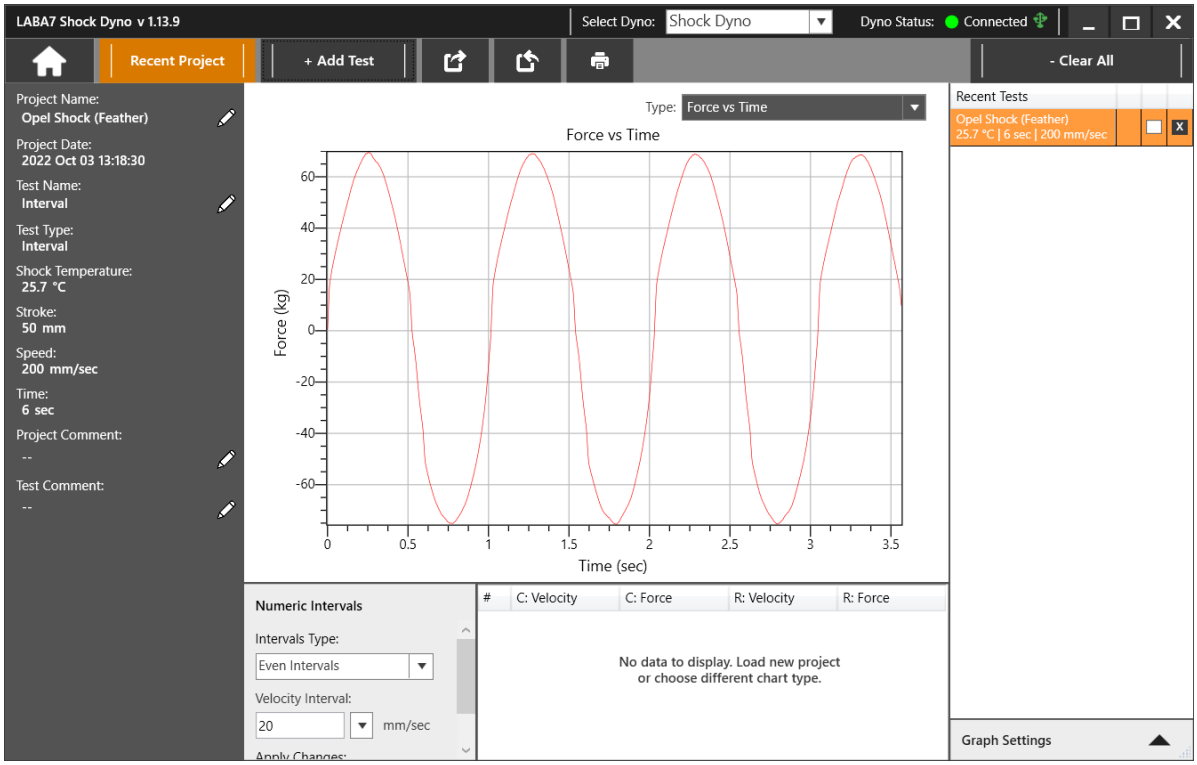

Figure 34

Force vs Time graph represents the force change in time.

The horizontal axis indicates the time, and the vertical axis indicates the change in force.

Such a graph can bring value to the user as it shows the change in the force for each different rotation of the Dyno throughout the whole test and can display details otherwise hidden in the Force vs Displacement graph.

Temperature vs Time

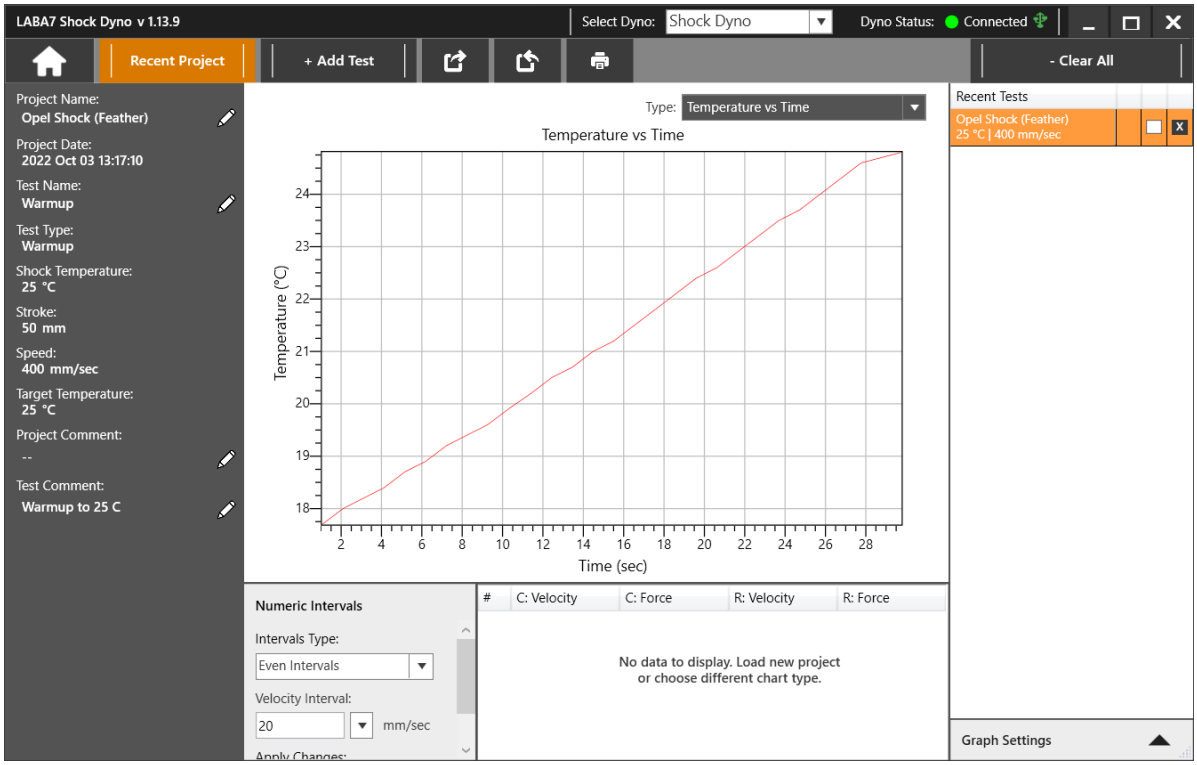

Figure 35

Force vs Temperature graph represents the warmup of the damper. It is not only available for the warmup test but also the interval or PVP test.

The horizontal axis indicates the change in time, and the vertical axis indicates the temperature change. The software has a temperature limit of 130°C.

9.9. Numeric Graph Data

A numeric graph data section is in New Project area and in Open area at the bottom of the screen. It displays the values of Force and Velocity for compression and rebound separately. The forces and velocity list is automatically updated whenever the selected test changes or the user clicks on the “Apply” button.

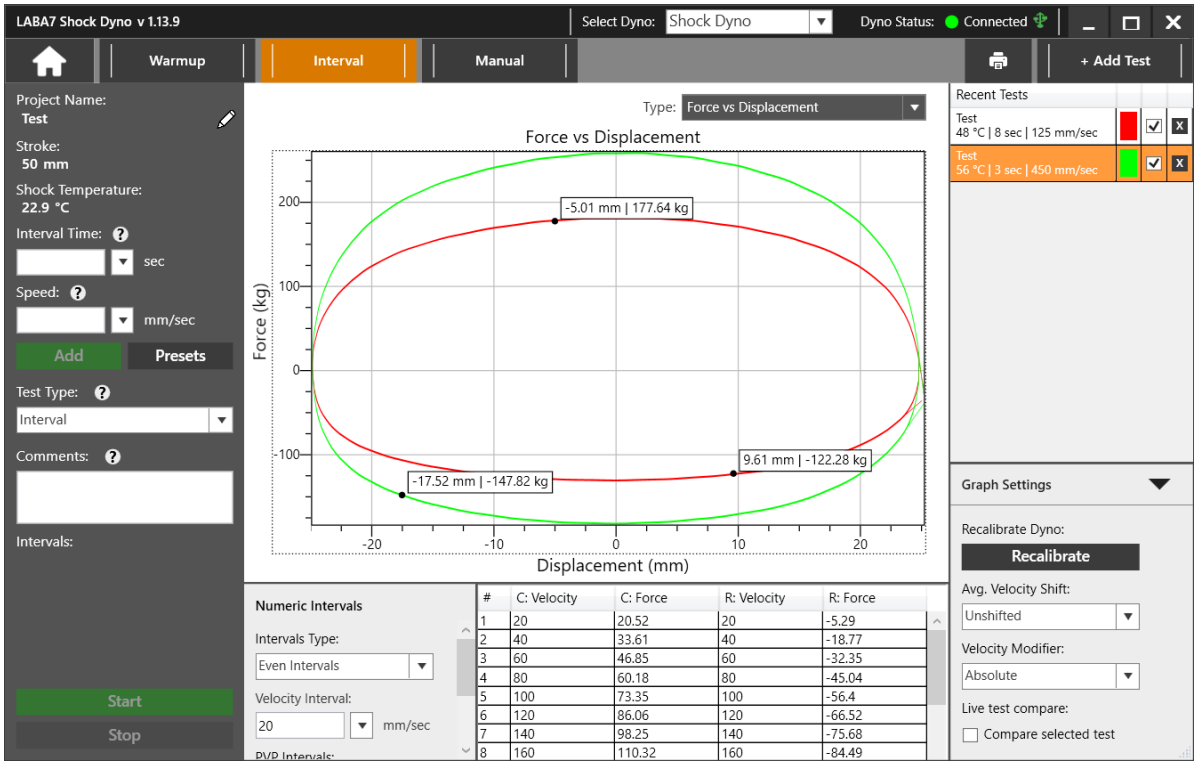

Figure 36

User can change the default velocity interval or create custom intervals by adjusting the Numeric Intervals settings:

- Intervals Type – select between even intervals or custom option.
  - Even Intervals – automatically calculates forces and velocity based on provided velocity interval step
  - Custom – allows user to define custom intervals.
- Velocity Interval – select from the drop-down menu or manually enter the velocity step between intervals.
- PVP Intervals – select between original and custom options
  - Original – displays the peak force and velocity of original multiple speed intervals
  - Custom – applies data interpolation and calculates the force for user-defined intervals
- Apply – applies changes to interval settings.

If a custom interval type is selected an additional option to modify the custom intervals appear. By clicking the “Modify” button a new Numeric Intervals dialog will appear.

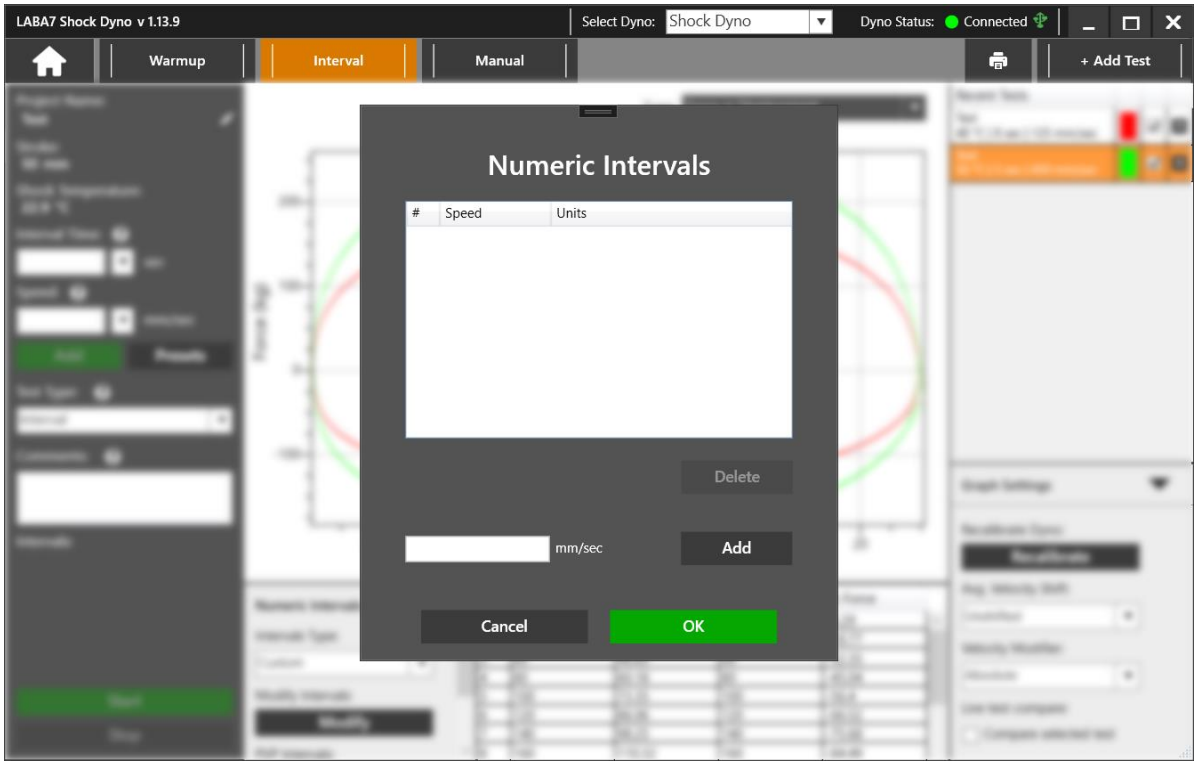

Figure 37

After entering a custom velocity value in the text box, a user can click “Add” in order to insert the custom speed into the table.

Clicking the “Delete” button will remove the selected custom interval from the list.

Clicking the “OK” button will save the modifications.

9.10. Additional Test Options

In the New Project and Open project areas, additional test options are available. Those options can be accessed by expanding the “Graph Settings” area at the bottom right side of the screen or by clicking a right-mouse button on the “Recent Tests” list.

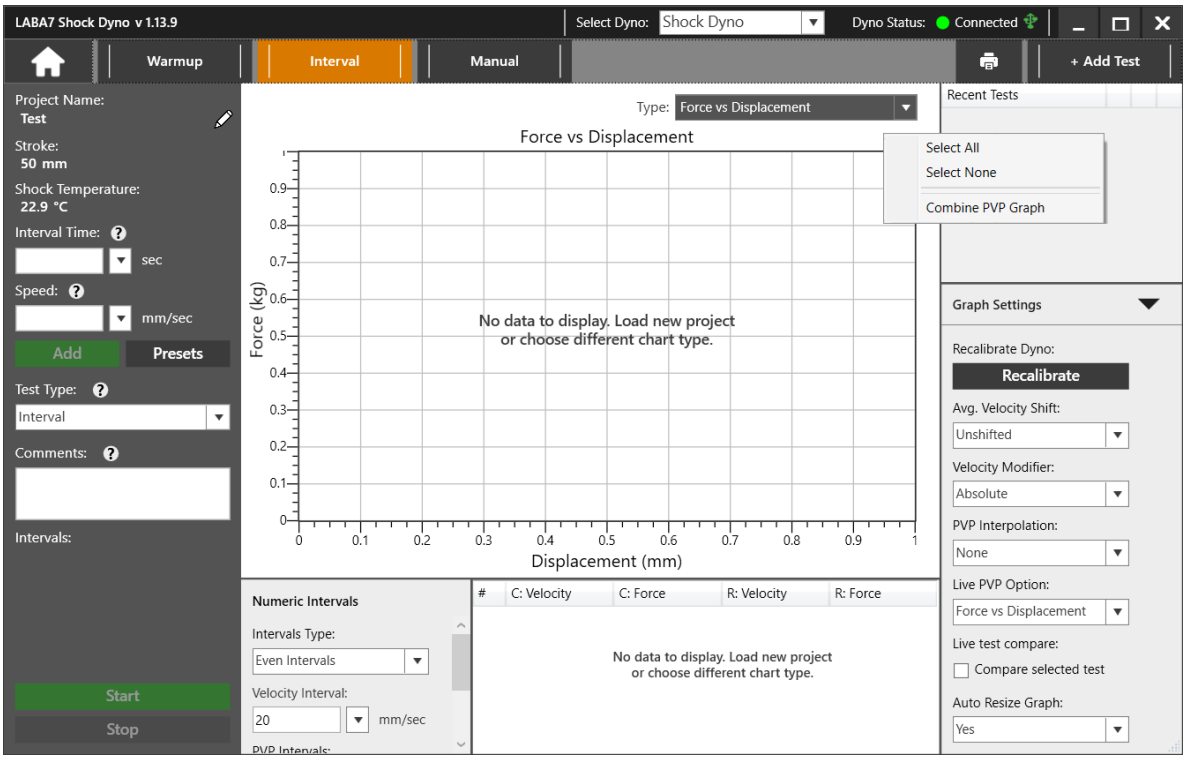

Figure 38

- Recalibrate – repeats the exact calibration that has been done upon creating a new project. When re-calibrating, the Dyno will measure the preload force and update the zero-tare value, which could shift after the damper gets warmer from testing
- Avg. Velocity Shift – shifts force axis to 0 or leaves it untouched when viewing a Force vs Avg. Velocity graph.
- Velocity Modifier – changes how velocity is presented in the graphs, either as a positive or negative speed for a rebound cycle.
- PVP Interpolation – enables Peak Velocity graph interpolation, which fits the curve with new data points and smoothens the line.
- Live PVP Option – enables a Peak Velocity graph preview during a live test.
- Live Test Compare – if checked, an additional selected graph will be displayed in the background during a live test.

- Auto Resize Graph: if enabled, the application will automatically resize the graph to fit the screen after selecting one or more graphs for comparison. If disabled, the user defined zoom will be kept unchanged. Double-clicking on the graph will resize the graph to fit the screen.
- Select All – contextual menu accessible by right-clicking the “Recent Tests” list – selects all tests.
- Select None – contextual menu accessible by right-clicking the “Recent Tests” list – deselects all tests.
- Combine PVP Graph – contextual menu accessible by right-clicking the “Recent Tests” list – combines all selected single speed interval tests into a PVP graph.
- Copy “New Project” Tests – contextual menu accessible by right-clicking the “Recent Tests” list – copies all available tests from the New Project area into the Open area.

9.11. Open Project

An open area that is designed to review and compare already created tests.

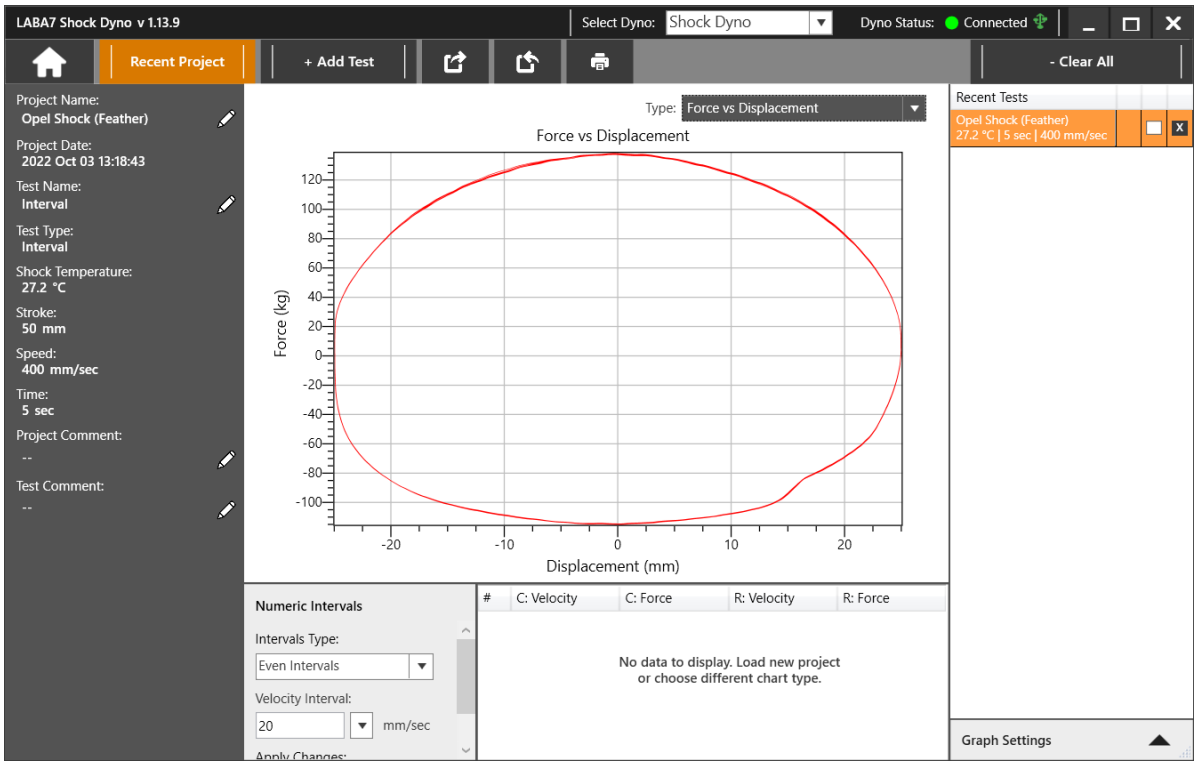

Figure 39

The main area presents the information of a test in the column on the left side. In addition to the graph viewing and comparing similar features in “New Project”, the open area provides a data import and export feature (see section 9.14 Data Import and Export).

9.12. Settings

In the Settings menu, accessible through the main menu, a user can modify the settings related to the general use of the application and custom features related to the graph view.

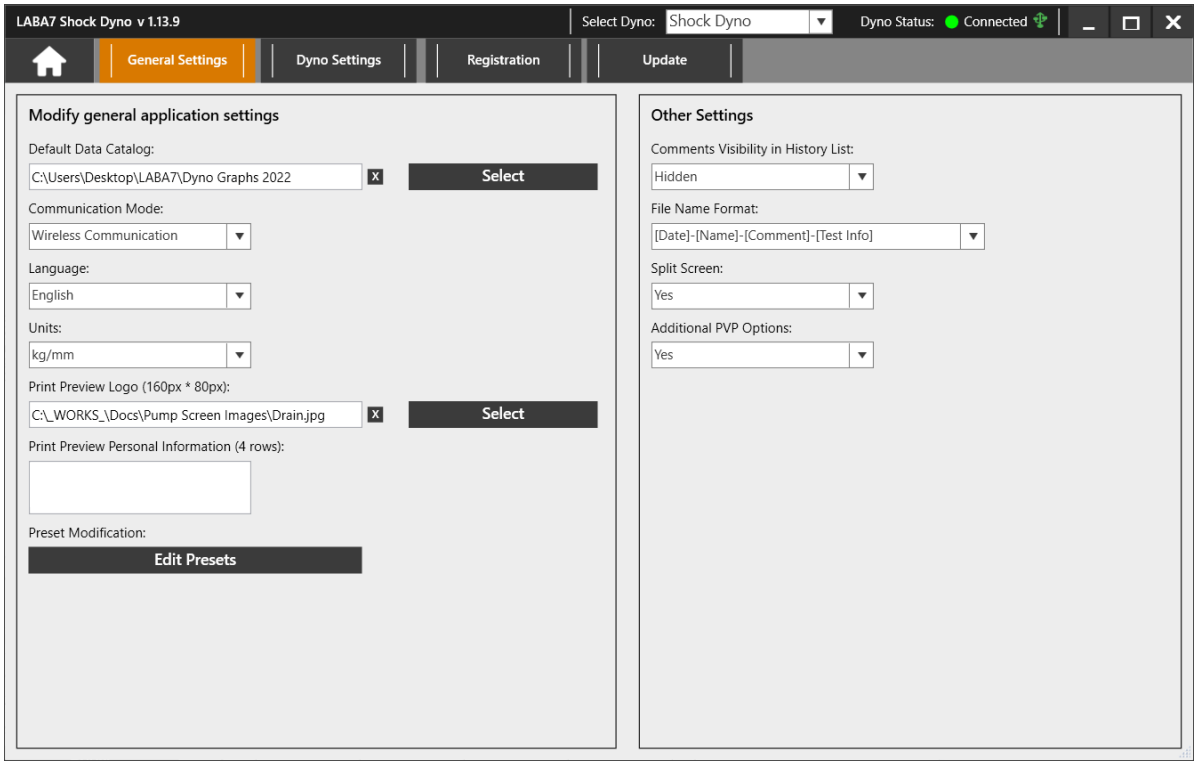

Figure 40

General Settings

- Default Data Catalog – change the default location where the application will store tests.
- Communication Mode – change between USB or Wireless communication (see section 8.3 Configuration for more details)
- Language – change to a different user interface language
- Units – allows user to change different units of measurement. Upon changing the units, the application will ask for a restart.
- Print Preview Logo – choose an image file that will be visible on a print preview in the upper left corner.
- Print Preview Personal Information – enter any information that is going to be visible on a print preview in the upper right corner.
- Preset Modification – allows the user to access the preset modification window (for more details, see section 9.5 Interval).

Other Settings

- Comments Visibility in History List – shows or hides the additional comments line in a “Recent Tests” list.
- File Name Format – allows the user to change the file naming format used to save files in the chosen data catalog.
- Additional PVP Options – shows or hides the additional PVP options such as PVP Interpolation or Live PVP Option.
- Split Screen – enables a split screen mode that displays 2 separate graphs in both “New Project” and “Open” areas. These graphs can be viewed and changed independently, allowing more details to fit the screen.

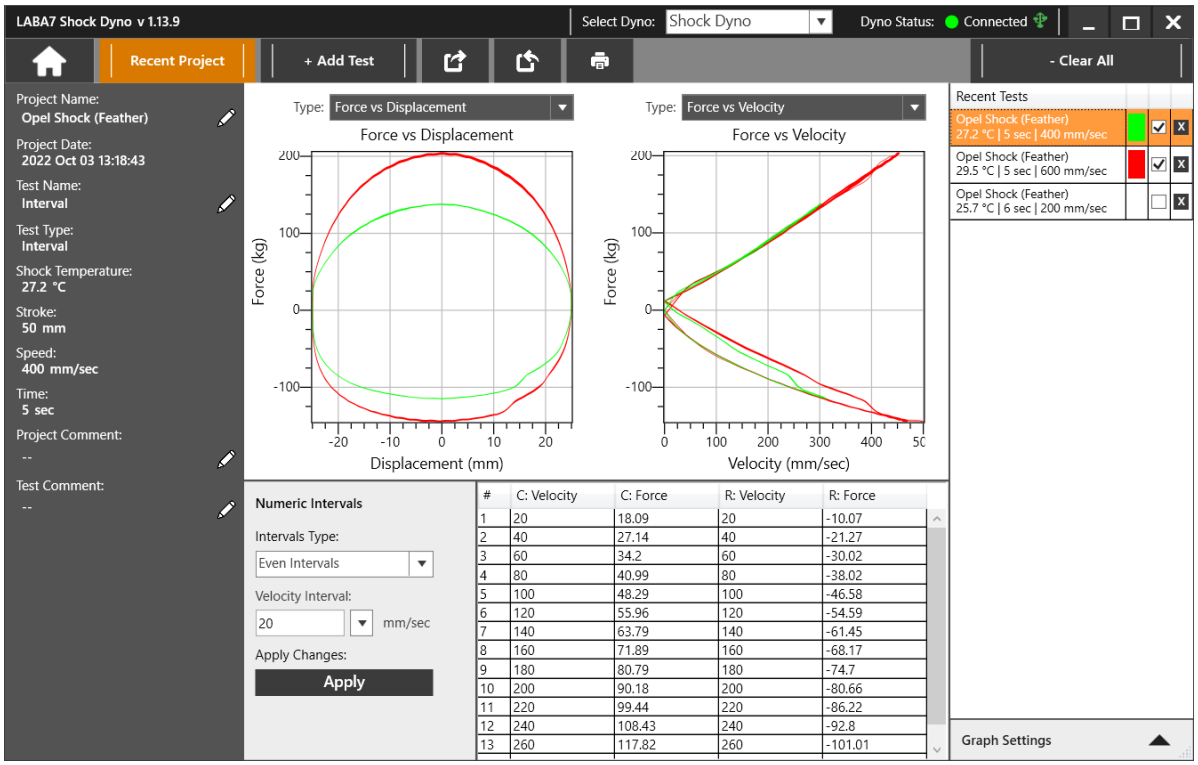

Figure 41

Registration

An area for registering the software. Contact LABA7 support for a license.

Update

An area for updating the firmware in the Shock Dyno.

9.13. Printing

The application allows users to print the test from the New Project or Open areas. The information in the printout matches the graph view in the application, meaning that comparing different tests or if data points are added to the graph, it will be visible in the printout. To access the printing menu, click on the printer icon in the status bar.

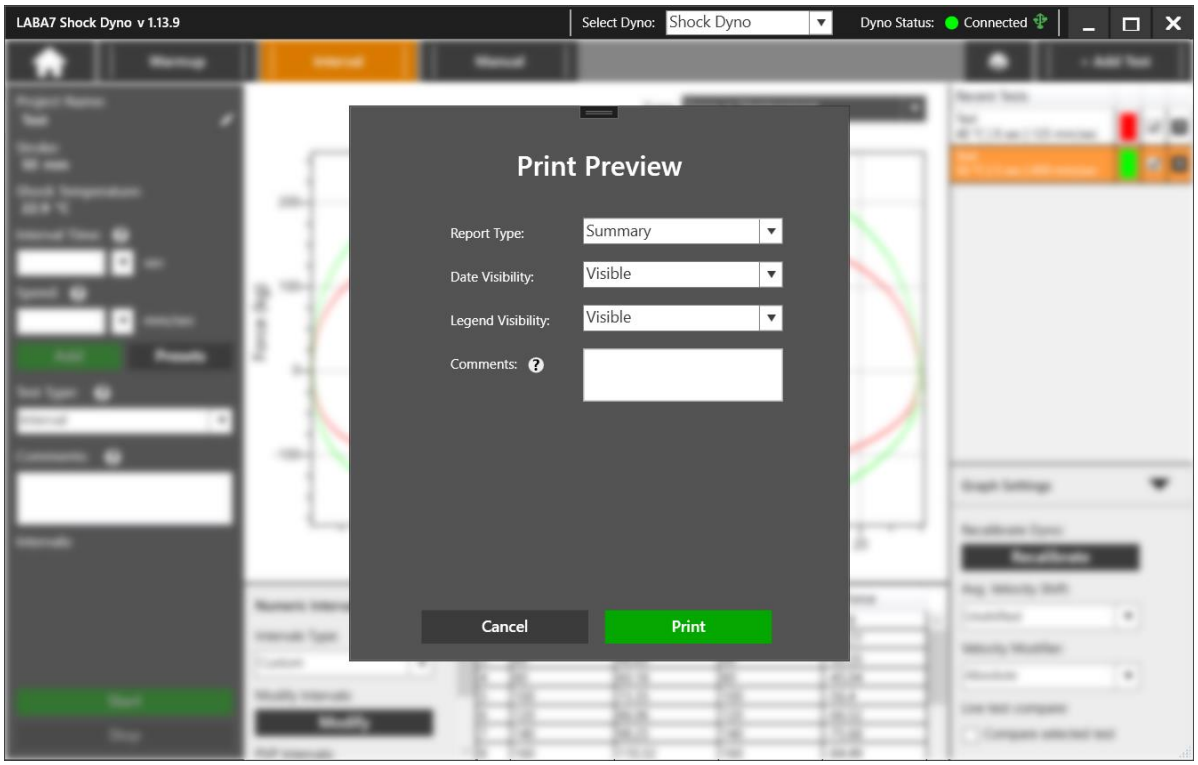

Figure 42

- Report Type – select between Summary or Detailed Report types.
    - Summary will give you a single-page report with the selected graph view and summary test information.
    - Detailed view is available for PVP tests or in Split Screen mode. This report shows 2 different graphs and summary of information about the test.
- Date Visibility – show or hide the date of when the printout was generated (it appears at the bottom of the page).
- Legend Visibility – show or hide graph legend.
- Comments – add additional comments that are visible only in the printout.

9.14. Data Import and Export

From an “Open” project area it is possible to export selected test as well as import a test from outside sources. Click on corresponding Import / Export icons to access the menu.

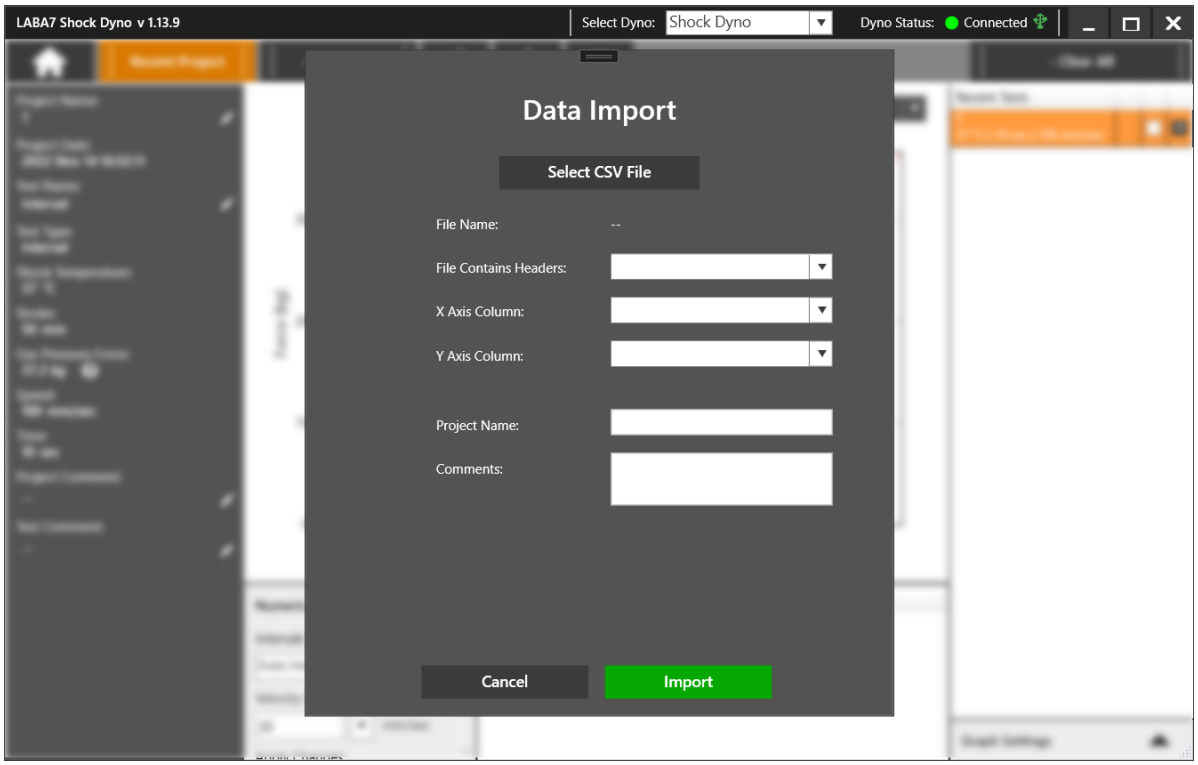

Figure 43

Data Import

Select a CSV file format that consists of 2 numeric columns separated by a comma. After opening a CSV file, enter the following information in the Import Dialog:

- File Contains Headers – choose if the first row of the CSV file is a header row.
- X-Axis Column – select which data column contains the X-axis values.
- Y-Axis Column – select which data column contains the Y-axis values
- Project Name – enter the name of the project that will be used inside the application.
- Comments – enter any comments related to the imported test.

ATTENTION: Imported tests are not tied to any specific graph type and can be used to compare with any other test. However, they do not carry numeric interval values of Force/Velocity.

Data Export

To export a selected test, click on the export icon. A dialog will appear showing the data that is going to be exported. Click the “Export” button to save the data as a CSV file.

10. Troubleshooting

This section defines the most common issues that can arise when using the Dyno related to communications, data transfer, application, or mechanical issues and what steps to take in order to fix them.

10.1. General

Issue	Solution
Dyno is not responding, unable to communicate.	Both, Dyno and the application, might be stuck on a loop, or a cache of either one can be full. Restart the Dyno (powering it off and unplugging the USB cable for 1 minute) and restart the application on a computer.
Application is frozen or stuck on a Please Wait dialog and cannot be closed.	Close the application through the Task Manager. If application is stuck on a USB connection, unplug the USB cable to properly shut down the application.
Dyno stops during the test, and when running another test, dyno is not running, only noise is seen on the graph.	During the previous test motor has reached overload, restart the machine.
Cannot communicate with Dyno over USB, Com Port does not appear in the selection.	Reconnect the USB cable (check the sockets on both ends – computer and Dyno). If the issue persists, try a different USB cable, as the latter might be damaged.

10.2. Wi-Fi Configuration

Issue	Solution
Cannot configure Wi-Fi parameters.	The communication mode in Dyno is incorrect. Change the communication mode.
Cannot change communication mode.	The com port number might be incorrect. Select the proper com port number and try again.
Cannot connect to router.	The router might not allow new connections; check the router settings or restart it.

	Check for typos, if caps lock is enabled, re-enter credentials.
Dyno is connected but status appears to be offline.	Computer is not connected to the same network as the Dyno. Reconnect device to the same network or reconfigure the Dyno.

10.3. Wi-Fi Operation

Issue	**Solution**
Test fails after starting it.	The router cache might be full, resulting in reduced bandwidth. Restart the router.
	Dyno might be receiving a weak signal. Make sure the Dyno is in an open area and the router is in of sight of the Dyno.
Test completes, but the data is missing packets, straight lines are visible across the graph or bad graph data is show.	The signal is unstable, or the router/application cache is full. Restart the application, router, and/or Dyno.
Unable to start a test, Dyno appears offline.	The IP address that is assigned to the Dyno by the router might have changed. Connect the USB cable, go to the Settings, select the proper com port and click on the Read Status button. If the Dyno is connected to the router, the application will update the IP address.

10.4. USB Configuration

Issue	**Solution**
Cannot change communication mode.	The com port number might be incorrect. Select the proper com port number and try again.

10.5. USB Operation

Issue	Solution
Test fails after starting it, lost data packets appear in the graph.	Windows USB driver is busy and cannot receive all the data coming from the Dyno. Close all unwanted programs on the computer, check if Windows updates are not running or an Antivirus is not making a scan, and try again.
Unable to start a test, Dyno appears offline.	The com port number for the Dyno assigned by Windows might have changed. Go to settings and select the proper com port number in the Dyno select on the area.
Test completes, but the data is missing packets, straight lines are visible across the graph or bad graph data is show.	The signal is unstable or the router/application cache is full. Restart the application, router, and/or Dyno.

10.6. Mechanical Failures

Issue	Solution
Dyno will not operate when attempting to start a test.	Make sure the red stop buttons are released prior to starting the test.
Shock keeps shifting/does not hold in place when running compression.	Make sure to insert both horizontal and vertical screws to secure it within the Dyno to hold it in place.
Dyno will not power on/communicate with software	Check if the power grid cable is compatible with the socket.
The device power switch does not light and the device does not start.	Unplug the power cable and change the fuse near the power switch. Fuse parameters: 5×20/10A.

10.7. LED Light Indicator

Light Color	Meaning
Orange	Dyno is starting up after power on, please wait.
White	Configuration is incomplete or the Wi-Fi network is not available. Follow the Software Setup section.
Red	The Emergency Stop button is engaged or the doors are open.
Blue	Dyno is connecting to the wireless network. Please wait.
Yellow	Dyno is ready for the operation.
Green	Operation in progress. Please wait until the operation completes.

ATTENTION: In case the issues persist, contact Laba7 support team for help.

11. Speed to load table

Featherlight Dyno:

Featherlight (60hz, 7.2reduction, 2.2kW)					
Stroke (mm)	**10**	**25**	**50**	**75**	**100**
Max load (kg)	2635	1143	519	380.8	286
Max speed (mm/sec)	131	327	654	982	1309

Featherlight (90hz, 7.2reduction, 2.2kW)					
Stroke (mm)	**10**	**25**	**50**	**75**	**100**
Max load (kg)	2357	941	470	314	235
Max speed (mm/sec)	187	490	982	1472	1963

Featherlight (130hz, 7.2reduction, 2.2kW)					
Stroke (mm)	**10**	**25**	**50**	**75**	**100**
Max load (kg)	775	311	156	103.5	77.5
Max speed (mm/sec)	280	709	1418	2128	2837

Light Dyno:

Light (60hz, 7.8reduction, 2.2kW)							
Stroke (mm)	**10**	**25**	**50**	**75**	**100**	**120**	**150**
Max load (kg)	3993	1601	801	533	399	320	266
Max speed (mm/sec)	121	302	604	906	1208	1450	1812

Light (90hz, 7.8reduction, 2.2kW)							
Stroke (mm)	**10**	**25**	**50**	**75**	**100**	**120**	**150**
Max load (kg)	2670	1068	532	355	266	212	178
Max speed (mm/sec)	181	453	906	1359	1812	2175	2719

Light (130hz, 7.8reduction, 2.2kW)							
Stroke (mm)	**10**	**25**	**50**	**75**	**100**	**120**	**150**
Max load (kg)	1848	738	369	245	184	147	122
Max speed (mm/sec)	262	654	1309	1963	2618	3150	3927

MID Dyno:

MID (60hz, 7.8reduction, 3.7kW)						
Stroke (mm)	**25**	**50**	**75**	**100**	**120**	**150**
Max load (kg)	2574	1285	856	643	515	428
Max speed (mm/sec)	302	604	906	1208	1450	1812

MID (90hz, 7.8reduction, 3.7kW)						
Stroke (mm)	**25**	**50**	**75**	**100**	**120**	**150**
Max load (kg)	1714	858	569	428	342	285
Max speed (mm/sec)	452	905	1358	1811	2175	2717

MID (130hz, 7.8reduction, 3.7kW)						
Stroke (mm)	**25**	**50**	**75**	**100**	**120**	**150**
Max load (kg)	1184	592	394	296	237	197
Max speed (mm/sec)	654	1309	1963	2618	3150	3927

Heavy Dyno:

HEAVY (60hz, 7.8reduction, 7.5kW)						
Stroke (mm)	**25**	**50**	**75**	**100**	**120**	**150**
Max load (kg)	4400	2250	1500	1120	894	743
Max speed (mm/sec)	337	673	1010	1346	1615	2020

HEAVY (90hz, 7.8reduction, 7.5kW)						
Stroke (mm)	**25**	**50**	**75**	**100**	**120**	**150**
Max load (kg)	3000	1485	991	743	594	496
Max speed (mm/sec)	505	1010	1515	2020	2420	3029

HEAVY (130hz, 7.8reduction, 7.5kW)						
Stroke (mm)	**25**	**50**	**75**	**100**	**120**	**150**
Max load (kg)	2055	1027	686	514	411	343
Max speed (mm/sec)	729	1459	2188	2917	3500	4367

12. Warranty Information

LABA7 Shock Dyno is covered for 1 year of manufacturer warranty starting from the date of purchase, and it covers any manufacturer-related failures during that period.

WHAT IS NOT COVERED

ALTERATION, MISUSE, OR ACCIDENT DAMAGE

Examples are:

- Failure to operate the device in accordance with the Owner's manual.
- Collision, fire, theft, freezing, vandalism, riot, explosion, or objects striking your device.
- Alteration of your device, including software programming or other components.
- Damage caused by improper maintenance or failure to follow the recommended maintenance schedule.

The repair of damages that are caused because parts or services used were not those prescribed in this manual's recommended maintenance schedule is not covered under warranty. It is the owner's responsibility to maintain the device as more fully set forth in and in accordance with the maintenance schedules outlined in this manual.

MODIFICATIONS

Damage or performance problems resulting from modifications to your device are not covered under warranty.

Examples of modifications:

- Altering any mechanical parts or software programming.

The manufacturer is not responsible for any damages to the device during transportation. During accepting the shipment, please inspect the package for any visual damage. If the package is damaged, do not accept it.

13. Contact

If you have further questions about the product or need help with the installation, our technical staff will be happy to help you. Contact information can be found on our website www.laba7.com.

- UAB LABA7

- Giluzio st. 15
  Vilnius
  LT-08412
  Lithuania

- info@laba7.com
- +37062199469

Reprinting, even in extract, is allowed only after obtaining approval. We reserve the right to make changes to the product at any time if we consider them to be in the interest of quality improvement without prior notice or notification. Figures may be examples which may differ in appearance from the goods delivered. We also reserve the right to errors and cannot be held responsible for typographical mistakes. Our general terms and conditions apply.

EU Declaration of Conformity

Date of Issue 2nd September 2021 Vilnius, Declaration Number 2021-09-02/01

Name of the manufacturer:	LTD “LABA7”
Address of the manufacturer:	Gilužio str. 15, LT-06239, Vilnius, Lithuania
Contacts of the manufacturer:	info@laba7.com
Object of the declaration:	Featherlight Shock Dyno
Identification code of the object:	LBA2-00040
Description of the object:	Featherlight Shock Dyno is the entry level shock dynamometer, which is based on scotch-yoke mechanism. This compact machine is oriented towards the MTB market and those who want to start their dyno work at a very affordable price. Main specifications: velocity: up to 1 900 mm/s; maximum force: 10 000 N load cell; adjustable stroke: 25-50-75-100 mm; motor: 3 HP-220V electric motor; weight: 170 kg.
Object of the declaration described above is in conformity with the relevant Union harmonisation legislation:	– Machinery (MD) Directive 2006/42/EC – Electromagnetic Compatibility (EMC) Directive 2014/30/EU – Low voltage (LVD) Directive 2014/35/EU – Radio Equipment (RED) Directive (2014/53/EU)
References to the relevant harmonized standards used or references to the other technical specifications in relation to which conformity is declared:	– EN IEC 61000-6-1:2019 – EN IEC 61000-6-2:2019 – EN IEC 61000-6-3:2021 – EN IEC 61000-6-4:2020 – EN IEC 61000-3-2:2019 – EN IEC 61000-3-3:2013 – ETSI EN 301 489-1:2019 – ETSI EN 301 489-17:2020 – IEC 60335-1:2020
Additional information:	This declaration certifies compliance with the above-mentioned directives. This declaration of conformity is issued under the sole responsibility of the manufacturer. The technical documentation for the object of declaration is available from the manufacturer at the address above.
Name and title of the manufacturers' representative:	Andrius Liškus CEO
Signature of the manufacturers' representative:	

EU Declaration of Conformity

Date of Issue 8th July 2020 Vilnius, Declaration Number 2020-07-08/01

Name of the manufacturer:	LTD “LABA7”
Address of the manufacturer:	Gilužio str. 15, LT-06239, Vilnius, Lithuania
Contacts of the manufacturer:	info@laba7.com
Object of the declaration:	Heavy Shock Dyno
Identification code of the object:	LBA2-00027
Description of the object:	Heavy shock dyno is the most powerful version of LABA7 shock dynamometers. It can service any shock and fork but is best suited for off-road cars, 4X4s, trucks, or advanced motocross suspension work. Main specifications: velocity: up to 3 000 mm/s; maximum force: 15 000 N load cell; adjustable stroke: 25-50-75-100-120-150 mm; motor: 10 HP-380V electric motor; weight: 550 kg.
Object of the declaration described above is in conformity with the relevant Union harmonisation legislation:	– Machinery (MD) Directive 2006/42/EC – Electromagnetic Compatibility (EMC) Directive 2014/30/EU – Low voltage (LVD) Directive 2014/35/EU – Radio Equipment (RED) Directive (2014/53/EU)
References to the relevant harmonized standards used or references to the other technical specifications in relation to which conformity is declared:	– EN IEC 61000-6-1:2019 – EN IEC 61000-6-2:2019 – EN IEC 61000-6-3:2021 – EN IEC 61000-6-4:2020 – EN IEC 61000-3-2:2019 – EN IEC 61000-3-3:2013 – ETSI EN 301 489-1:2019 – ETSI EN 301 489-17:2020 – IEC 60335-1:2020
Additional information:	This declaration certifies compliance with the above-mentioned directives. This declaration of conformity is issued under the sole responsibility of the manufacturer. The technical documentation for the object of declaration is available from the manufacturer at the address above.
Name and title of the manufacturers' representative:	Andrius Liškus CEO
Signature of the manufacturers' representative:	

EU Declaration of Conformity

Date of Issue 6th October 2020 Vilnius, Declaration Number 2020-10-06/01

Name of the manufacturer:	LTD “LABA7”
Address of the manufacturer:	Gilužio str. 15, LT-06239, Vilnius, Lithuania
Contacts of the manufacturer:	info@laba7.com
Object of the declaration:	Light Shock Dyno
Identification code of the object:	LBA2-00034
Description of the object:	Light Shock Dyno is a device for building, rebuilding, or tuning shocks and forks. It is perfect for testing MTB, road motorcycles, and road car suspensions. Main specifications: velocity: up to 2 500 mm/s; maximum force: 10 000 N load cell; adjustable stroke: 25-50-75-100-120-150 mm; motor: 4 HP-220V electric motor; weight: 300 kg.
Object of the declaration described above is in conformity with the relevant Union harmonisation legislation:	– Machinery (MD) Directive 2006/42/EC – Electromagnetic Compatibility (EMC) Directive 2014/30/EU – Low voltage (LVD) Directive 2014/35/EU – Radio Equipment (RED) Directive (2014/53/EU)
References to the relevant harmonized standards used or references to the other technical specifications in relation to which conformity is declared:	– EN IEC 61000-6-1:2019 – EN IEC 61000-6-2:2019 – EN IEC 61000-6-3:2021 – EN IEC 61000-6-4:2020 – EN IEC 61000-3-2:2019 – EN IEC 61000-3-3:2013 – ETSI EN 301 489-1:2019 – ETSI EN 301 489-17:2020 – IEC 60335-1:2020
Additional information:	This declaration certifies compliance with the above-mentioned directives. This declaration of conformity is issued under the sole responsibility of the manufacturer. The technical documentation for the object of declaration is available from the manufacturer at the address above.
Name and title of the manufacturers' representative:	Andrius Liškus CEO
Signature of the manufacturers' representative:	

LIETUVOS RESPUBLIKA UAB LABA7 LTD REPUBLIC OF LITHUANIA

EU Declaration of Conformity

Date of Issue 4th December 2019 Vilnius, Declaration Number 2019-12-04/01

Name of the manufacturer:	LTD “LABA7”
Address of the manufacturer:	Gilužio str. 15, LT-06239, Vilnius, Lithuania
Contacts of the manufacturer:	info@laba7.com
Object of the declaration:	Mid Shock Dyno
Identification code of the object:	LBA2-00011
Description of the object:	Mid Shock Dyno provides the best price-to-performance ratio. It is perfect for dirt track, motocross, and track car suspension servicing and tuning. Main specifications: velocity: up to 2 500 mm/s; maximum force: 15 000 N load cell; adjustable stroke: 25-50-75-100-120-150 mm; motor: 5.5 HP-380V electric motor; weight: 500 kg.
Object of the declaration described above is in conformity with the relevant Union harmonisation legislation:	– Machinery (MD) Directive 2006/42/EC – Electromagnetic Compatibility (EMC) Directive 2014/30/EU – Low voltage (LVD) Directive 2014/35/EU – Radio Equipment (RED) Directive (2014/53/EU)
References to the relevant harmonized standards used or references to the other technical specifications in relation to which conformity is declared:	– EN IEC 61000-6-1:2019 – EN IEC 61000-6-2:2019 – EN IEC 61000-6-3:2021 – EN IEC 61000-6-4:2020 – EN IEC 61000-3-2:2019 – EN IEC 61000-3-3:2013 – ETSI EN 301 489-1:2019 – ETSI EN 301 489-17:2020 – IEC 60335-1:2020
Additional information:	This declaration certifies compliance with the above-mentioned directives. This declaration of conformity is issued under the sole responsibility of the manufacturer. The technical documentation for the object of declaration is available from the manufacturer at the address above.
Name and title of the manufacturers' representative:	Andrius Liškus CEO
Signature of the manufacturers' representative:	

LIETUVOS RESPUBLIKA UAB LABA7 LTD REPUBLIC OF LITHUANIA