# LABA7 Electromagnetic Shock Dyno EMA
# User Manual

Lithuania 2026

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# 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!

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**UAB LABA7**
**Address:** Vakarinė st. 10, Vilnius LT-06298, Lithuania
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# 2. Safety Information

- Make sure to read and understand the whole user manual before using the Shock Dyno EMA (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 EMA 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 does not fit your wall socket.
- Do not use an extension cord.
- The power socket to which you are connecting the Shock Dyno EMA 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.
- When operating the device, especially in cases when the doors of the device are open, ensure you maintain a safe distance to prevent injury in case of an accident.
- Run a verification cycle (e.g. motion without load) to confirm correct behavior before applying force.
- After test, allow all moving parts to come to full rest before opening enclosures or working near them.
- Proper mounting of the damper/shock is essential for safe and reliable operation.
- The device may be operated only by trained and authorized personnel who are familiar with its controls.
- This equipment can endanger life by exposure to rotating machinery and high voltages.

## Unauthorized Use and Liability

The LABA7 EMA device must only be operated in accordance with the manufacturer's instructions and approvals. Any unauthorized use, modification, improper operation, or operation without the manufacturer's knowledge may result in unsafe conditions.
In such cases, the manufacturer assumes no responsibility or liability for any damage, malfunction, injury, data loss, or other resulting consequences.
By operating this device, the user acknowledges and accepts full responsibility for its use outside the specified operating guidelines.

## Commissioning and Training Requirement

The LABA7 EMA device must be installed, commissioned, and initially configured in cooperation with LABA7 or an authorized LABA7 representative.
Before independent operation, installation verification, initial test operation, and operator training must be completed. The device must not be operated independently by untrained or unauthorized personnel.

## Personnel roles and responsibilities

**User:** A trained person authorized to operate the equipment. The user may mount and remove shock absorbers using LABA7-approved adapters and mounting methods, run tests, use the software controls, and activate the emergency stop. The user may perform only basic external cleaning, visual checks and basic troubleshooting as described in this manual. The user must not open locked enclosures, remove covers, bypass safety devices, modify wiring, change internal components, perform internal repairs, or access internal electrical or mechanical systems.

**Authorized service personnel:** A qualified person authorized by LABA7 to service the equipment. Authorized service personnel may unlock and open service enclosures, troubleshoot faults, perform maintenance and repairs, and work on internal electrical and mechanical components.

**Bystanders:** Any person in the vicinity who is not operating or servicing the equipment. Bystanders must remain outside the designated hazard zone during operation and must not touch the device, shock absorber, cables, moving parts, controls, computer interface, or any mounted component.

## Intended use and misuse

**Intended use:** The LABA7 EMA device is intended only for controlled testing of shock absorbers using LABA7-approved adapters, mounting methods, software, and operating procedures. The device is intended for indoor workshop use on a stable, flat, level surface, in an environment suitable for precision electromechanical equipment. Any other use is considered outside the intended use of the device.

**Reasonably foreseeable misuse:**

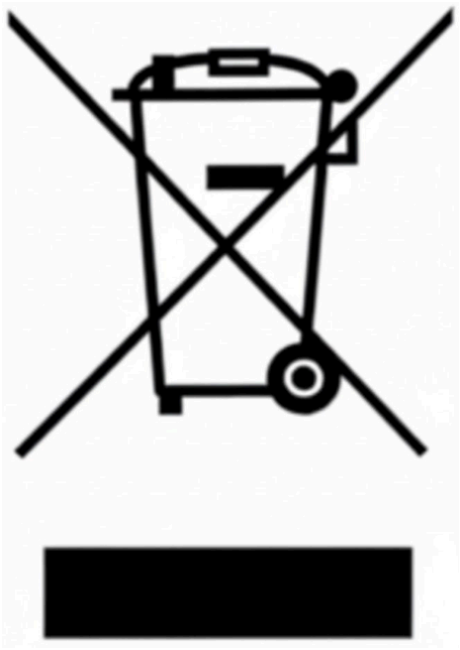
The following actions are prohibited:

- Do not use the device for any purpose other than shock absorber testing.
- Do not operate the device without required training and authorization.
- Do not use non-approved adapters, improvised fixtures, damaged mounts, or unsupported mounting methods.
- Do not test parts that are loose, incorrectly mounted, damaged, or not suitable for the device.
- Do not place hands, fingers, tools, clothing, cables, fasteners, or any other objects near the moving mechanism during operation.
- Do not place loose metal objects, magnetic objects, electronic devices, watches, tools, or personal items near the magnetic area.
- Do not bypass, disable, modify, or defeat any safety interlock, emergency stop, sensor, guard, cover, door, safety lid, or software safety function.
- Do not operate the device if abnormal noise, vibration, smell, overheating, smoke, damaged cables, fluid leakage, loose components, or mechanical damage is observed.
- Do not climb, sit, stand, lean, or place external loads on the device.
- Do not modify the device, wiring, firmware, software, control parameters, mechanical structure, adapters, or safety systems unless specifically instructed and approved by LABA7.
- Do not allow bystanders, children, visitors, or untrained persons to operate, touch, or remain near the device.

Operation outside the intended use, safety instructions, operating limits, or approved procedures may result in serious injury, equipment damage, incorrect test results, and loss of warranty or service support.

# 3. Safety Labels and Their Meanings

| Label | Explanation |
|---|---|
| | Warning – Crushing of Hands (ISO 7010-W024)<br>This safety symbol indicates a potential crushing or pinch hazard to hands from the closing or moving parts of the equipment. It alerts users to keep hands and fingers clear of these areas to avoid serious injury. |
| | Warning – Electricity (ISO 7010-W012)<br>This safety symbol indicates a potential electrical hazard. It alerts users that electrical components, voltages, or currents are present that could cause electric shock or injury. Users should take appropriate precautions, avoid contact with exposed electrical parts. |
| | Prohibition – Not to Be Serviced by Users (ISO 7010-P069)<br>This safety symbol indicates that the equipment must not be opened, adjusted, maintained, or serviced by users. It informs users that only qualified or authorized personnel should perform servicing, repair, or internal inspection to avoid risk of injury, electric shock, damage to the equipment, or other hazards. |

| | |
|---|---|
|  | Environmental Information – Separate Collection of Electrical and Electronic Equipment (EN 50419)<br>The crossed-out wheeled bin symbol indicates that this product must not be disposed of with unsorted household waste. In accordance with EN 50419 and the EU Waste Electrical and Electronic Equipment (WEEE) Directive, the product must be collected separately and disposed of at an appropriate collection facility for electrical and electronic equipment. |
| | Emergency – Emergency Stop (ISO 7010-E020)<br>This safety indicates the location of an emergency stop device. It identifies a control that is intended to stop the equipment immediately in an emergency situation to reduce the risk of injury, damage, or hazardous conditions. |
| | Warning – Magnetic Field (ISO 7010-W006)<br>This safety symbol indicates a potential hazard due to magnetic fields. Users are warned that strong magnetic fields are present, which may interfere with medical implants (e.g., pacemakers), affect magnetic storage media, or attract ferromagnetic objects, potentially causing injury or equipment damage. Appropriate precautions should be taken to maintain a safe distance from the magnetic field. |

| | |
|---|---|
| | Protective Earth (Ground) (IEC 60417-5019)<br>This symbol indicates the protective earth (ground) connection. |

# 4. Highlights

Congratulations on your purchase of the LABA7 Shock Dyno EMA!

- Our fully automatic electromagnetic 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 – Empty shocks/Shocks with springs/Forks with springs/Forks with air springs/Bump stops/ Gas pressure force/Seal drag force/Spring rate.
- High-accuracy force/pressure sensors.

# 5. Standard package for Electromagnetic Shock Dyno EMA includes

- Electromagnetic shock dyno unit (EMA).
- Smart power supply unit.
- Unit lifting/unloading adapters.
- Power cable for mains connection (EU or USA plug variant).
- LAN Cable (RJ45), 5 meters.
- USB to LAN cable (RJ45) Adapter.
- Shock absorber scratch protection pads.
- Standard U-clamp adapters (2 pieces).
- User manual (free download from our webpage).
- Software (free download from our webpage).
- Customer support via email / WhatsApp.

# 6. Technical Specifications

Below are the specifications of each individual electromagnetic Shock Dyno model:

**EMA 30KW:**

- Peak force: 10kN.
- Stroke: 0-250mm.
- Maximum velocity: 7m/s.
- Maximum acceleration 100G.
- Power requirements: 1 phase 220VAC or 240VAC.

**EMA 60KW:**

- Peak force: 20kN.
- Stroke: 0-250mm.
- Maximum velocity: 7m/s.
- Maximum acceleration 100G.
- Power requirements: 3 phase 380 VAC / 400 VAC - from 16 A.

**EMA 90KW:**

- Peak force: 30kN.
- Stroke: 0-250mm.
- Maximum velocity: 7m/s.
- Maximum acceleration 100G.
- Power requirements: 3 phase 380 VAC / 400 VAC - from 16 A.

**EMA 120KW:**

- Peak force: 40kN.
- Stroke: 0-250mm.
- Maximum velocity: 7m/s.
- Maximum acceleration 100G.
- Power requirements: 3 phase 380 VAC / 400 VAC - from 16 A.

# 7. Know Your Shock Dyno EMA

## 7.1. Overview

The overview of the LABA7 Shock dyno EMA is presented in the image below:

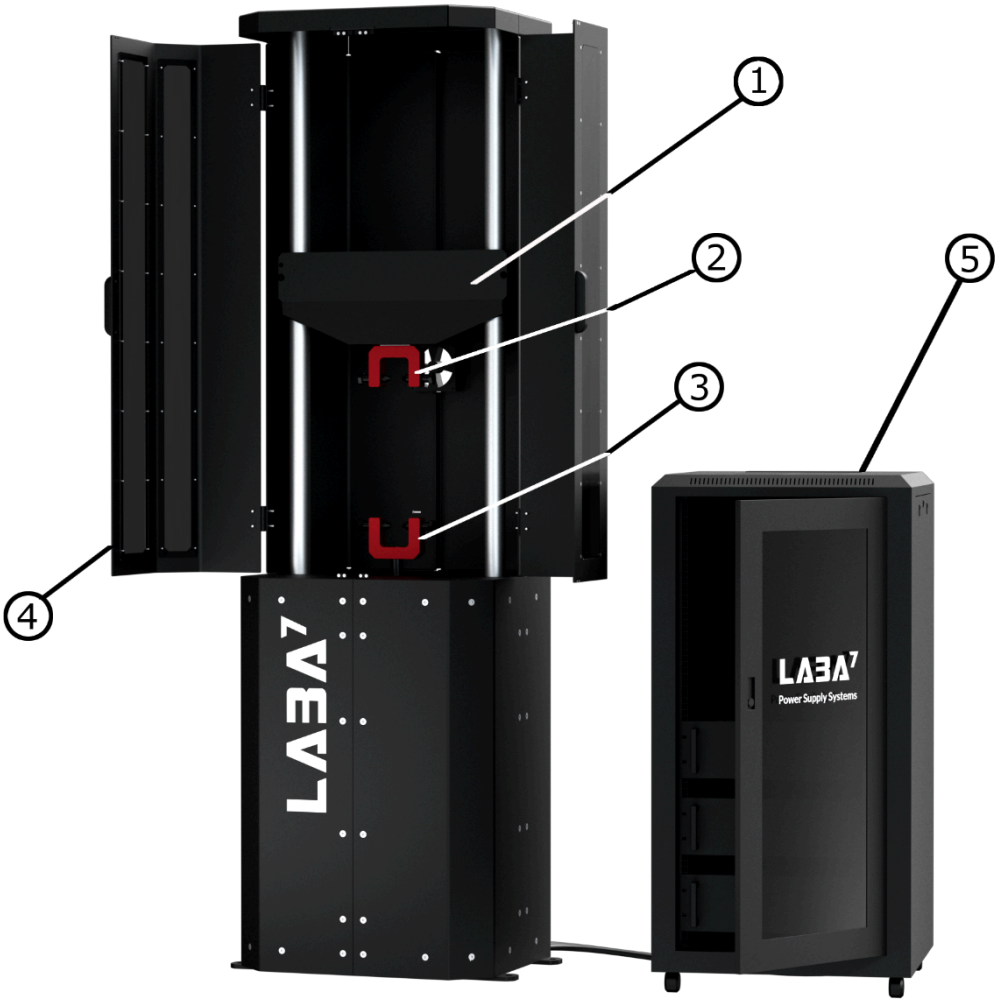



*Figure 1*

1. Crossbar.
2. Top mounting.
3. Bottom mounting
4. Safety lid.
5. LABA7 smart power supply.

## 7.2. LABA7 smart power supply overview

The overview of LABA7 smart power supply is presented below:

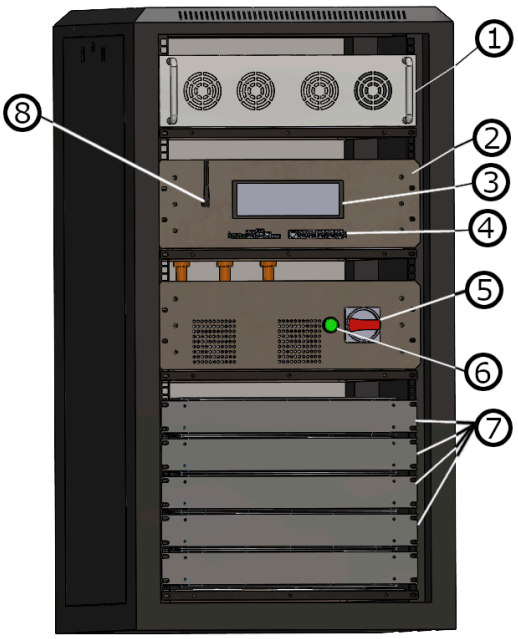



*Figure 2*

1. Power supply.
2. Control unit.
3. Screen.
4. Wire connectors.
5. Power switch.
6. Power indicator.
7. Super capacitor module.
8. Wi-Fi antenna.

## 7.3. EMA Anchor Hole Placement

EMA must be securely anchored to the floor using strong bolts. Failure to properly anchor the device may cause vibration, damage to the device, and inaccurate measurement results.

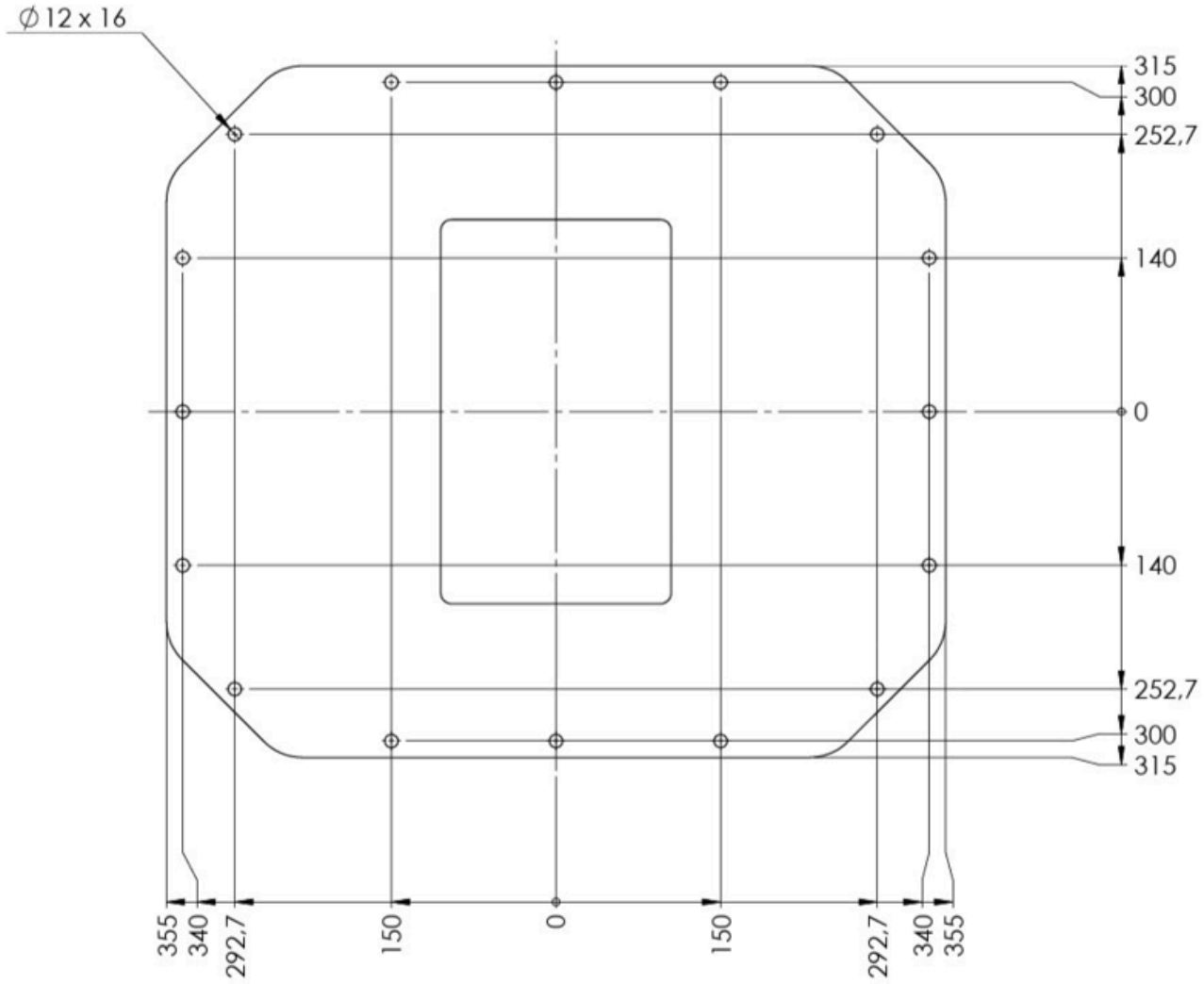



*Figure 3*

## 7.4. 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.

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.

## 7.5. Discharge module

The Discharge module is a safety feature of the LABA7 EMA power supply designed to safely discharge the internal high-voltage circuit.

**Purpose**

The discharge function ensures that stored electrical energy is safely released:

- Before performing service or maintenance.
- Before repositioning or transporting the device.
- When company policy prohibits leaving devices powered on.

**Operation**

- Activating the discharge function initiates a controlled discharge of internal capacitors.
- The system reduces voltage from operating level (up to 700V) to a safe level.
- The **LED light color** indicates the current state of the system.

## LED Light Indicator

| Light Color | Meaning |
|---|---|
| Yellow | Idle (system powered on, without active high voltage) |
| Yellow/Green blinking | Arming / precharge in progress |
| Green | High voltage armed |
| Blue | Discharging in progress |
| Blue/Green | Discharge completed, discharge switch still engaged |
| Red | Error condition |

**Discharge Procedure**

1. Ensure the system is not running a test.
2. Activate the **Discharge tumbler switch**. Switch it to “ON” position.
3. Observe the **LED light indicator**:
    - Blue → discharging in progress
    - Blue/Green → discharge completed
4. When discharge is completed and “BLUE/GREEN” LED is indicated - return the discharge tumbler switch to “OFF” position.
5. Only proceed once discharge is confirmed.

## 7.6. Automatic Crossbar Control (optional)

The Shock Dyno EMA can be equipped with optional automatic crossbar control. It allows adjusting and locking the crossbar using a controller.

The controller has 4 buttons with arrows:

1. Left – unlocks the crossbar so it can be moved.
2. Right – locks the crossbar in its current position.
3. Up – moves the crossbar up.
4. Down – moves the crossbar down.

Adjusting the crossbar position:

1. Make sure no test is running.
2. Press “Left” to unlock the crossbar.
3. Use “Up” or “Down” to move the crossbar to the required position.
4. Press “Right” to lock the crossbar in place.

ATTENTION: Keep hands, tools and other objects clear of the crossbar and mounting area while the crossbar is moving. Always make sure the crossbar is locked before starting a test.

# 8. Accessories

## 8.1. Adapters

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

**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 4*

**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 5*

**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 6*

**MTB Fork Assembly**

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

*Figure 7*

**MTB Cartridge Assembly**

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

*Figure 8*

**Trunnion Assembly**

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

*Figure 9*

## 8.2. Adapter Installation

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

1. Make sure the electromagnetic Shock Dyno EMA 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 10 – 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.

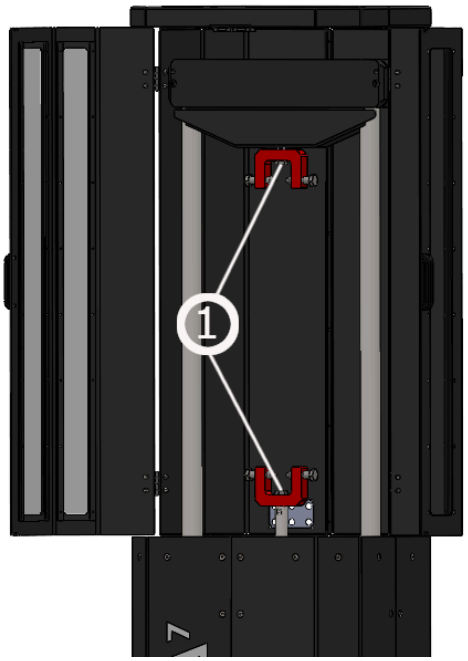



*Figure 10*

# 9. First Launch

This section provides information associated with the first use of the LABA7 Shock Dyno EMA. Follow the steps below to launch the Shock Dyno EMA for the first time:

## Power Cables (W, V, U) connection:

1. Identify the connectors on the LABA7 smart power supply marked “W”, “V”, and “U”.
2. On the Shock Dyno EMA, find the matching sockets marked “W”, “V”, and “U”.
3. Rotate the ring on the socket, set the red spot at the top.
4. Push the connector into the socket until you hear a "click" sound. If no click is heard, remove the connector and repeat the steps. Do not proceed until the click is confirmed.
5. Do these steps for all 3 wires (“W”, “V”, “U”).

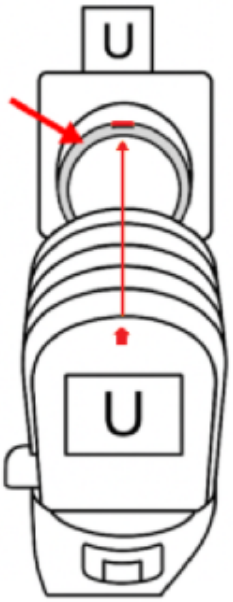



*Figure 11*

## Modular RJ45 connectors (CAN, FRC, ENC, TEMP) connection:

1. Identify the RJ45 connectors marked “CAN”, “FRC”, “ENC” and “TEMP”.
2. On the Shock Dyno EMA, find the matching sockets marked “CAN”, “FRC”, “ENC” and “TEMP”.
3. Push the connector into socket and lock it in by rotating clockwise.
4. Do these steps for all 4 connectors (“CAN”, “FRC”, “ENC”, “TEMP”).

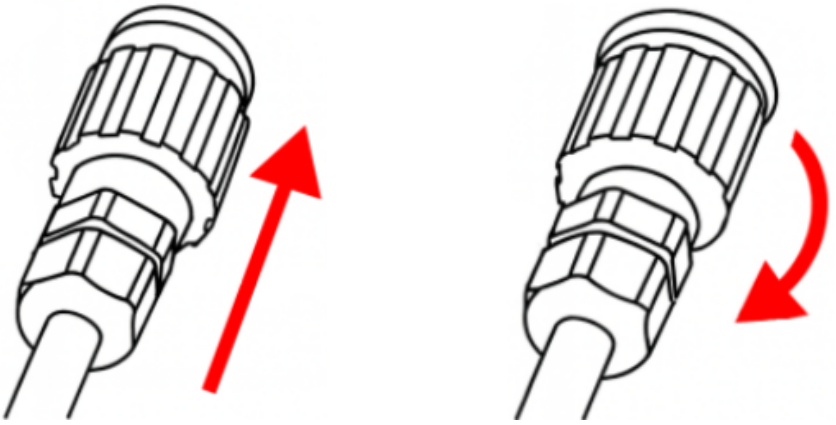


*Figure 12*

## Circular multipole connectors (EM, STOP) connection:

1. Identify the circular multipole connectors marked “EM” and “STOP”.
2. On the Shock Dyno EMA, find the matching sockets marked EM and STOP.
3. Push the connector into socket and lock it in by screwing clockwise.
4. Do these steps for both connectors (“EM”, “STOP”).

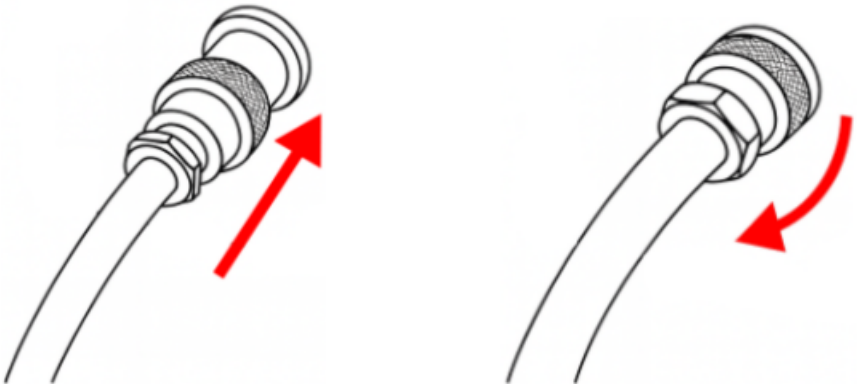


*Figure 13*

## Air Supply Connection:

1. Locate the air supply port on the back of the Shock Dyno EMA.
2. Connect the air supply hose to this port.
3. Ensure the connection is secure and airtight.

## Ground Connection:

1. Locate the ground terminal at the back of the Shock Dyno EMA.
2. Attach the ground wire to the terminal.
3. Ensure the connection is secure and properly tightened.

## Damper Installation and Power-On:

1. Open the safety doors by pulling from the cover side handle.
2. Place the damper within the top and bottom adapter and secure it.
3. Power on the Shock Dyno by turning the power switch (Figure 2) clock-wise, which is behind the front door of the power supply, to configure the software.

# 10. Software Setup

## 10.1. System requirements

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

- Windows 10, 11
- .NET CORE 8.0
- 8 GB of RAM
- 3 GB of free disk space

## 10.2. Installation

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

1. Open the Shock Dyno software folder.
2. Locate the “LABA7-win-Setup.exe” executable file and double-click to run the installation.
3. Setup will install the program and automatically launch the software once the installation is done (a shortcut will be created on your desktop).

Alternative installation method

1. Open the Shock Dyno software folder.
2. In the file path bar at the top of the window, type “cmd” (without quotation marks) and press Enter.
3. In the Command Prompt window that appears, paste the following command and press Enter: LABA7-win-Setup.exe --installto "C:\Users\Public\Documents\Shock Dyno Software"
   **Note**: You can change the path inside the quotation marks to any desired installation directory
4. The installation will begin, software will be installed to the specified location, after installation the software will automatically launch the software (a shortcut will be created on your desktop).

## 10.3. Configuration and setting up LAN-cable communication

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

1. Launch the application and go to the Settings page which is located in the top right corner.

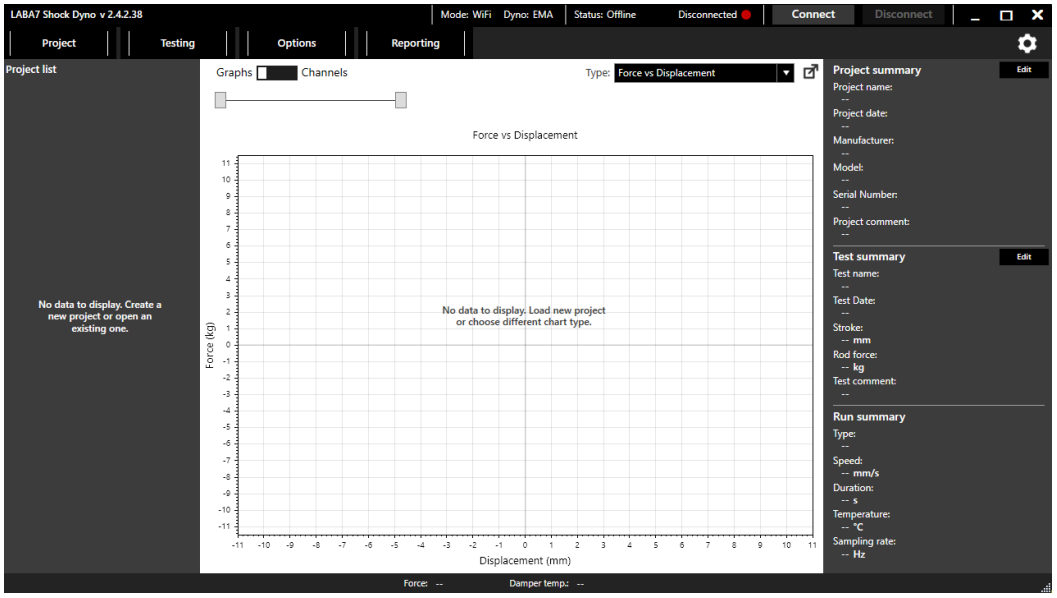



*Figure 14*

2. Select the default data catalog, this is the catalog, where all of your test project files will be saved (Figure 15 – Step 1).

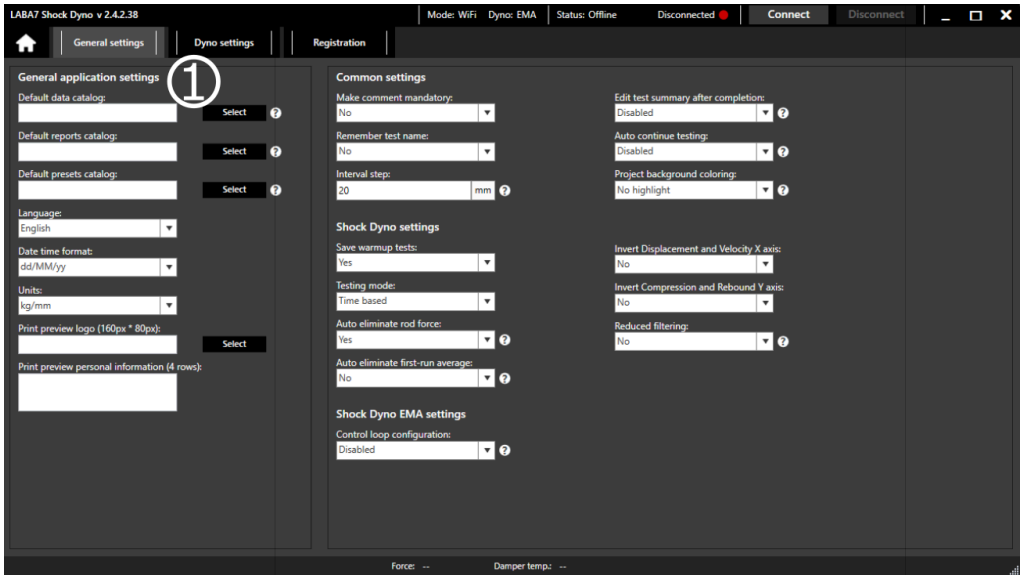



Figure 15

3. Go to the Dyno Settings tab.
4. Add a new Dyno model by clicking Add button (Figure 16 – 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.

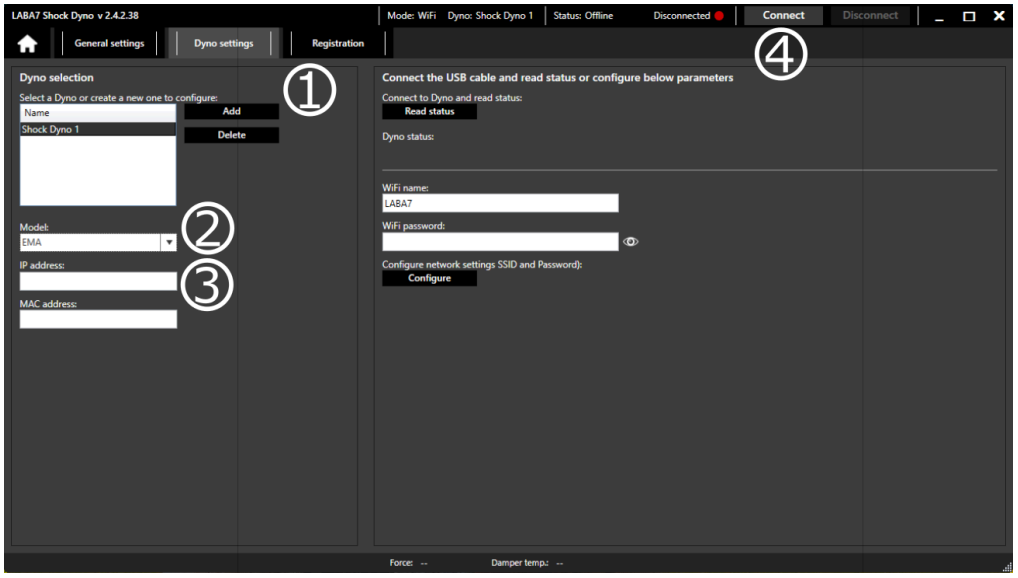



*Figure 16*

5. Connect the dyno to computer with LAN cable. Lan cable should be connected to "ETH" port of the LABA7 smart power supply.
6. Turn on the Dyno if it was previously turned off by turning the power switch, wait till it boots up. LAN IP address showing up on the screen indicates that the device is ready.
7. Select Model: EMA (Figure 16 – Step 2).
8. Enter the IP address of the device. The IP address is shown on the screen of the power supply (Figure 16 – Step 3).
9. Press Connect (Figure 16 – Step 4). Connected status indicates, that the connection is successful.

<u>ATTENTION</u>: Based on your preference, go to the next section for either wireless communication setup

## 10.4. 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.
- To setup wireless communication, the device has to be already connected via LAN cable, check paragraph 8.3 on how to do that.

Follow the steps below to configure the wireless communication:

1. Make sure the dyno is connected to the computer with LAN cable and the communication is active. Connected Status in the top indicates, that the connection is active.
2. Go to the Dyno Settings tab.
3. Enter Wi-Fi name (Figure 17 – Step 1).
4. Enter Wi-Fi password (Figure 17 – Step 2).
5. Click on Configure button (Figure 17 – Step 3).
6. Once you get notification about successful Wi-Fi connection, press Disconnect (Figure 17 – Step 4).
7. Disconnect the LAN cable from the PC and wait, till the device will start showing wLAN IP address on the screen.
8. Change the IP address to the one which is now being showed in the screen of the device. (Figure 17 – Step 5).
9. Press Connect (Figure 17 – Step 6).

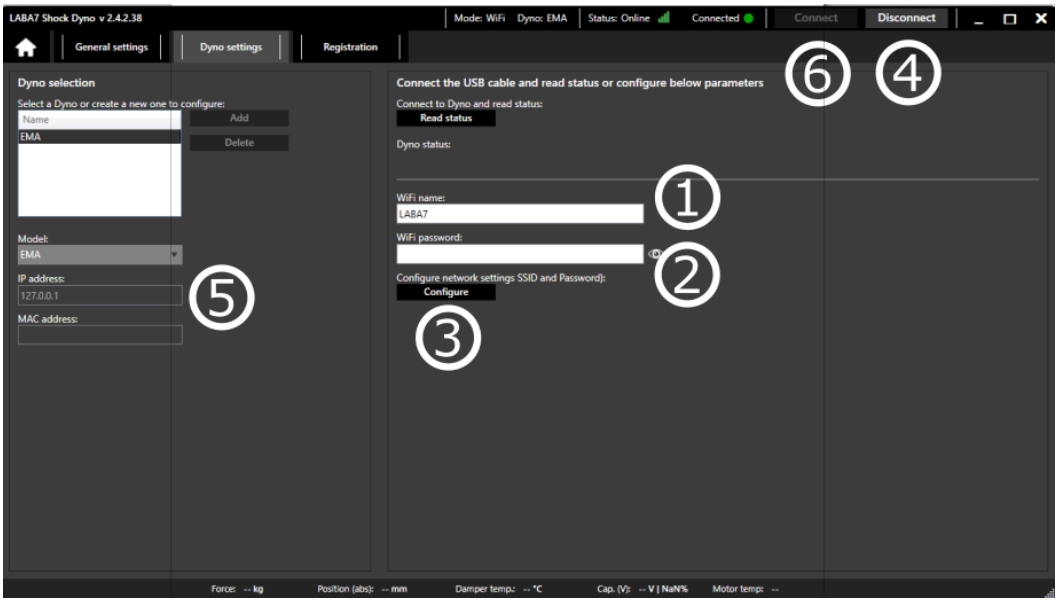



*Figure 17*

After a successful connection to the router, Dyno status should be


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

# 11. Software Operation

## 11.1. Main Menu

Once the application is launched, you will see the main screen with 5 separate buttons:

- Project - create new, open old projects and tests, import .csv.
- Testing – for new test configuration and execution.
- Options – tools for graph analyzation and other additional functionalities.
- Reporting – for report printing and data exporting.
- Settings – software and hardware configuration.

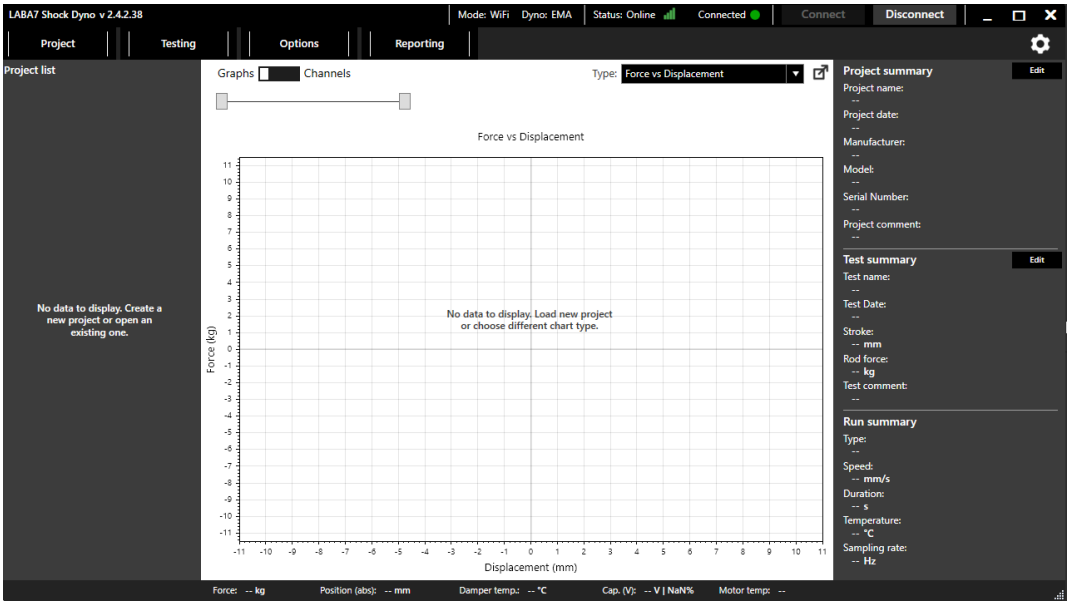



*Figure 18*

Additionally, you can check your software version, edit project summary, edit test summary. You can see which dyno is active and what communication method is being used as well. Also, in the bottom, user is provided with live data information of force, position, damper temperature, capacitor module voltage and the motor temperature. If the motor temperature is not optimal, the machine will not allow you to do tests.

## 11.2. New Project

Whenever a new damper is inserted into the Dyno, it is recommended to start a New Project. Locate project button in the top left corner, press it and then - press new project.

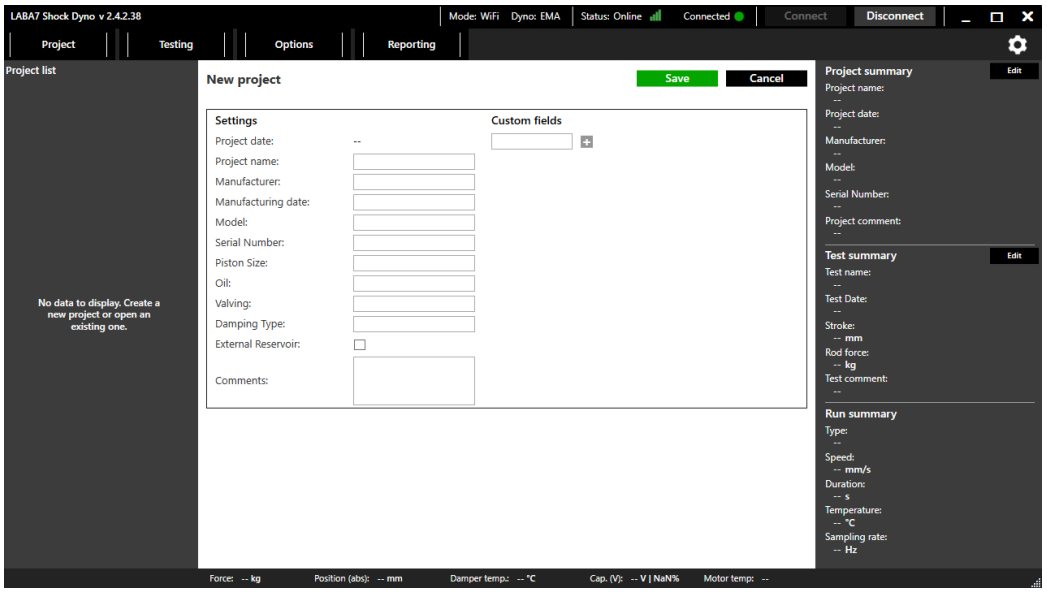



*Figure 19*

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.
- Manufacturer – manufacturer of the damper being tested.
- Manufacturing date – the date when the damper was manufactured.
- Model – model name of the damper which is being tested.
- Piston size – the size of the damper's piston.
- Oil – oil type which is being used in the damper.
- Valving – valving type of the damper which is being tested.
- Damping type – the damping type of the damper which is being tested.
- External reservoir – select if the damper has an external reservoir.
- Comment – comment about a project.
- Custom fields – allow you to create your own data fields to suit specific project needs.

After all needed info is entered, press Save.

## 11.3. Testing

This section describes the EMA testing window.

In this window user can see the parameters of the EMA, such as: Max system voltage and operating status. This window is used to build tests as well.

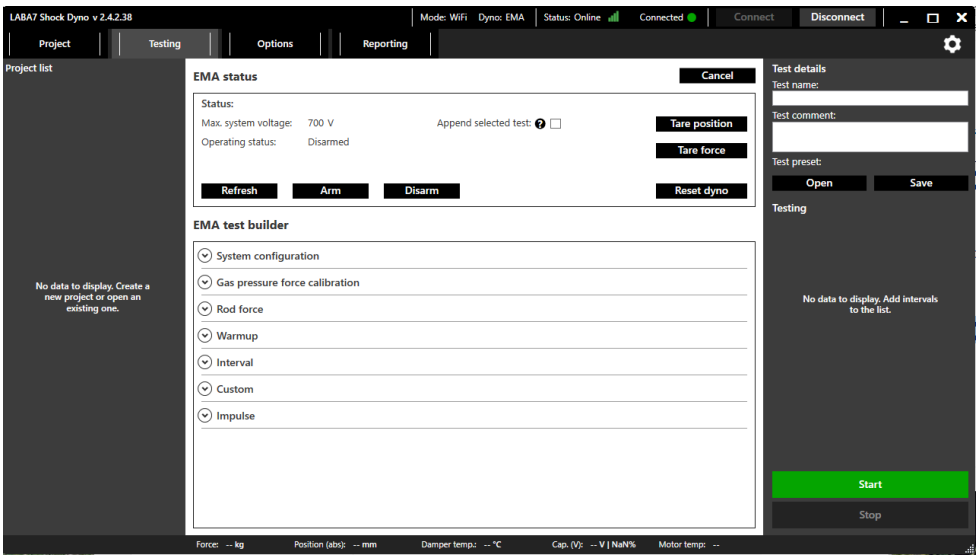



*Figure 20*

In the EMA status window, user also has 6 buttons which controls the EMA:

1. **Refresh** – refreshes EMA status (operating status).
2. **Arm** – charges the capacitor bank of the EMA.
3. **Disarm** – discharges the capacitors on the EMA and sets EMA to idle mode.
4. **Reset dyno** – resets the dyno from the emergency state (if the emergency button was engaged previously).
5. **Tare position** – Tares the position.
6. **Tare force** – Tares current force.
7. **Start** – Starts the test.

<u>ATTENTION</u>: 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.

## 11.4. EMA test builder

After project is created, it is time to build first test using test builder (Figure 21).

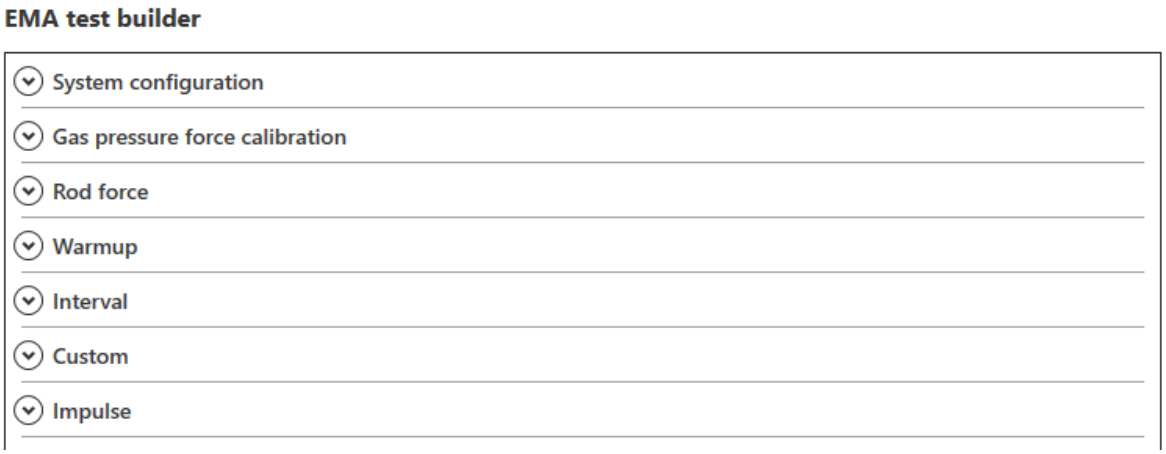



*Figure 21*

## 11.5. Control loop configuration

By the default the Control loop configuration is disabled, you can enable it in General settings, by selecting “Enabled” in dropdown near Control loop configuration.

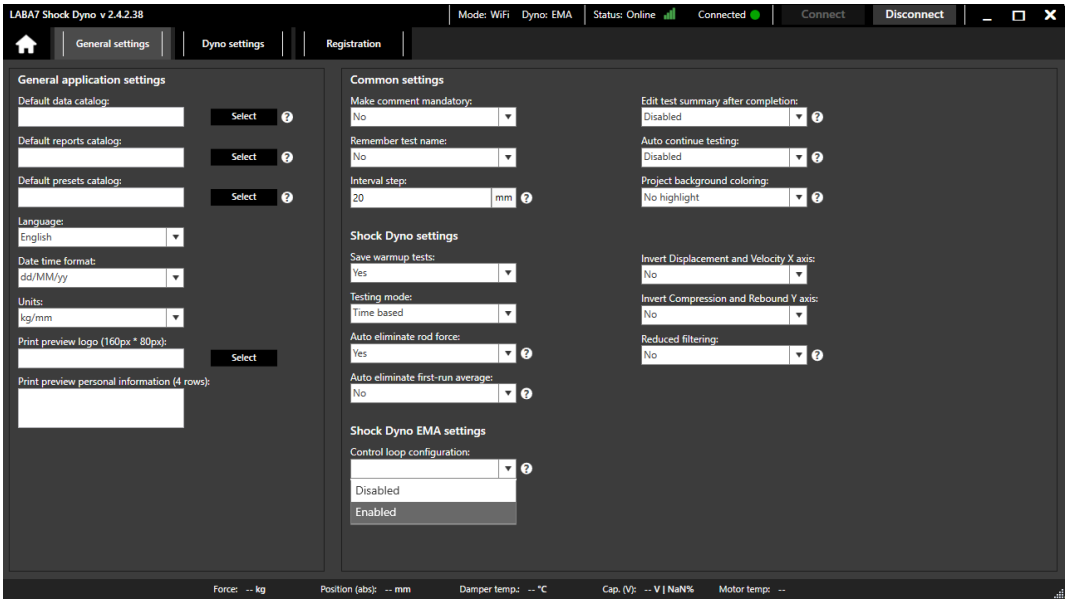



*Figure 22*

The user is also allowed to adjust the PID algorithms according to his needs. The detailed instruction on adjusting the PID is included in the other document which comes with the EMA.

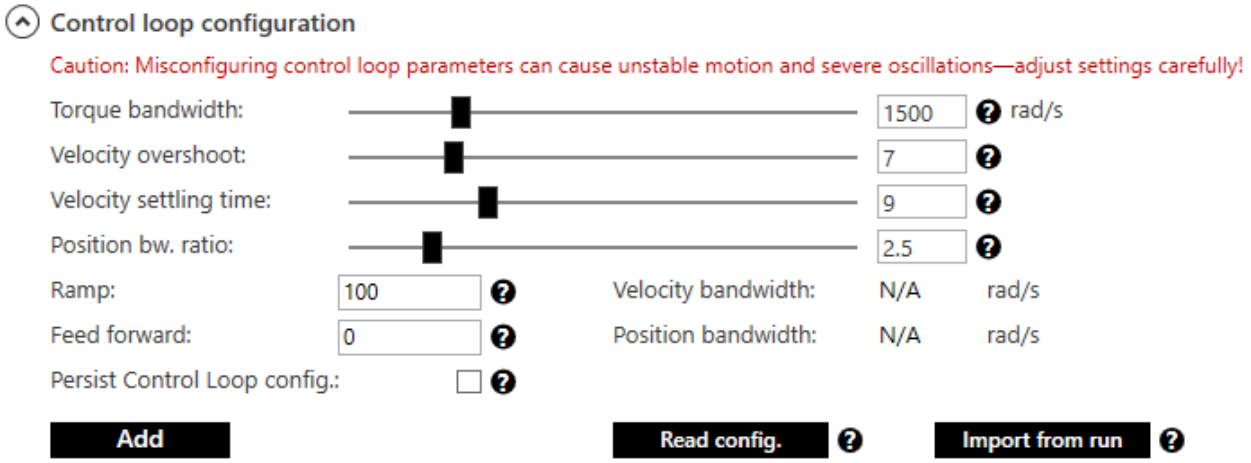



*Figure 23*

## 11.6. System configuration

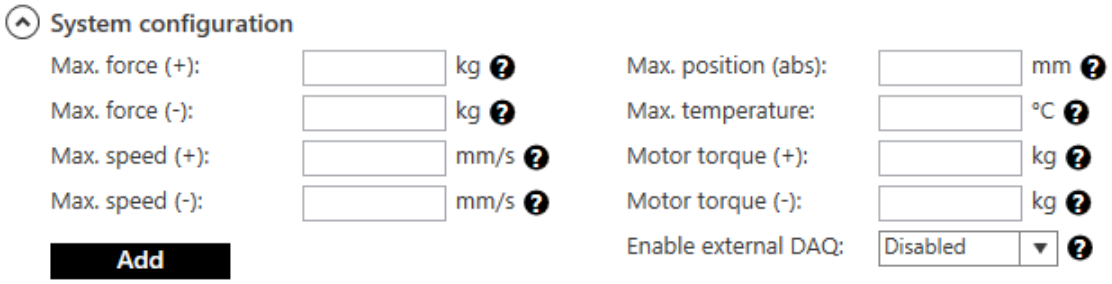



Figure 24

In system configuration the user defines the limits of the test, such as:

- Max. force (+) – maximum allowed compression force.
- Max. force (-) – maximum allowed rebound force.
- Max. speed (+) – maximum allowed compression speed.
- Max. speed (-) – maximum allowed rebound speed.
- Max. position (abs) – maximum absolute position of the dyno mast.
- Max. temperature – maximum allowed temperature during the test.
- Motor torque (+) – the maximum torque the motor will provide in compression cycle.
- Motor torque (-) – the maximum torque the motor will provide in rebound cycle.

After desired configuration parameters are entered, user has to press **Add**.

## 11.7. Gas pressure force calibration

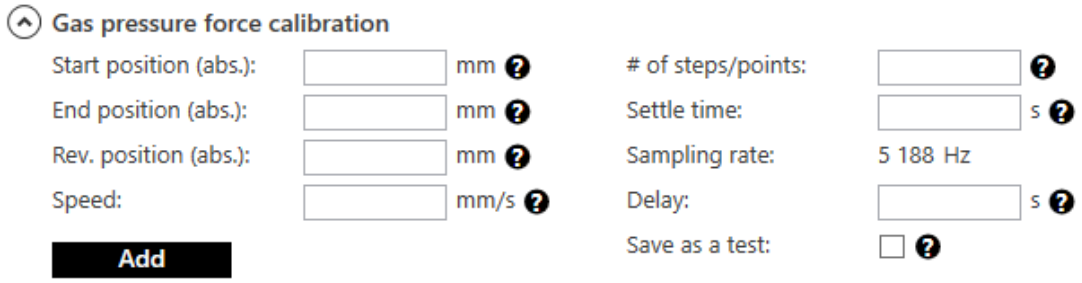



Figure 25

In gas pressure force calibration menu, the user defines how the gas pressure force should be measured. This step is optional, if the user does not care about the gas pressure force, this step can be skipped. To setup the gas pressure force calibration, the user has to define parameters such as:

- Start position (abs.) – the absolute position at which the gas pressure force calibration will start.
- End position (abs.) – the absolute position at which the dyno will stop compressing the damper.
- Reversal (abs.) – the distance the dyno will go above end position, to flip the seals of the damper before going back.
- Speed – the speed on which the gas pressure force calibration will be executed.
- # of steps/points – number of force measuring points.
- Settle time – the duration of every measurement step.
- Delay – the amount of time the dyno will wait to start a new run, once the gas pressure force calibration is done.
- Save as a test – save this test as a separate run in results.

After the desired gas pressure calibration parameters are entered, user has to press **Add**

**How Gas Pressure Force Calibration works**

Gas pressure force calibration is used to measure and compensate for the static gas force present in a damper. This ensures that the measured damping forces reflect only the true dynamic behavior of the damper, excluding the influence of internal gas pressure.

**Process:**

1. **Define configuration limits (A):**
   Set Max. position (abs) in System configuration (e.g., 100 mm).
2. **Set calibration range (B):**
   Set Start position (abs.) and End position (abs.) in Gas pressure force calibration, this is the portion of the stroke within which the gas pressure is to be measured (e.g., 5 to 90 mm).
3. **Static force measurement:**
   Set # of steps/points in Gas pressure force calibration. The system moves the damper in steps within stroke range that was set in 2nd step, stopping at several points in both compression and rebound (e.g., 4 steps). At each stop, the static force is measured.
4. **Force averaging:**
   The average force between compression and rebound at each stop is calculated. From these points, a gas pressure force curve is generated.
5. **Compensation (C):**
   During actual testing, the measured forces are compared against this gas pressure curve. The software subtracts the static gas pressure component from the raw data, ensuring only the net damping force is analyzed.

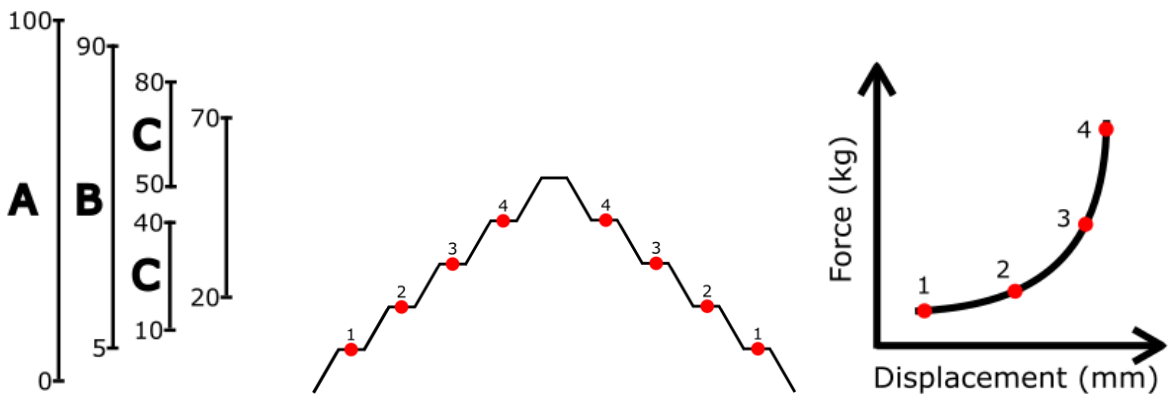



*Figure 26*

## 11.8. Rod force

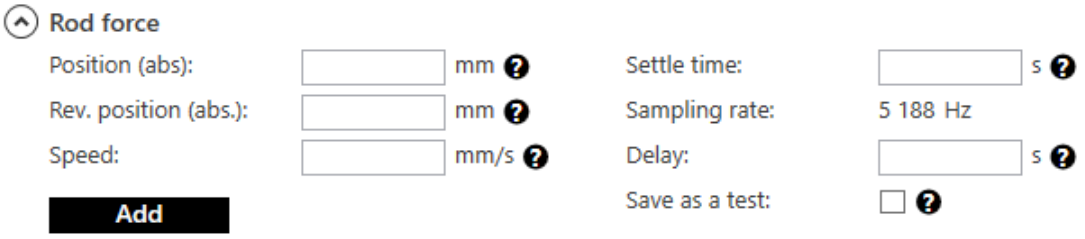



*Figure 27*

Rod force configuration menu is used to setup the rod force test. This is also optional. To configure a rod force run, the user has to define parameters such as:

- Position (abs.) – the absolute position of the rod at which the force measurement will be applied.
- Rev. Position (abs.) – the absolute return position of the rod after force application.
- Speed – the speed at which the rod will travel between defined positions.
- Settle time – the pause time allowed for the rod to stabilize before the force is measured.
- Delay – the amount of time the dyno will wait before starting a new run once the current rod force test is finished.
- Save as a test – save this test as a separate run in results.

Rod force is the static preload or offset force present in the damper due to the difference in effective piston areas on the compression and rebound sides, internal pressure imbalance, or mechanical bias such as seal friction. In testing, this static component causes the measured force to be shifted away from true zero, which can distort damping results—especially at low velocities.

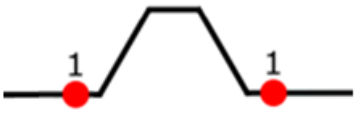



*Figure 28*

The rod force measurement feature determines this offset by moving the actuator to a defined position, performing a small reversal to release seal tension, and averaging the steady-state forces measured in both directions. The resulting value represents the rod's preload force, which is then automatically subtracted from all subsequent test data to ensure the force graphs are properly centered and reflect only dynamic damping behavior. This compensation is also used to correct for any mismatch or drift in load cell zero points (taring differences), ensuring consistent and accurate force readings across all measurement conditions.

## 11.9. Warmup

*Figure 29*

Warmup configuration menu is used to setup the warmup run. This is also optional. To setup a warmup run, user has to define parameters such as:

- Target temperature – the target temperature of the damper.
- Preload – the amount of preload which will be used for warmup test.
- Stroke – amount of displacement which will be used during warmup run execution.
- Speed – speed on which warmup run will be executed.
- Max time – time limit of the warmup test. If the damper will not reach the target temperature in defined max. time – the warmup test will be shut off.
- Delay – amount of time the dyno will wait to start a new run, once warmup run is finished.
- “Remember” checkbox – when selected, the software keeps the entered interval parameters for the next addition, so you do not need to enter them again.

## 11.10. Side Load

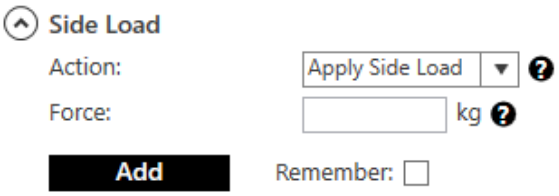



Figure 30

Side Load configuration menu is used to apply a side force to the damper during testing. This function is optional and is only available on EMA dynos equipped with the side load option.

The Side Load is added to the test as a separate step. To set up a Side Load step, the user has to define parameters such as:

- Action – select the side load action:
  - Apply Side Load – applies the defined side load force to the damper.
  - Go Home – releases the side load and moves the side load unit to its home position.
- Force – the side load force to be applied. This field is only shown when "Apply Side Load" is selected.
- "Remember" checkbox – when selected, the software keeps the entered parameters for the next addition.

After the desired parameters are entered, the user has to press **Add**.

Once applied, the side load stays active for all following runs in the test until a "Go Home" step is reached. Because of this, a "Go Home" step should always be added at the end of the test, or after the last run that requires side load.

## 11.11. Interval

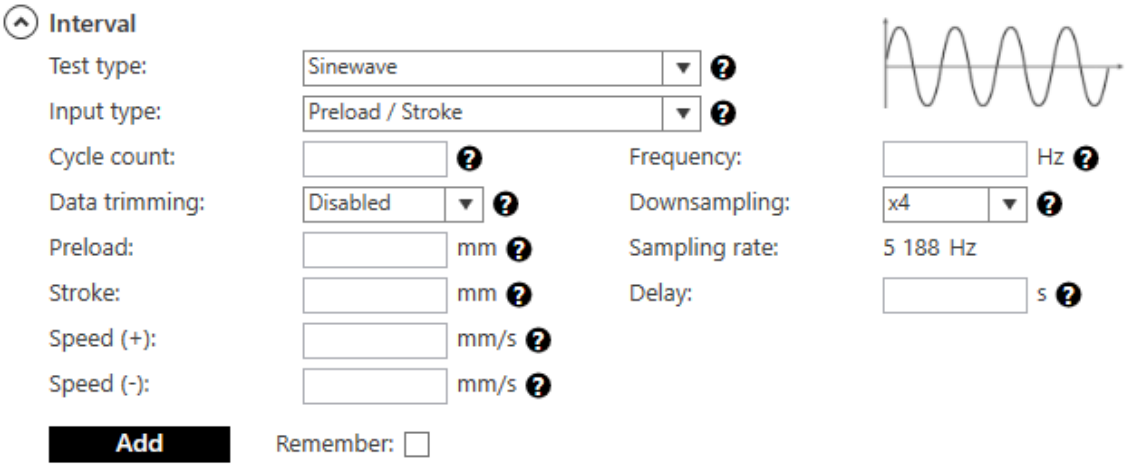



*Figure 31*

In interval section the user defines the actual parameters of the test itself, such as:

- Test type – user can choose between sinewave, constant velocity and constant acceleration test types. Once the type is selected, the user can see the waveform of the selected test type in the right side.
- Input type – preload/stroke or offset/amplitude.
- Cycle count – the number of cycles which will be executed with this test type.
- Data trimming – lets interval data to be trimmed by removing cycles from start and/or the end of full test wave form.
- Preload – the preload distance which will be executed before starting the test.
- Stroke – the amount of displacement which will be used during test.
- Speed (+) – speed of the compression cycle.
- Speed (-) – speed of the rebound cycle.
- Frequency – shows the frequency of the test waveform.
- Downsampling – the data reduction factor used to record measurement points at a lower sampling rate.
- Delay – amount of time the dyno will wait to start a new run, once current one is finished.
- “Remember” checkbox – when selected, the software keeps the entered interval parameters for the next addition, so you do not need to enter them again.

After desired interval parameters are entered, user has to press **Add**. The user is allowed to add more than one testing intervals with different types and parameters. If the "Remember"

checkbox is selected, the software will keep the interval parameters for your next entry, so you do not need to re-enter them each time.

Interval test types:

**Sinewave Motion:** A sinewave movement pattern produces a smooth, continuous oscillation that varies sinusoidally with time. This means the piston moves up and down in a predictable, cyclic manner with gradually changing velocity and acceleration. It's used primarily for characterizing the frequency response of a shock absorber — helping engineers analyze damping performance, phase lag, and resonance behavior under realistic, periodic road conditions such as ripples or undulating surfaces.

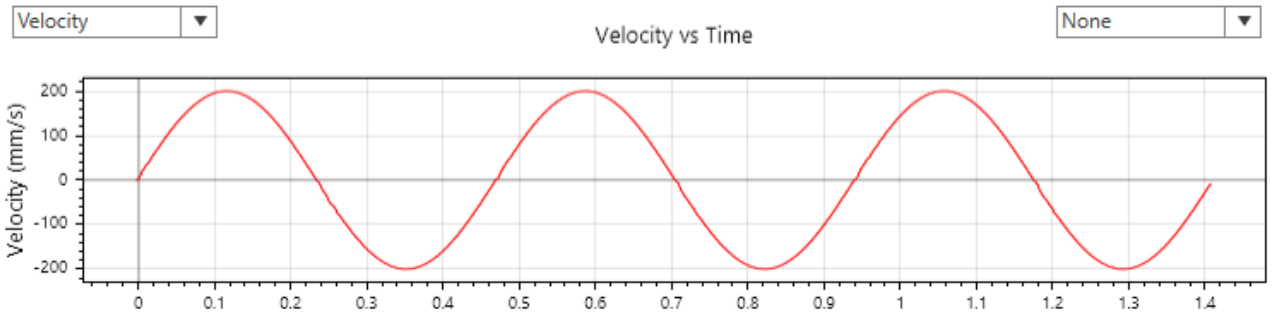



*Figure 32*

**Constant Acceleration Motion**: In constant acceleration mode, the shock dyno drives the piston with a uniform rate of change in velocity, meaning the acceleration remains steady throughout a portion of the stroke. This pattern is ideal for evaluating the damper's force response to changing speeds and for studying its behavior under transient conditions, such as rapid vehicle maneuvers or impacts. It provides insight into how the damper handles quick compression or rebound events where acceleration forces dominate.

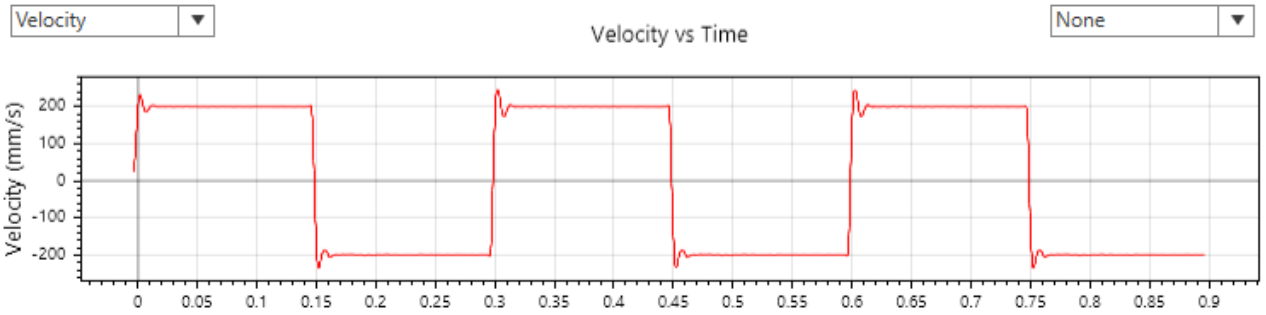



*Figure 33*

**Constant Velocity Motion:** Constant velocity motion keeps the piston moving at a steady speed throughout the test stroke, producing a uniform rate of displacement over time. This is one of the most common test modes, used to map the damper's force–velocity characteristics, such as in a standard shock dyno curve. It allows engineers to quantify damping force at different piston velocities, which is essential for tuning ride comfort and handling balance in both automotive and motorsport applications.

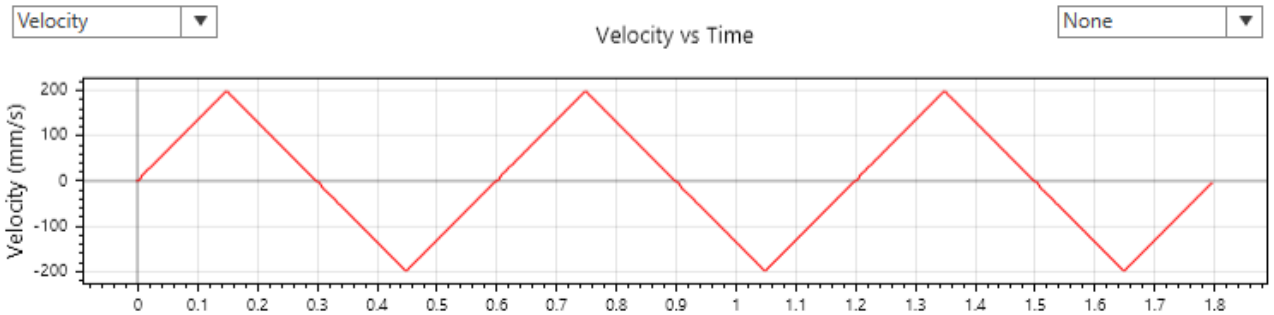



*Figure 34*

**Sawtooth Motion:** The sawtooth waveform produces a linear motion in one direction (compression or rebound) followed by a rapid return to the start position. This creates a repeating pattern of steady-speed movement with sudden reversals. It's used to simulate sudden impacts or directional changes, helping evaluate the damper's response to quick reversals and hysteresis effects in the damping system.

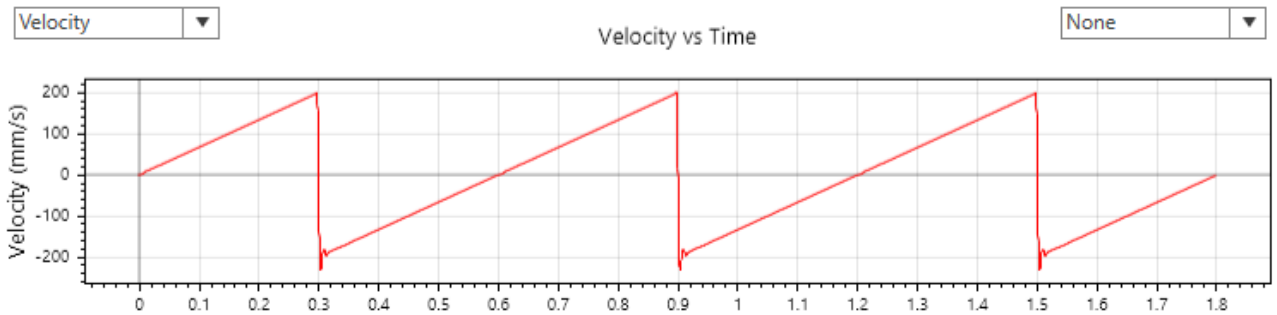



*Figure 35*

**Inverted Sawtooth (Bouncing Ball) Motion:** An inverted sawtooth pattern reverses the shape — featuring a rapid acceleration in one direction followed by a slower, linear return. It mimics the motion of a bouncing ball losing height over time, making it useful for testing energy dissipation and rebound control. This waveform helps assess how a shock absorber manages repeated, decaying impacts like wheel hop or repetitive bumps.

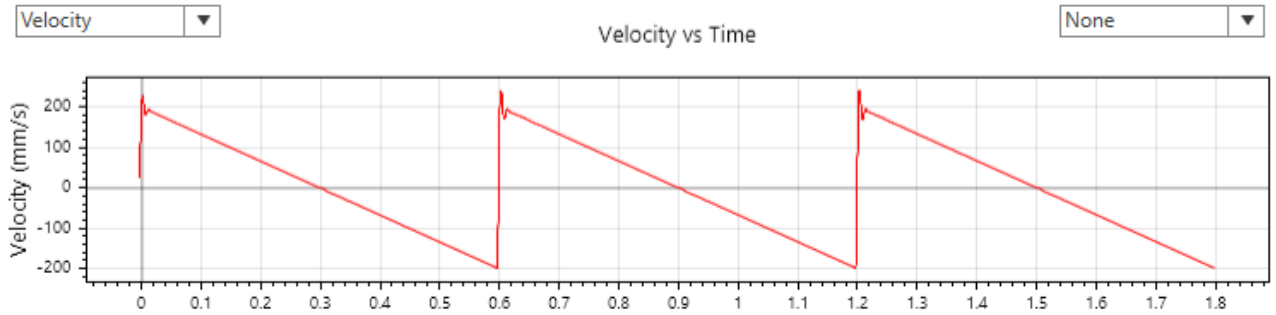



*Figure 36*

## 11.12. Impulse

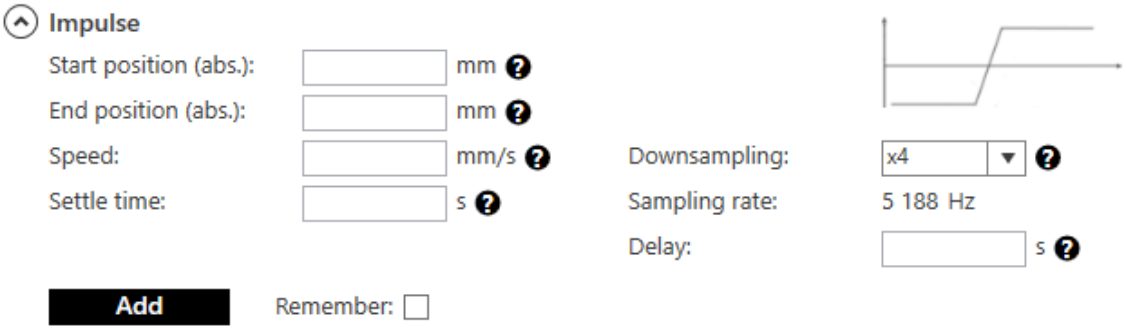



*Figure 37*

Impulse is a type of test, which does not get repeated. To setup impulse test, user has to define parameters such as:

- Start positions (abs.) – the absolute positions where the impulse test will begin.
- End positions (abs.) – the absolute positions where the impulse test will finish.
- Speed – the speed at which the rod will move from start to end positions.
- Settle time – the pause time allowed for the system to stabilize before measurement is taken.
- Downsampling – the data reduction factor used to record measurement points at a lower sampling rate.

- Delay – the amount of time the dyno will wait before starting a new run once the impulse test is finished.
- “Remember” checkbox – when selected, the software keeps the entered interval parameters for the next addition, so you do not need to enter them again.

## 11.13. Custom

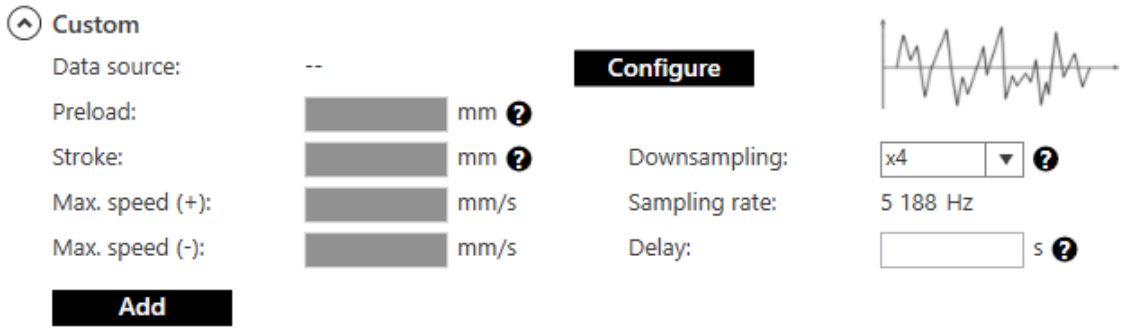



*Figure 38*

Custom interval test allows the user to upload and simulate track data or generate a pink noise waveform. To make this type of test, the user has to press **Configure**.

## 11.14. Free fall

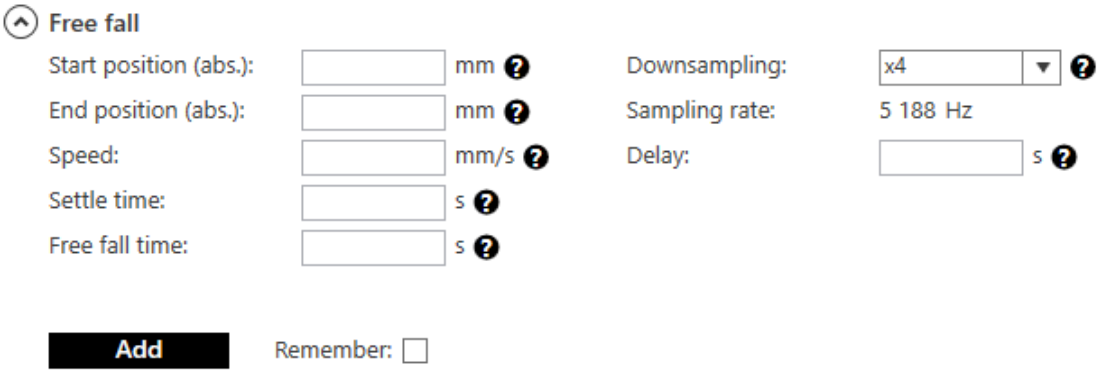



*Figure 39*

**Free fall** is a type of test used to analyze the rebound behavior of a shock absorber and spring assembly. The test begins by compressing the damper to a defined position at a controlled speed. After reaching the target position, a short settle time is applied (recommended ~0.5 s) to stabilize the system.

Once the settle phase is complete, the motor is disengaged and the assembly is allowed to move freely under spring force while data is recorded. This enables analysis of rebound characteristics and comparison between different settings.

To set up a Free fall test, the user has to define parameters such as:

- Start position (abs.) – the absolute position where compression begins.
- End position (abs.) – the absolute compressed position of the damper.
- Speed – the speed at which the rod moves to the target position.
- Settle time – pause after reaching target position to stabilize the system.
- Free fall time – duration of data recording after motor disengagement.
- Downsampling – data reduction factor used for recording measurements.
- Delay – time before the next run starts after the test is finished.
- “Remember” checkbox – stores entered parameters for future tests.

## 11.15. Creating track data test

In order to setup track data test, the user has to follow steps presented below:

1. Select CSV format according to the telemetry device the user used (Figure 40 – Step 1).
2. Select units (Figure 40 – Step 2).
3. Press **Select** and select the file you want to use for the test (Figure 40 – Step 3).
4. Once the file is selected, the user will see the displacement curve of the file.
5. Select filtering (optional) (Figure 40 – Step 4).
6. If the user does not need to simulate the whole file, he is allowed to trim it. To do that, press and hold shift-key, set the first trimming line on the desired place of the curve (Figure 40 – Step 5), then, while the shift-key is still being pressed, set the second trimming line (Figure 40 – Step 6).
7. The user is also allowed to manually set the minimum position of the damper (Figure 40 – Step 7).
8. The user is also allowed to manually set the Displacement multiplier (Figure 40 – Step 8).
9. Press **Apply** (Figure 40 – Step 9).
10. Press **OK**.
11. Press **Add**.

*Figure 40*

## 11.16. Signal generator

Our software allows user to generate five types of noises: linear sweep, exponential sweep, linear chirp, exponential chirp, pink noise.

1. Select signal type (Figure 41 – Step 1).
2. Enter the duration of the test (Figure 41 – Step 2).
3. Enter the stroke of the test (Figure 41 – Step 3).
4. Enter the minimum frequency (Figure 41 – Step 4).
5. Enter the maximum frequency (Figure 41 – Step 5).
6. Press **Generate** .
7. Press **OK** .
8. Press **Add** .

*Figure 41*

**Signal types:**

**Pink Noise Motion:** Pink noise excitation is a random, broadband signal that contains equal energy per octave, meaning lower frequencies carry more power than higher ones. This waveform creates a motion pattern with varying amplitudes and frequencies, closely resembling real-world, irregular road inputs. It's valuable for durability testing and dynamic performance evaluation, providing a realistic measure of how the damper behaves under complex, unpredictable conditions.

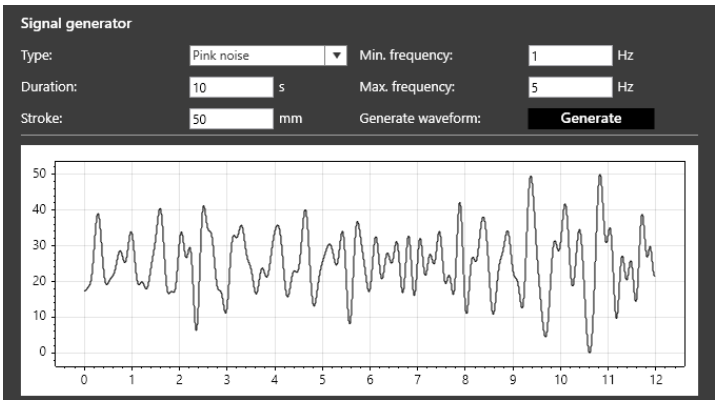



*Figure 42*

**Linear Sweep Motion:** In a linear sweep, the frequency of oscillation increases at a constant rate over time — for example, from 0.1 Hz to 20 Hz in a uniform ramp. This allows engineers to observe how damping force and phase behavior change across a range of frequencies. It's primarily used for frequency response characterization and identifying resonant frequencies or performance transitions in the damper.

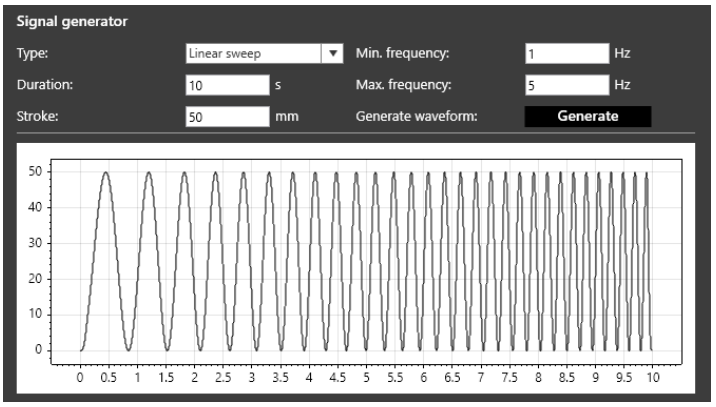



*Figure 43*

**Exponential Sweep Motion:** An exponential sweep increases frequency logarithmically rather than linearly, meaning the lower frequencies are covered slowly while higher frequencies are reached more rapidly. This provides finer resolution where damper response tends to vary most (at low frequencies). It's often used for detailed system identification and modal testing, revealing nonlinearities and frequency-dependent damping characteristics.

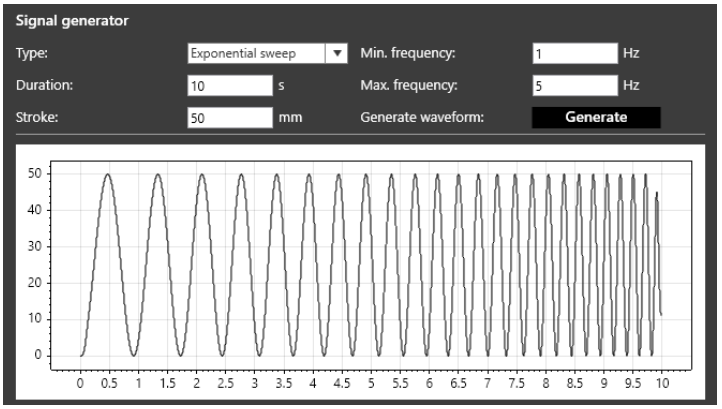



*Figure 44*

**Linear Chirp Motion:** A linear chirp is similar to a linear sweep but typically applied as a sinusoidal input with linearly increasing frequency — a continuous, rising "chirp" in oscillation rate. It's used to assess how the damper transitions between different frequency ranges in real time. This helps in validating damper models and control algorithms, especially for electronically controlled dampers (semi-active or adaptive systems).

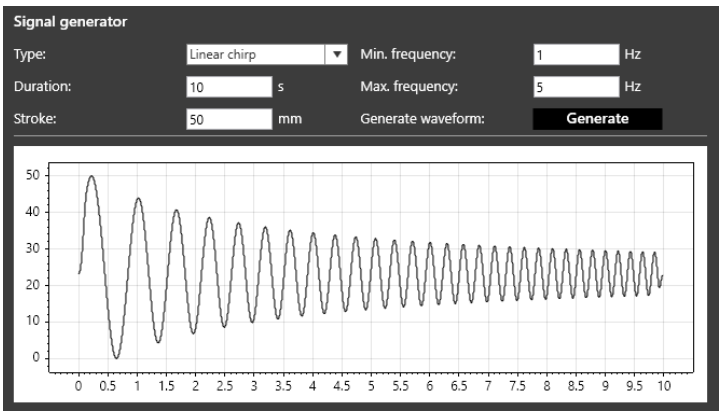



*Figure 45*

**Exponential Chirp Motion:** An exponential chirp increases frequency exponentially with time, producing a denser sampling of low-frequency behavior while still reaching high frequencies. This pattern closely matches the way many real-world vibrations occur, where lower-frequency inputs dominate. It's particularly useful for system identification, spectral analysis, and detecting nonlinear response under complex excitation.

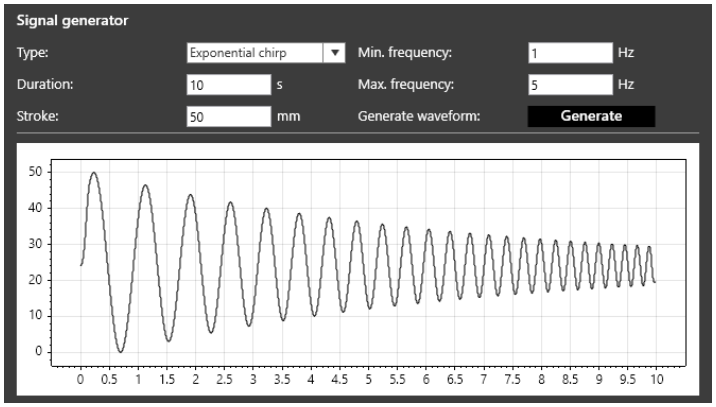



*Figure 46*

## 11.17. Starting the test

Once the user finishes building his test sequence, to start test he has to follow the steps below

1. Arm the dyno by pressing **Arm**.
2. Enter test name.
3. Enter test comment(optional).
4. Press **Start**.

In order to stop the running test, user has to press **Stop**.

## 11.18. Graph comparison - EMA data mode

The user has 2 options how to look at graphs: EMA and shock dyno mode. This section describes the EMA data mode. To switch between modes, the user has to locate Graphs Channels switch button in the top left corner.

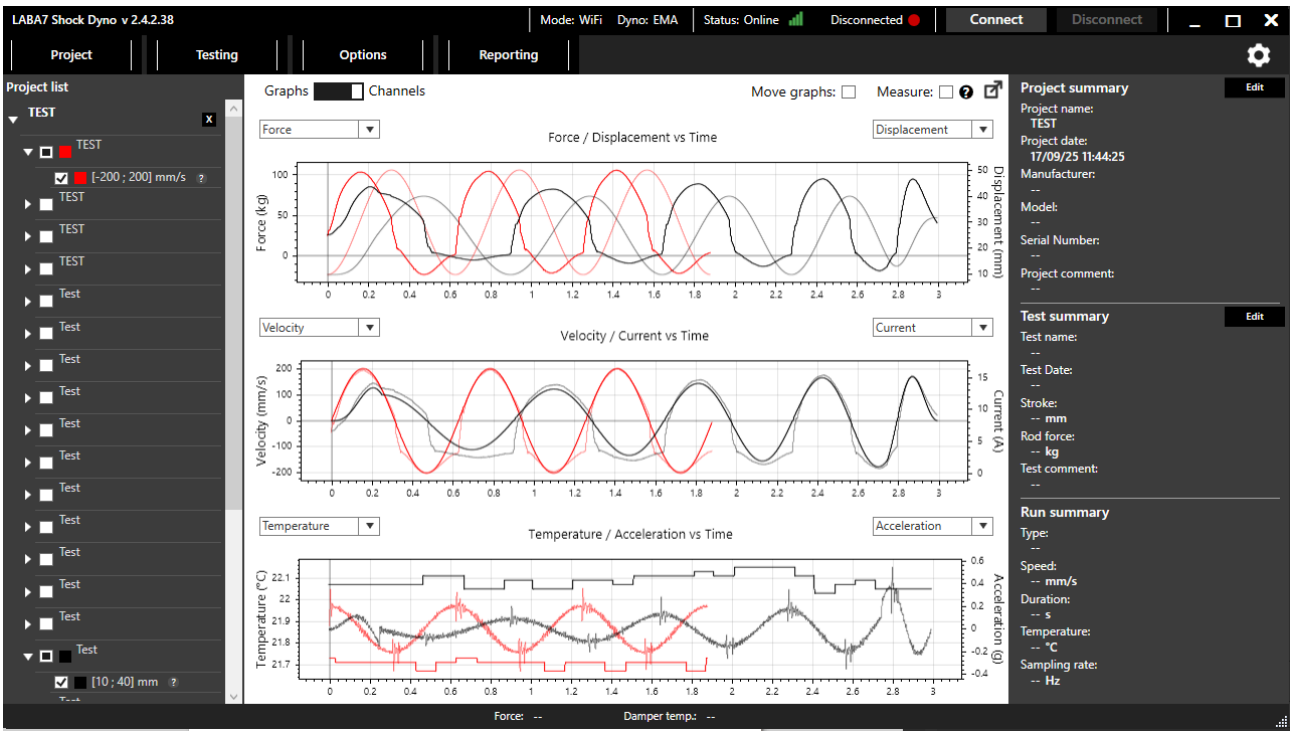



*Figure 47*

In EMA data mode, user is allowed to look at 6 curves at once. The user can select from 6 types of curves:

- Force
- Displacement
- Velocity
- Current
- Temperature
- Acceleration

To view graphs user has to select them in the project list, on the left side of the software window. By clicking on Measure: ☑ checkbox in the top right corner, user can enable some measuring tools presented in the Figure 48 below.

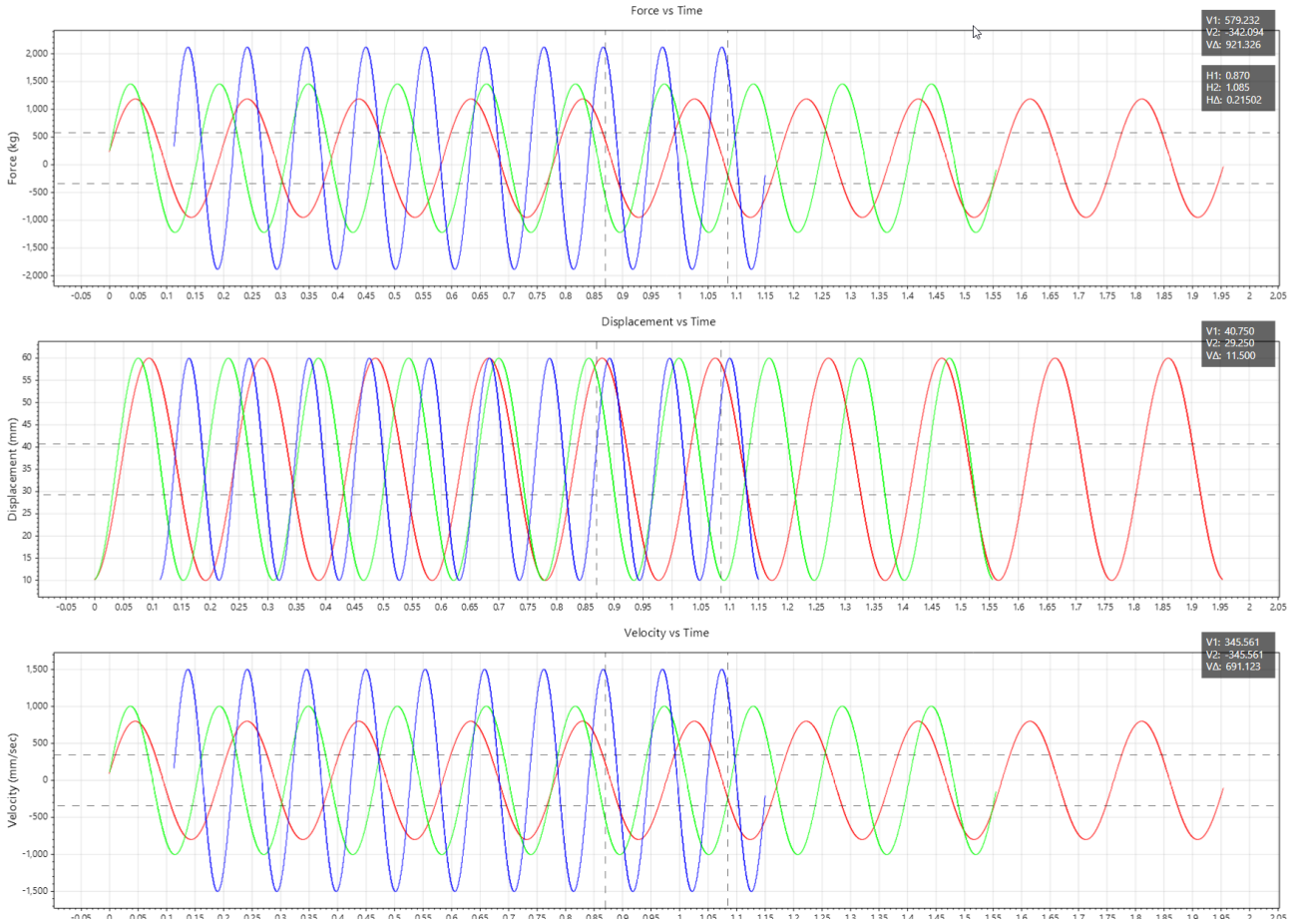



*Figure 48*

The user is also allowed to move the graphs in horizontal axis by clicking on Move graphs: ☑ then, clicking on and dragging the desired graph. Comparison between original and moved graphs is shown in the Figure 49 below.

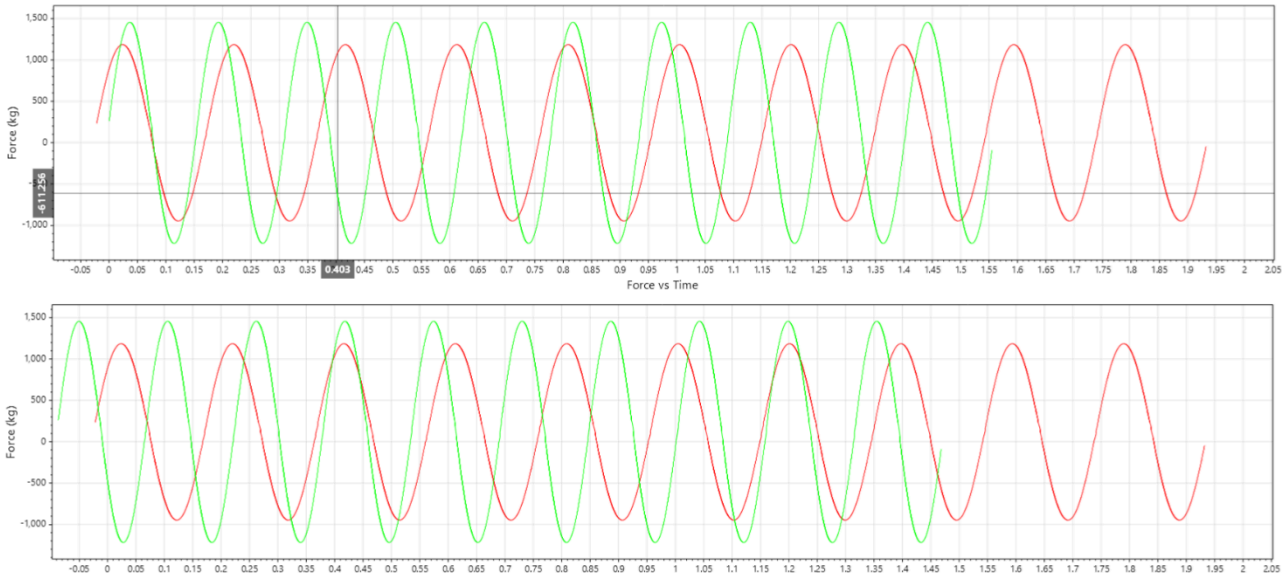



*Figure 49*

## 11.19. Enabling the original curve

The user is also allowed to look at the original curve, which was sent to the dyno to execute and compare it to the actual executed curve. To do this, user has to right-click on the run, which original curve wants to see and select “show original waveform”. The original curve is represented with dotted line.

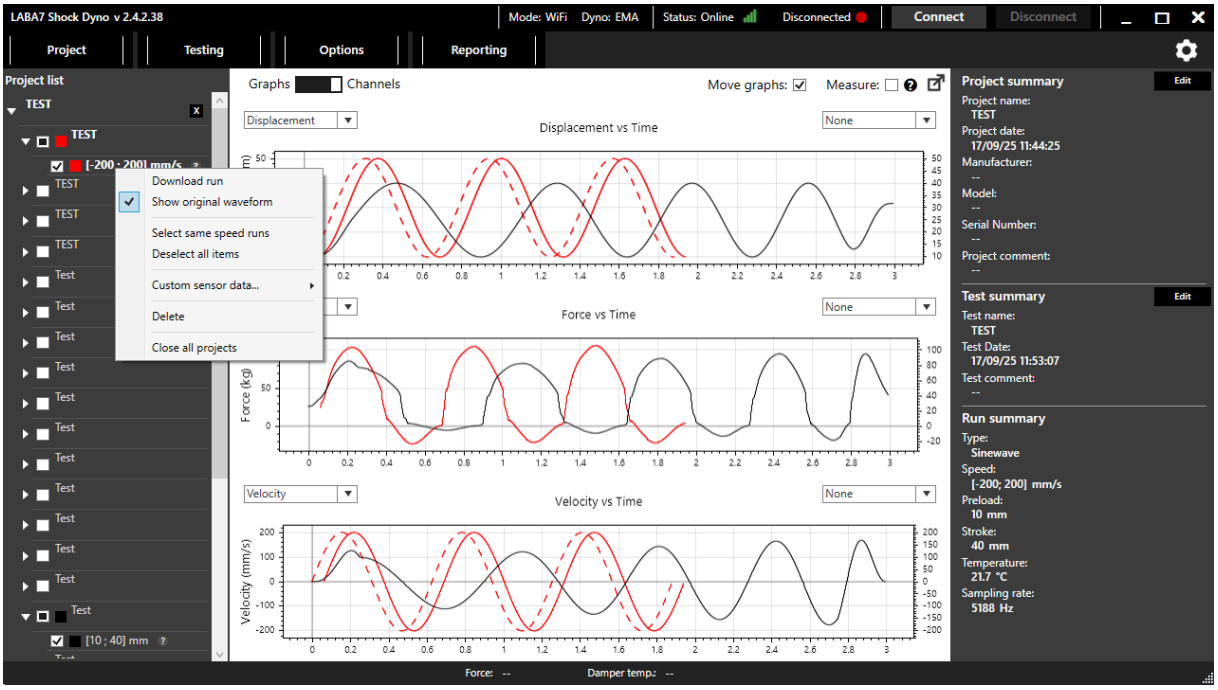



*Figure 50*

## 11.20. Graph Comparison Shock Dyno mode

The user is also allowed to look at graphs made with EMA, in shock dyno mode. To switch between modes, the user has to locate Graphs Channels switch button in the top left corner.

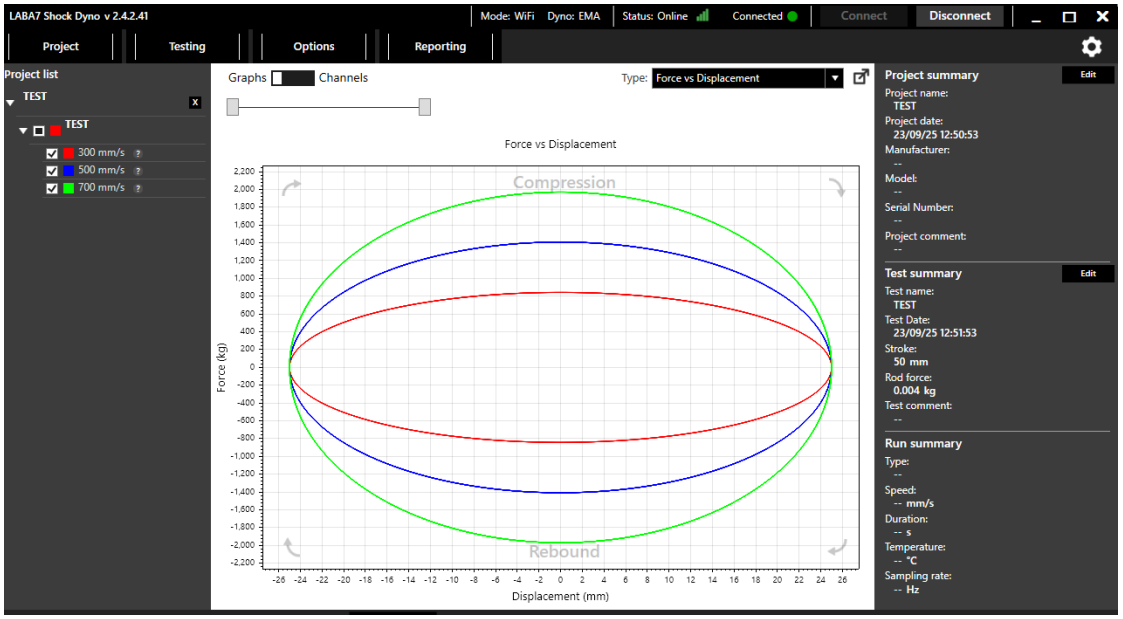



*Figure 51*

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 see data values at specific data points, user has to hover over desired graph point and the exact values of both axes will be shown.

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.

## 11.21. Graph Types, Shock Dyno mode

This section describes the different graph types available for each test in shock dyno data mode.

### Force vs Displacement

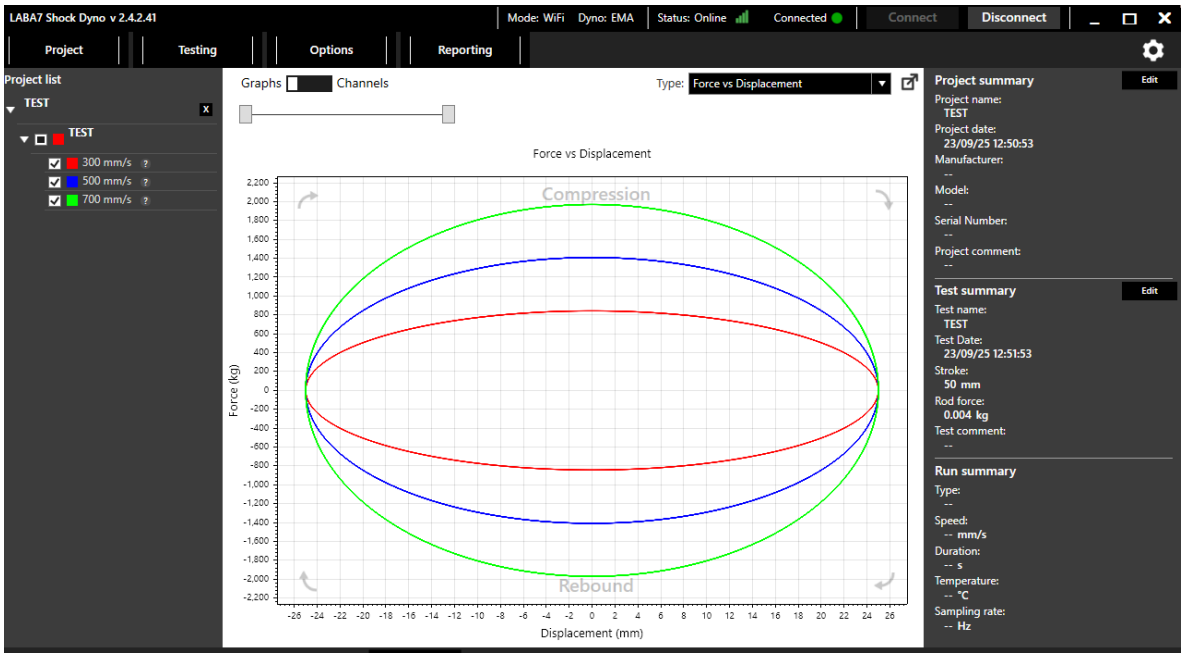



*Figure 52*

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

## Avg. Force vs Displacement

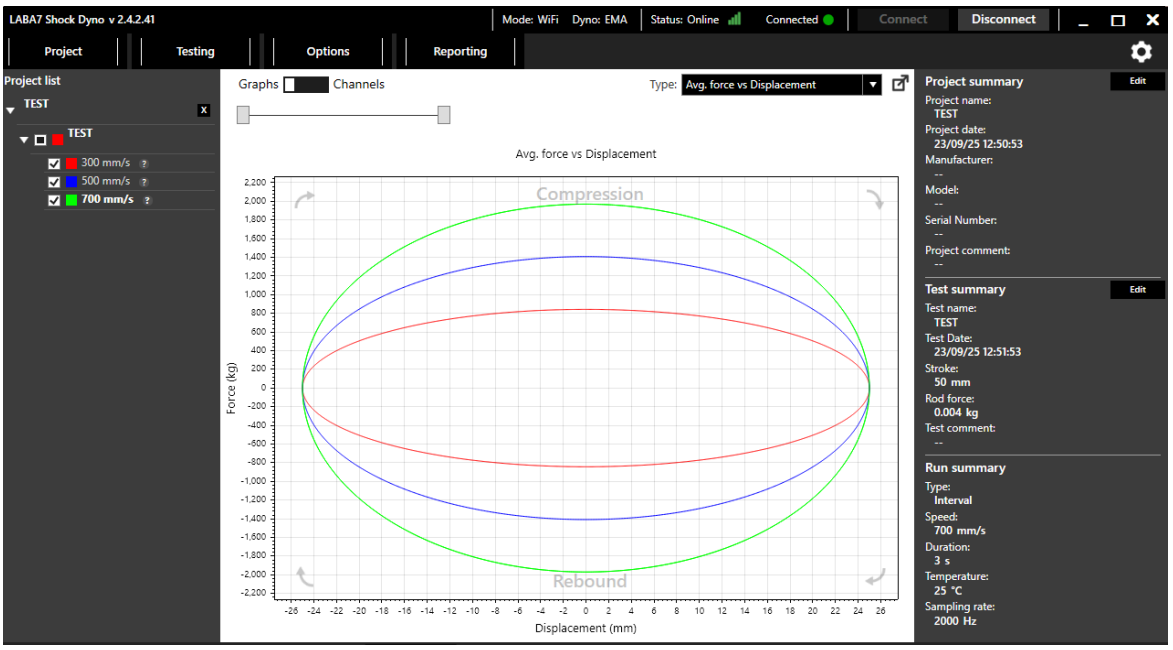



*Figure 53*

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

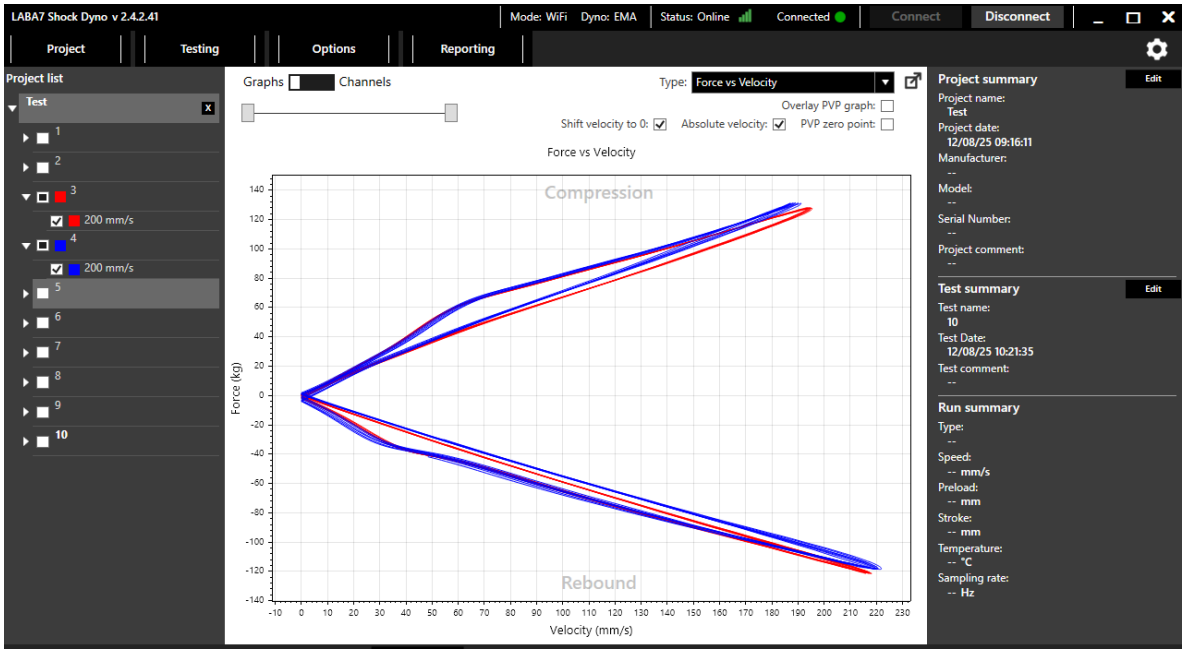



*Figure 54*

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

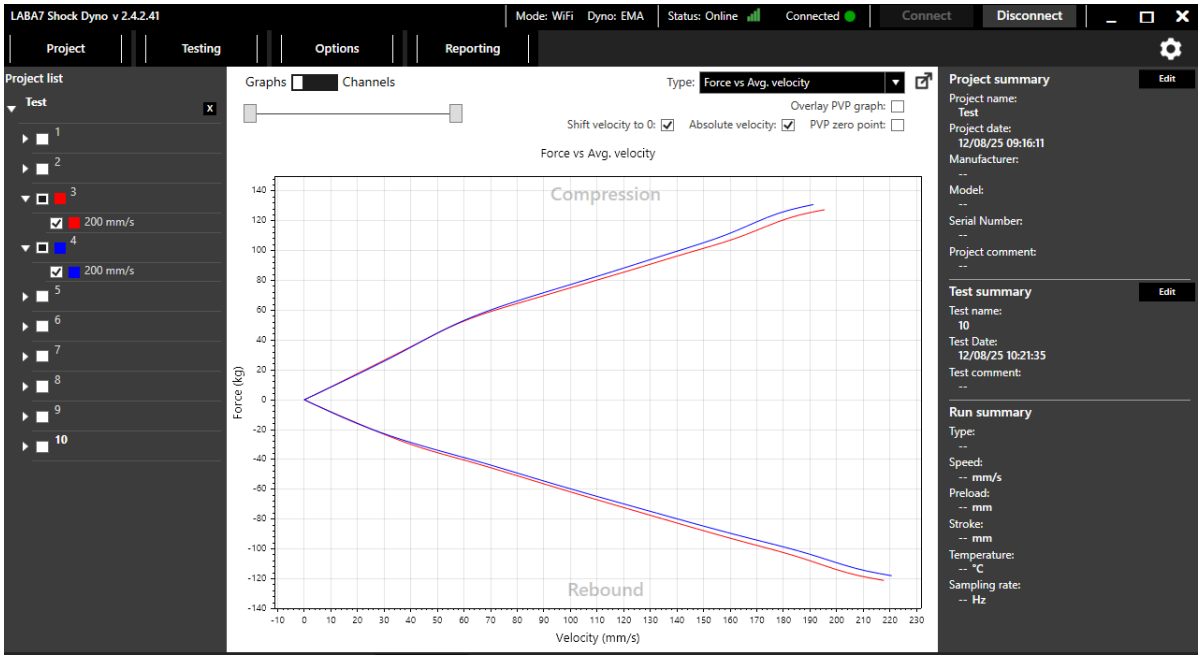



*Figure 55*

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.

## Force vs Combined Velocity

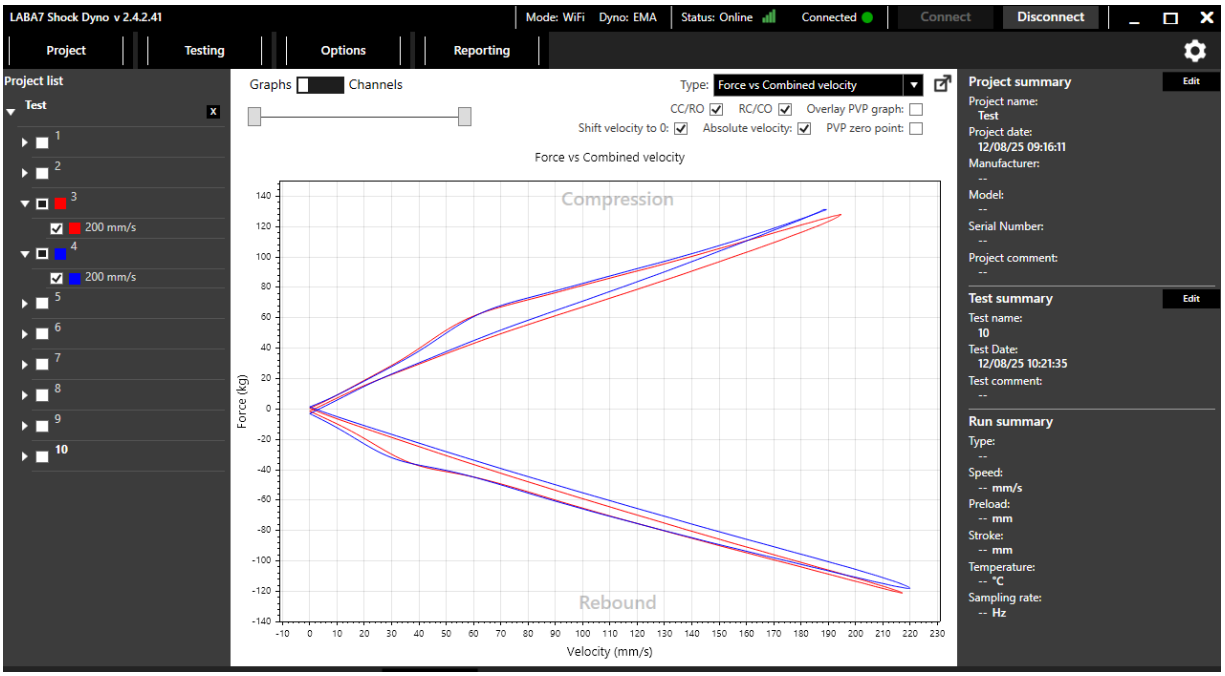



*Figure 56*

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 Peak Velocity

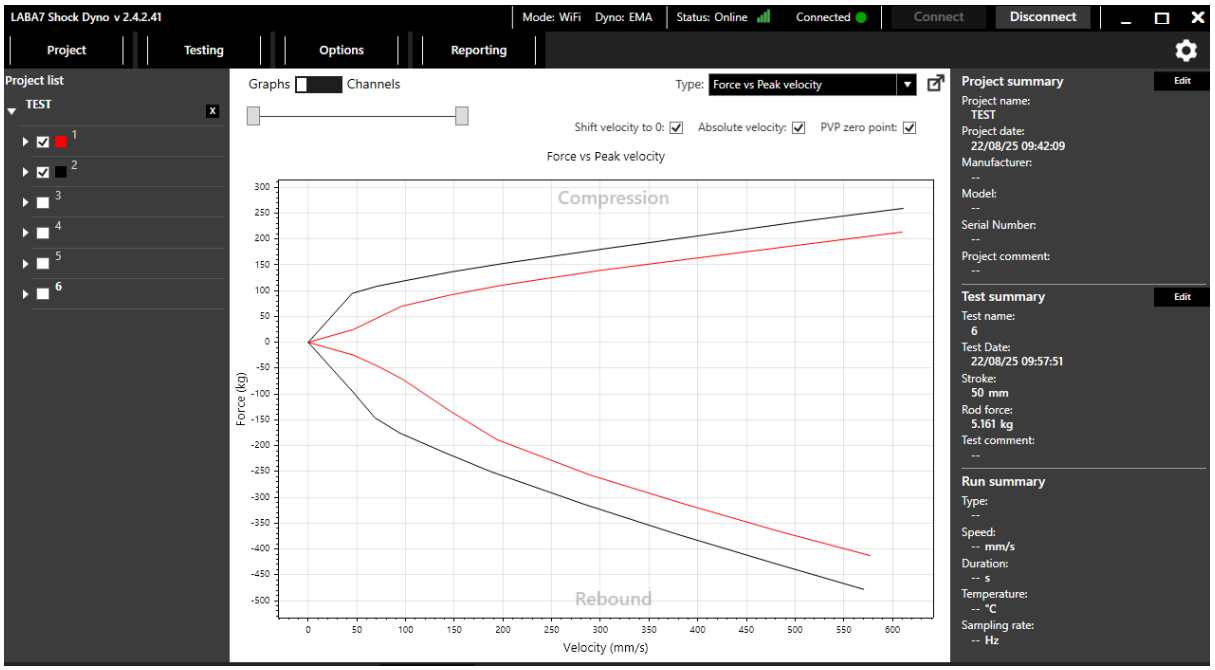



*Figure 57*

Force vs Peak Velocity graph is available for multiple speed tests.

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

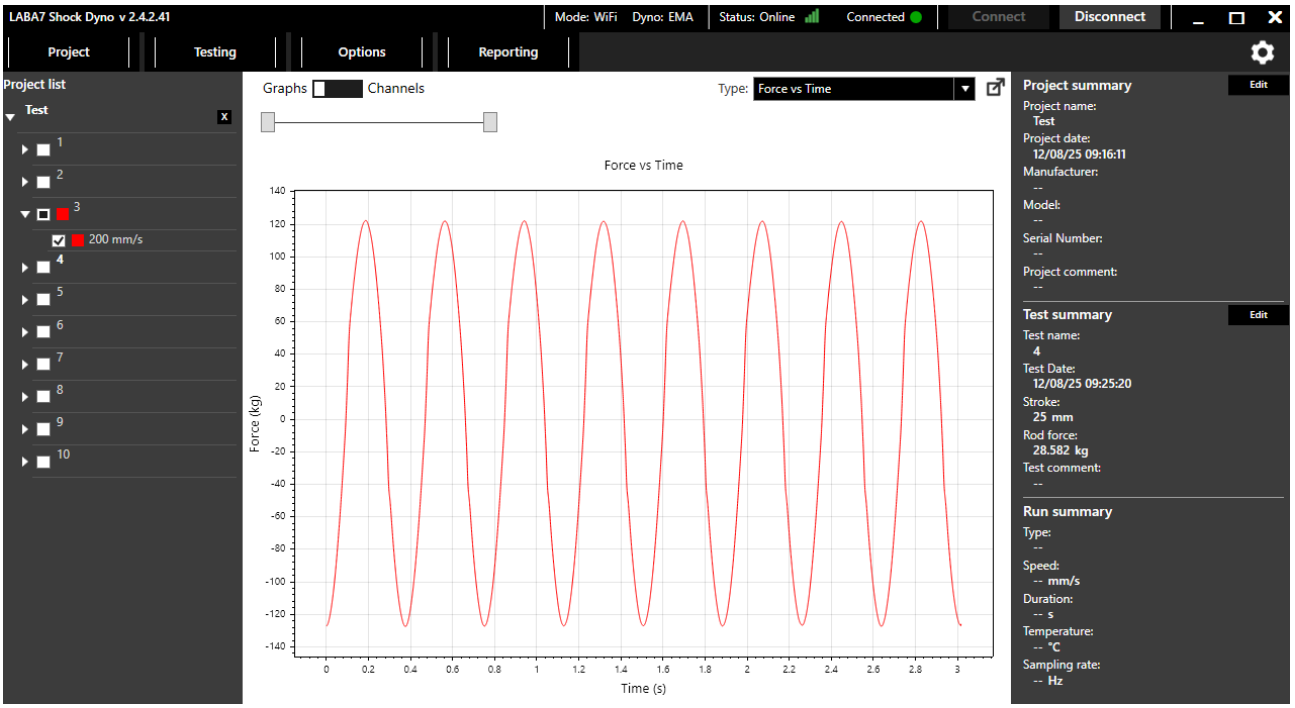



*Figure 58*

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

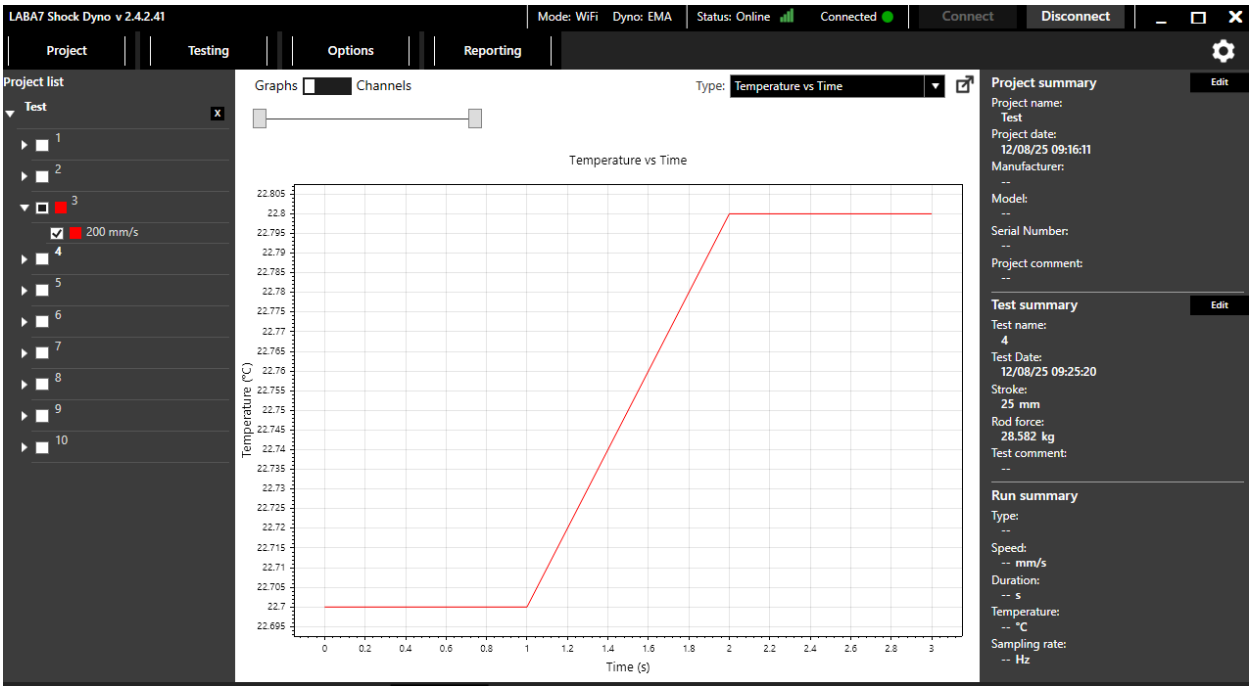



*Figure 59*

Time vs Temperature graph represents the warmup of the damper. It is not only available for the warmup test but also the interval runs.

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

## 11.22. Graph tools

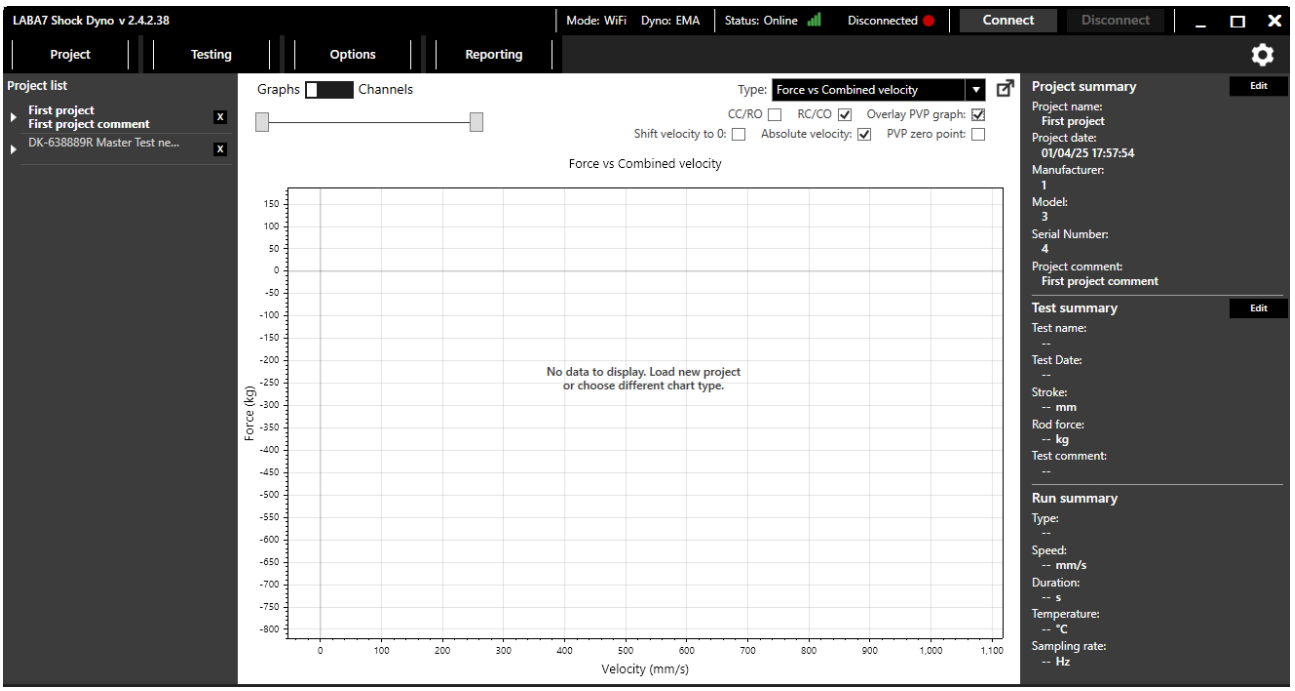



*Figure 60*

- Shift velocity to 0 – shifts force axis to 0 or leaves it untouched when viewing a Force vs Avg. Velocity graph.
- Absolute velocity – changes how velocity is presented in the graphs, either as a positive or negative speed for a rebound cycle.
- PVP zero point – enables Peak Velocity graph interpolation, which fits the curve with new data points and smoothens the line.
- Overlay PVP graph – displays the Peak Velocity Point (PVP) curve from the current test overlaid onto other selected runs/tests.
- CC/RO – filters or emphasizes graph data with the compression circuit closed and rebound open, helping isolate rebound damping behavior.
- RC/CO – filters or emphasizes graph data with rebound closed and compression open, highlighting compression damping performance.

## 11.23. Additional Test Options

In options menu, additional graph settings are available. To reach them, user has to press "Options", then – hover over graph options and select his desired additional graph option.

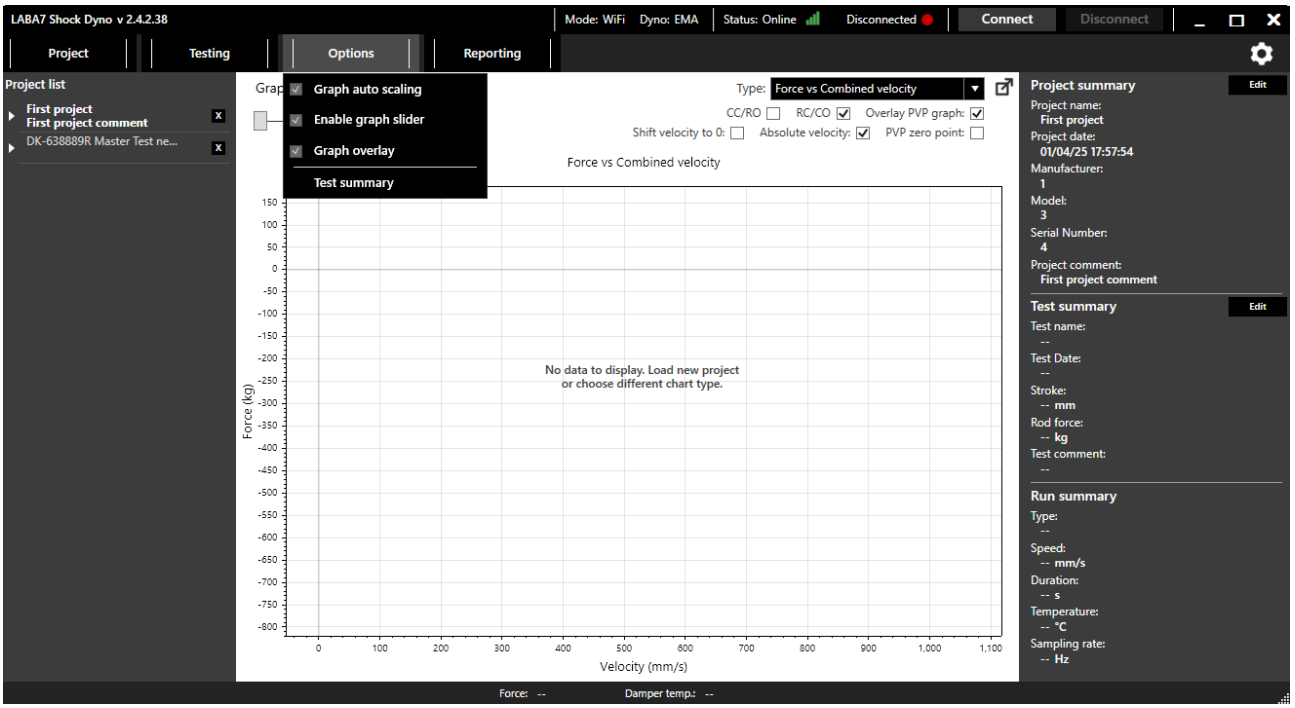



*Figure 61*

- Graph auto scaling – adjusts the zoom scale to best fit the active graph.
- Enable graph slider – enables the graph slider.
- Graph overlay – shows the cycle naming on the graph.
- Test summary – opens the test summary window of the selected test.

## 11.24. Save and open EMA test presets

In order to save a preset user has to make a test in test builder, and after adding all of the runs, press **Save** button, which is located below the test comment window.

In order to upload previously saved preset, user has to press **Open** which is located next to preset save button.

## 11.25. Open existing project

In order to open existing project, the user has to locate the “project” button in the top left corner and press “open existing”.

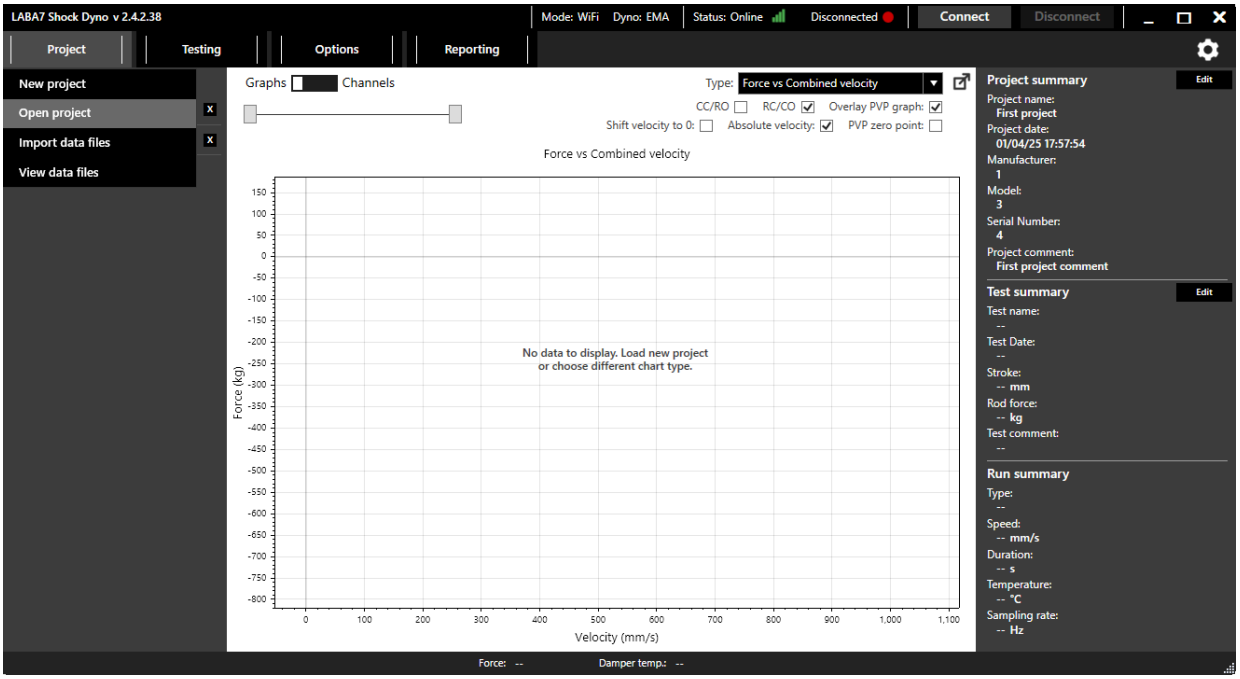



*Figure 62*

The Open Project feature is used to load previously saved work and continue testing within an existing project. It allows users to open project files containing past test results, configurations, and notes, so new tests can be appended to the same project for continuous data collection and comparison. Projects can be stored anywhere on the computer, giving flexibility in how and where work is organized.

Projects may also be stored on a shared drive for team access. However, when multiple users open and modify the same project file simultaneously, the last one to save will overwrite the existing file, since the software retains and writes the full project state upon saving. To prevent data loss, it is recommended that only one user edits a shared project at a time.

<u>ATTENTION</u>: Large project files can take considerable time to load or save. Avoid keeping very large files in shared workspaces to reduce delays and potential synchronization issues.

## 11.26. Force eliminations and other test related data

The user is allowed to edit the test summary, to do that, the user has to locate test summary, which is in the right side of the screen and press **Edit** .

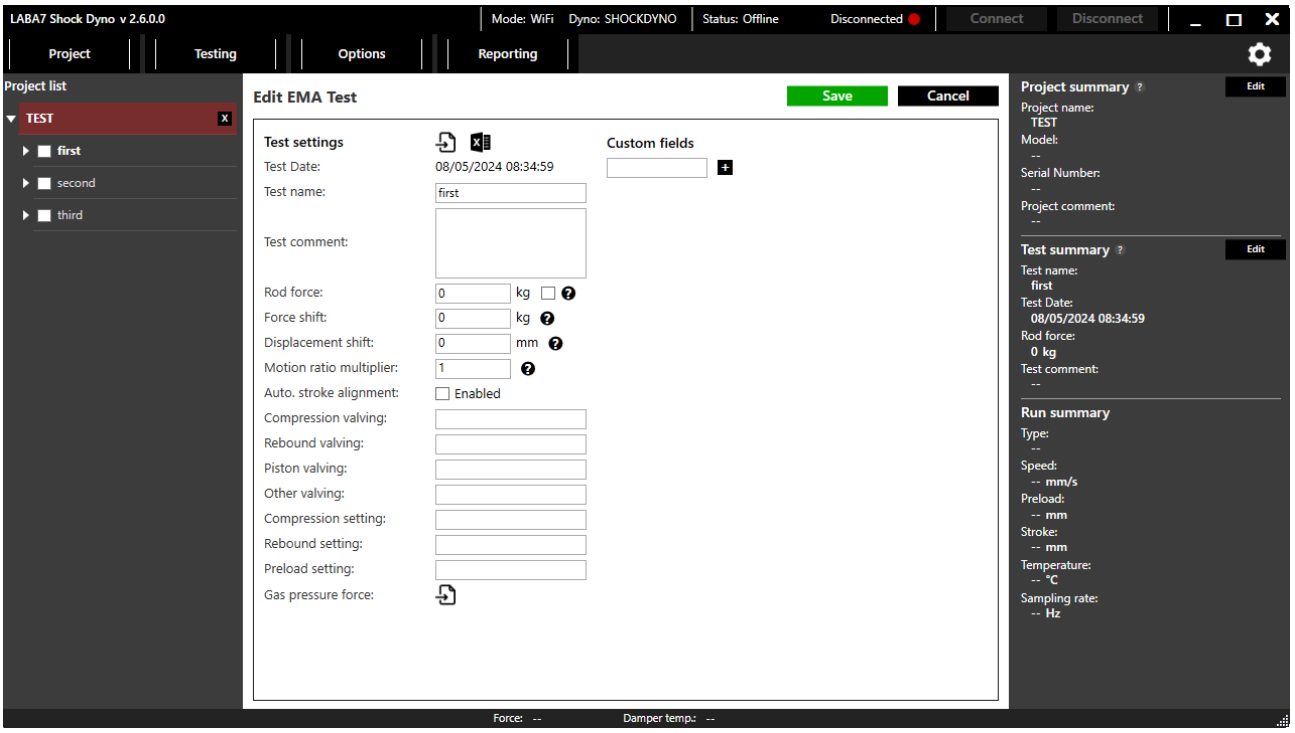



Figure 63

In test summary, user is allowed:

- Edit test name.
- Edit test comment.
- Check the rod force and edit it.
- Enter force shift, that shifts the force graph in shock dyno graph view.
- Enter displacement shift, that shifts displacement graph in shock dyno graph view.
- Enter motion ratio multiplier.
- Enter compression valving data.
- Enter rebound valving data.
- Enter piston valving data.
- Enter data about other valving.
- Enter comment about compression setting.
- Enter comment about rebound setting.

- Enter comment about preload setting.
- Add some additional fields to enter more needed data about the test. This data can be saved for upcoming tests, by clicking on “save” icon.

## 11.27. 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.

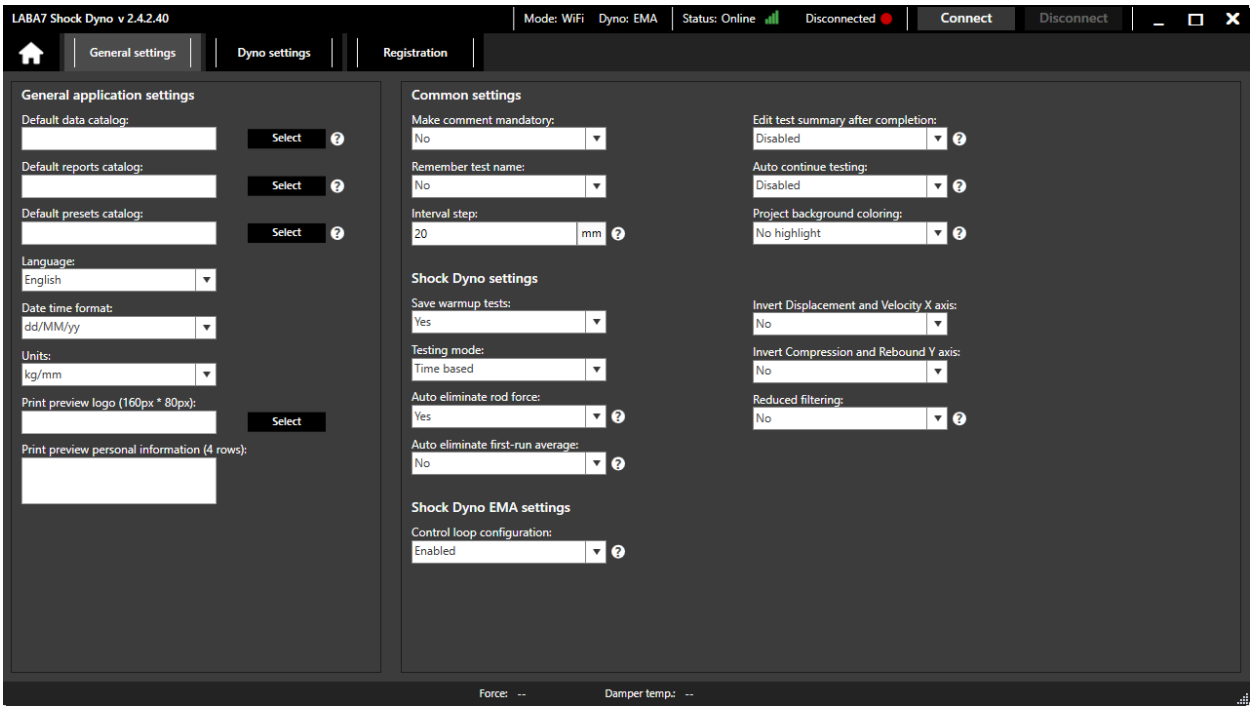



*Figure 64*

**General Settings**

- Default data catalog – change the default location where the application will store tests.
- Default reports catalog – change the default location where the application will store reports.
- Default preset catalog – change the default location where the application will store presets.
- Language – change to a different user interface language.
- Date time format – change how date and time is presented.
- Units – allows user to change different units of measurement.
- 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.

**Other Settings**

- Make comment mandatory – makes the test comment mandatory.
- Remember test name – remembers test names that have been used before.
- Interval step – defines the step size for velocity intervals.
- Edit test summary after completion – opens the test summary window automatically after the test run is complete.
- Auto continue testing – opens the testing window automatically after the test run is complete.
- Project background coloring – determines how projects can be differentiated between themselves:
    - No highlight - same background for all projects.
    - Altering - odd and even projects will have different background color.
    - Colored – each project will have its own background color.
- Save warmup tests – makes the software save the warmup test in project.
- Testing mode – select the interval mode, cycle based or time based.
- Auto eliminate rod force – automatically eliminates rod force after the test run is complete.
- Auto eliminate first-run average – automatically eliminates first-run average after the test run is complete.
- Invert vertical axis – inverts the vertical axis of the graphs.
- Invert horizontal axis – inverts the horizontal axis of the graphs.
- Reduced filtering – applies minimal digital smoothing to the load-cell signal, preserving high-frequency torque components while reducing sensor noise. Useful for observing natural motor behavior such as cogging torque or ripple.
- Control loop configuration – once enabled allows adjusting the PID algorithms according to user needs.

**About**

An area for registering the software, updating the software and checking release notes. Contact LABA7 support for a license key.

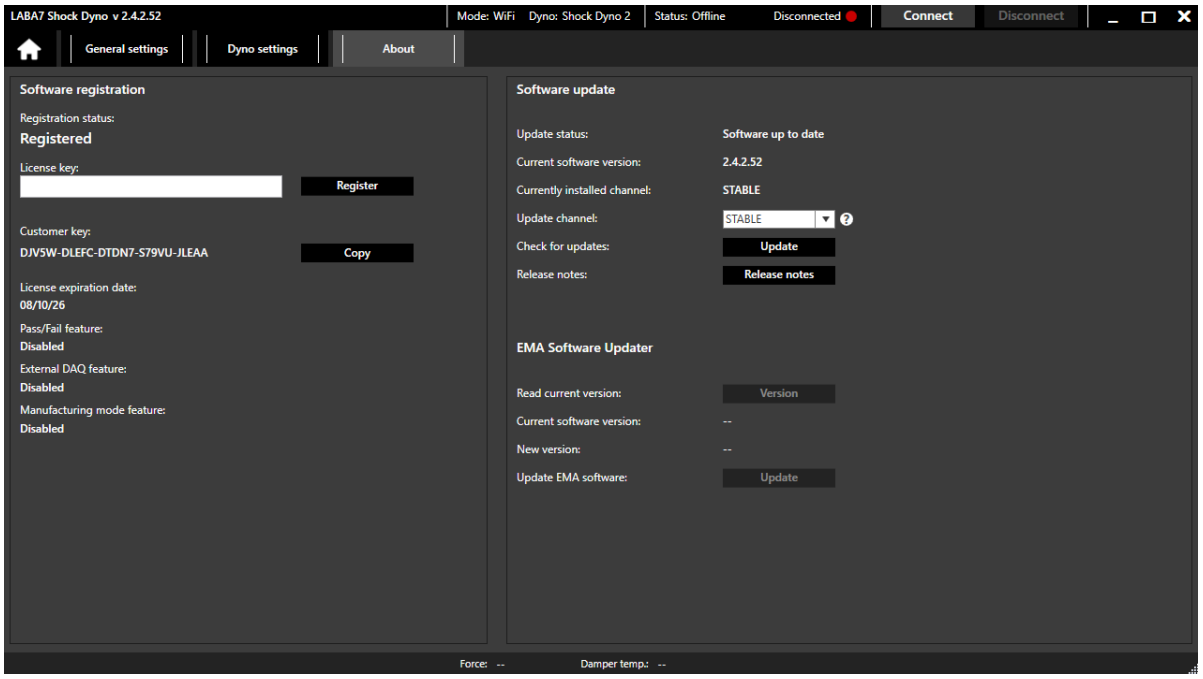



*Figure 65*

Update Channel function allows the user to choose which version stream of the software to receive updates from.

- STABLE – provides thoroughly tested releases that prioritize reliability and long-term stability. Updates are less frequent but have undergone extensive validation.

- BETA – provides access to the latest features, improvements, and fixes. However, these versions may be less stable or contain minor issues.

Changing the update channel takes effect only after performing a Check for Updates and installing the newly available version.

Release Notes provide a summary of the changes made in each new software version. They typically include information about newly added features, improvements, bug fixes, and any known issues.

## 11.28. Reporting

The application is capable of printing test reports to .pdf file. Different data modes (Shock dyno and EMA) offer different types of reports.

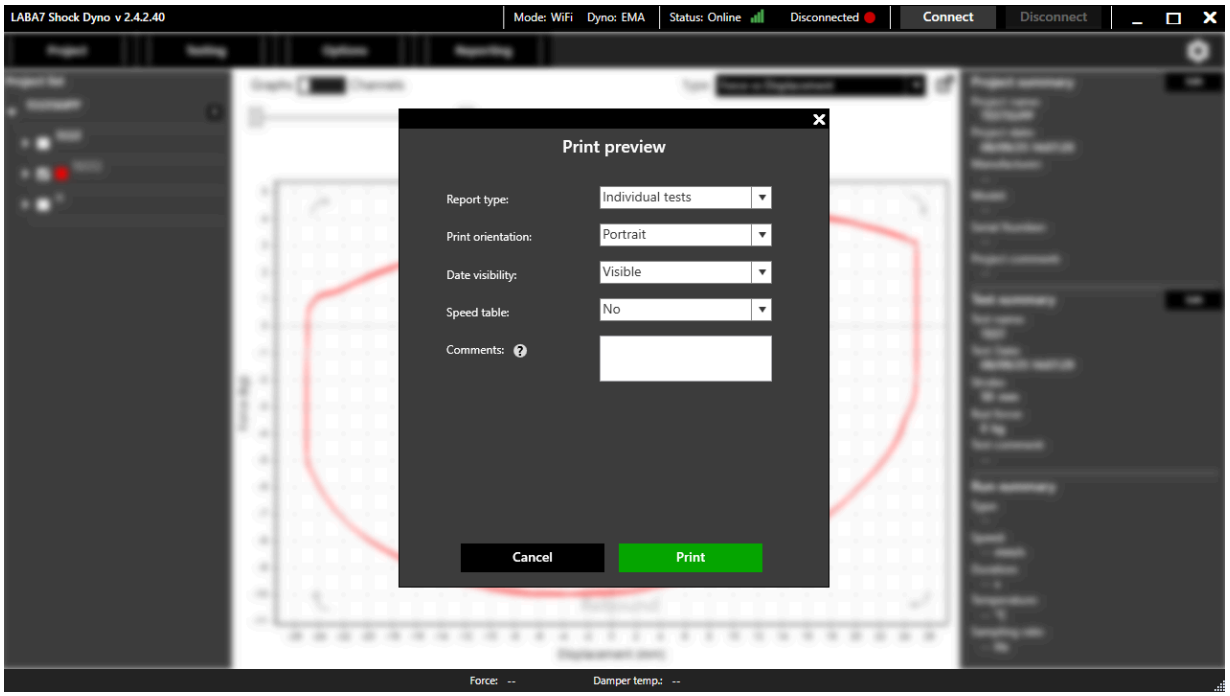



*Figure 66*

**Current graph report type (Shock dyno mode)**

Current graph report type includes selected test runs and puts it into one page. To print current graph test report, follow these steps:

1. Select one or multiple test runs which you want to include into your report, from the project list.
2. Press “Reporting”, then – “print”.
3. Select the “Current graph” report type.
4. Select orientation.
5. Select date visibility.
6. Enter a comment if needed.
7. Press Print.

**Individual tests report type (Shock dyno mode)**

Individual test report type includes selected test runs and puts it into separate pages. To print individual test report, follow these steps:

1. Select one or multiple test runs which you want to include into your report, from the project list.
2. Press “reporting”, then – “print”.
3. Select the “individual tests” report type.
4. Select the orientation.
5. Select date visibility.
6. Select speed table visibility.
7. Add some comment if needed.
8. Press Print.

**Comparison report type (Shock dyno mode)**

Comparison report type includes all of the selected test runs in one graph, making it easy for the user to compare the runs. To print a comparison test report, follow these steps:

1. Select multiple test runs you wish to compare.
2. Press “reporting”, then – “print”.
3. Select comparison report type.
4. Select orientation.
5. Select legend visibility.
6. Select date visibility.
7. Select separation by speed visibility.
8. Enter a comment if needed.
9. Press Print.

**PVP report type (Shock dyno mode)**

PVP report type includes force vs displacement, force vs peak velocity graphs and peak velocity intervals table. To print PVP report, follow these steps:

1. Select multiple runs from the test.
2. Press “reporting”, then – “print”.
3. Select PVP report type.
4. Select orientation.
5. Select date visibility.
6. Enter a comment if needed.
7. Press Print.

**PVP comparison report type (Shock dyno mode)**

PVP comparison report type allows to compare 2 or more force vs peak velocity curves in one graph. To print PVP comparison report, follow these steps:

1. Select two or more tests by clicking on the test checkbox to select all of its runs.
2. Press “reporting”, then – “print”.
3. Select PVP comparison report type.
4. Select orientation.
5. Select date visibility.
6. Select legend visibility.
7. Enter a comment if needed.
8. Press Print.

**EMA graph (EMA mode)**

Ema graph includes force vs time, displacement vs time and speed vs time graphs. To print EMA graph, user has to complete following steps:

1. Select desired runs which you want to include in the report.
2. Press “reporting”, then “print”.
3. Select EMA graph type.
4. Select orientation.
5. Select date visibility.
6. Enter a comment if needed.
7. Press Print.

# 12. Data Export and Import

The software is capable of exporting and importing test data from or to .csv file. There are 3 options of export: export interval, export PVP and export Avg. velocity. To access this functionality, press “reporting” in the main menu.

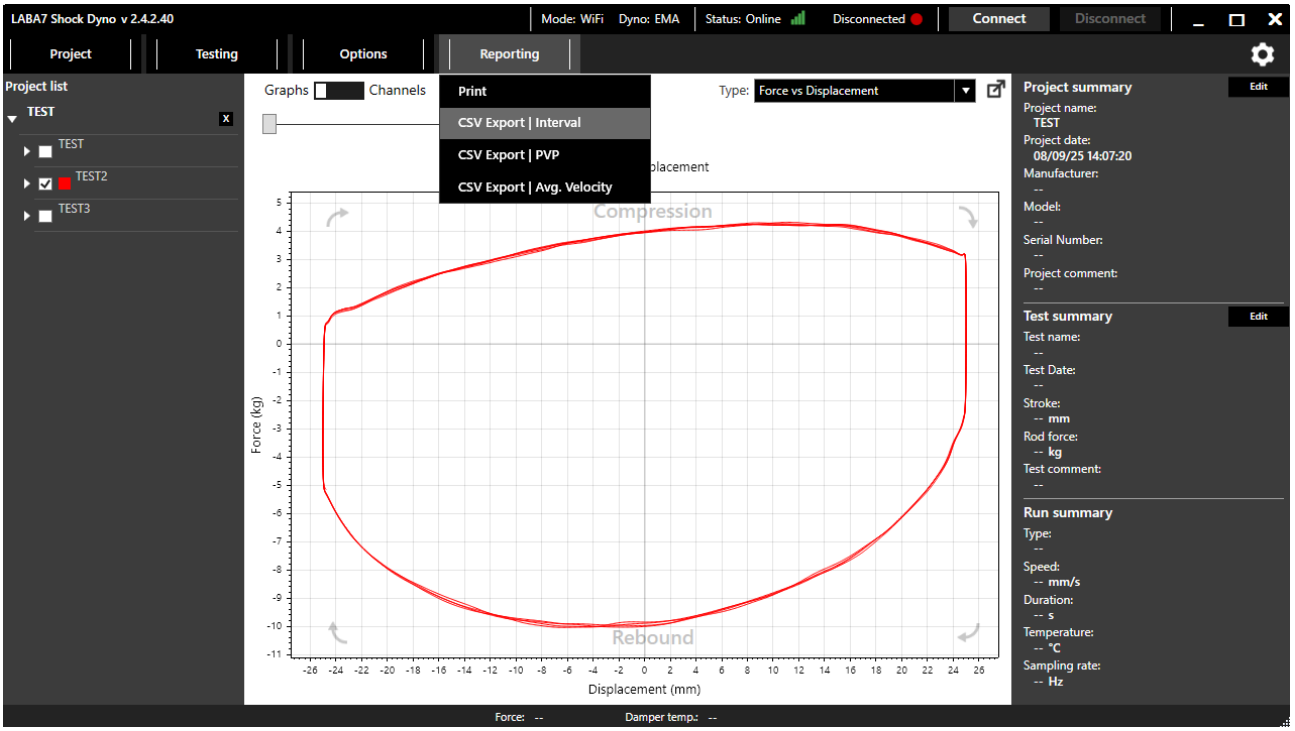



*Figure 67*

**Export interval**

To export separate intervals, follow these steps:

1. Select one or more test runs from the project list.
2. Press reporting (Figure 67).
3. Select CSV Export | Interval.

**Export PVP**

To export peak velocity plot data, follow these steps:

1. Select multiple runs or whole test.
2. Press “reporting” (Figure 67).
3. Select CSV Export | PVP.

**Export Avg. velocity**

To export average velocity graph, follow these steps:

1. Select the run you want to export.
2. Press “reporting” (Figure 67).
3. Select CSV Export | Avg. Velocity.

**Importing**

The software allows user to import .csv files, old laba7 files and some files from other manufacturers.
To import mentioned files, user has to follow these steps:

1. Press on “project” in the top left corner.
2. Click on Import data files.
3. Select the imported files the user is interested to take a look at.

The software also allows user to view data files, in that case, it is not possible to edit the imported file. To view data files, user has to follow these steps:

1. Press on “project” in the top left corner.
2. Click on View data files.
3. Select the files user wishes to view.

# 13. DAQ configuration

To access the DAQ configuration menu, navigate to “Settings” and go to the “Integration” tab. In the “Custom sensors enabled” field, select “Enabled” from the drop-down menu. If the connected DAQ device is not visible, click “Refresh” to rescan for available devices. After accessing the DAQ configuration menu, users can use functions and configure the parameters described below.

NOTE: This function is available only with an activated license key. To obtain a license key, please contact customer support.

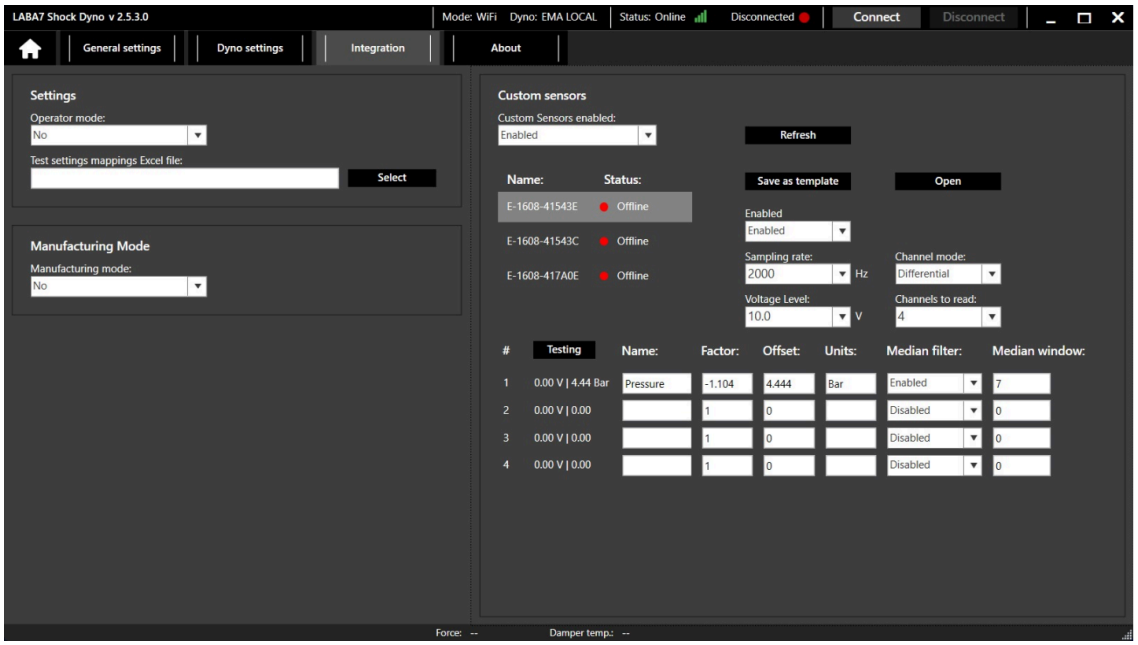



*Figure 68*

- Name — specifies the name of the DAQ device. This name is used to identify the DAQ within the system.
- Status — indicates whether the DAQ device is currently connected. The status can be Online or Offline.
- Save as template — saves the current DAQ configuration parameters as a template that can be reused.
- Open — opens a previously saved template and applies its configuration parameters.
- Enabled — enables the current device so the data can be collected during testing.
- Sampling rate — sets the rate at which the DAQ collects data.
- Voltage level — sets input voltage level.
- Channel mode — selects the measurement mode for each DAQ channel. Two modes are available:

    - Differential — measures the voltage difference between two input terminals. This mode helps reduce noise from external interference and is useful for precise measurements.
    - Single-ended — measures the voltage between the input terminal and the DAQ's ground. This mode is simpler but more susceptible to noise.
- Channels to read — allows you to select which DAQ channels will be active for measurement.
- Name — specifies the name of the sensor connected to the DAQ.
- Factor — multiplies the measured value by a specified number to convert it into the desired units.
- Offset — adjusts the measured value by adding or subtracting a fixed amount.
- Units — specifies the measurement units for the sensor's data.
- Median filter — applies a median filter to the sensor data to reduce noise.
- Median window — defines the number of data points used by the median filter. Larger values increase smoothing but may reduce responsiveness to rapid changes (default value for Median window: 7).

When configuring a channel, all the information must be filled. If any of the fields like Name or Units is empty, channel will not be recorded. Median filter for each channel is applied individually and during data collection. Data channels are labeled 1 to 8 from left to right on the device (1 to 4 for differential mode). If the user connects a sensor to 3rd channel, all 3 channels in the software will have to be configured.

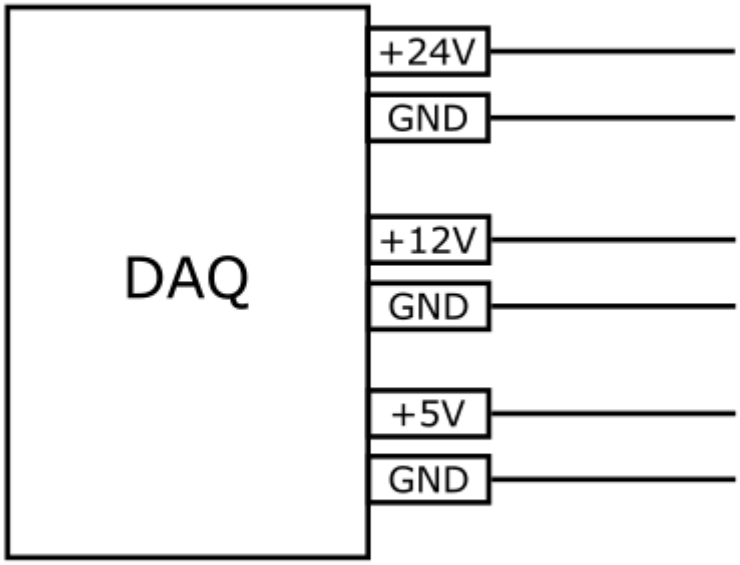
If single-ended mode is selected, the following channels correspond to labels on the device:

- Channel 1 — CH1+
- Channel 2 — CH1-
- Channel 3 — CH2+
- Channel 4 — CH2-
- Channel 5 — CH3+
- Channel 6 — CH3-
- Channel 7 — CH4+
- Channel 8 — CH4-

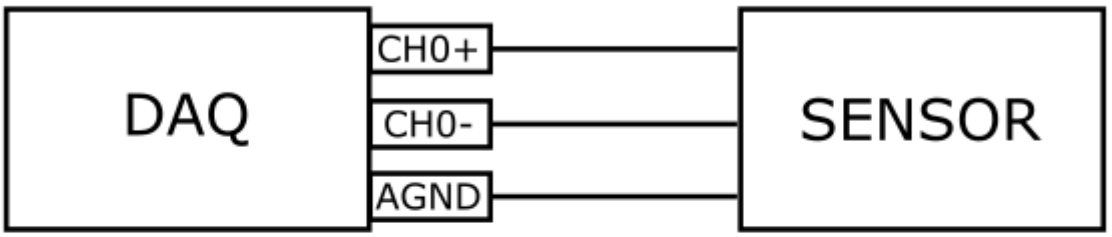
If differential mode is selected, the channel labels match the channel numbers:

- Channel 1 — CH1+ and CH1-
- Channel 2 — CH2+ and CH2-
- Channel 3 — CH3+ and CH3-
- Channel 4 — CH4+ and CH4-

POWER OUTPUT (500 mA MAX EACH)




Differental Analog Input




Single-Ended Analog Input

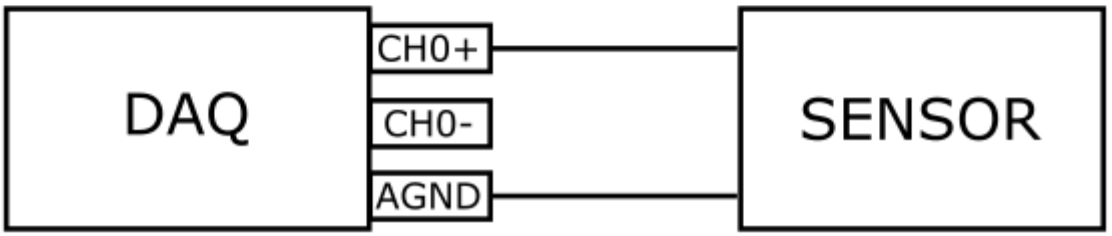



Figure 69

# 14. Electrical wiring

The LABA7 3 phase shock dynos are wired for TNS 3 phase wiring systems. Check the image bellow to determine which wiring your building has. If the user has different power system in his workshop, he has to reach the LABA7 customer support for instructions.

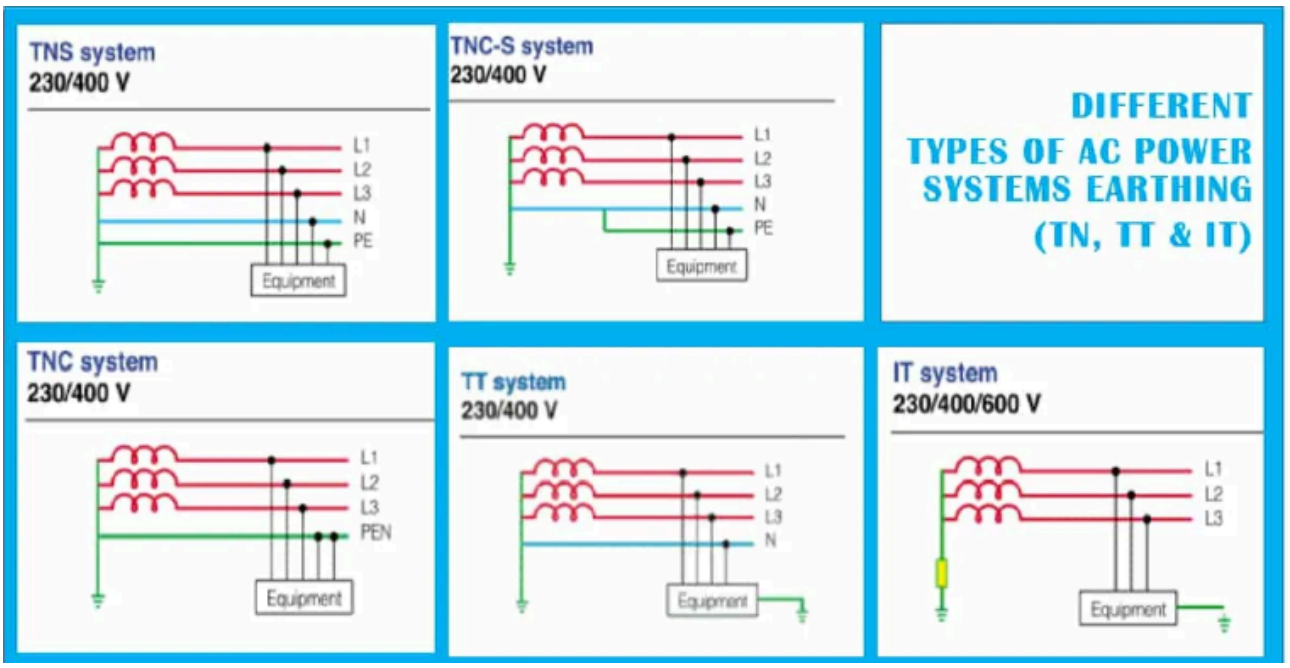



Figure 70

# 15. 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.

## 15.1. General

| Issue | Solution |
|---|---|
| Dyno is not responding, unable to communicate. | Both, Dyno and the application, might be stuck on a loop,<br>or a cache of either one can be full. Restart the Dyno by powering it off. |
| Application is frozen or stuck on a Please Wait dialog and cannot be closed. | Close the application through the Task Manager. |
| Dyno stops during the test, and when running another test, dyno is not running, only noise is seen on the graph. | 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. |

## 15.2. Wi-Fi Configuration

| Issue | Solution |
|---|---|
| Cannot configure Wi-Fi parameters. | The communication mode in Dyno is incorrect. Change the communication mode. |
| Cannot connect to router. | The router might not allow new connections; check the router settings or restart it. |
| Cannot connect to router.<br>Dyno is connected but status appears to be offline. | Check for typos, if caps lock is enabled, re-enter credentials. |
| | Computer is not connected to the same network as the Dyno. Reconnect device to the same network or reconfigure the Dyno. |

## 15.3. 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 shown. | 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. |

## 15.4. 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. | Contact LABA7 support. |
| Dyno does not power on or voltage does not rise up to 700V after pressing the “ARM” button. | Check that the green indicator light is illuminated and verify that the mains power supply is connected. If the issue persists, contact LABA7 support. |

## 15.5. Screen indicator

| Screen | Meaning |
|---|---|
| Yellow color bar | Dyno is ready. |
| Red color bar | Dyno is in emergency state. Check if emergency button is released ant press “reset” in the application. |
| Green color bar | Dyno is executing test. |
| wLan IP:xx.xx.xx.xx | Dyno is connected to wi-fi and ready to run. |
| LAN IP:xx.xx.xx.xx | Dyno is in LAN communication mode and ready to run. |

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

# 16. Additional information

This section provides additional information related to conformity with the relevant Union harmonisation legislation:

– This equipment complies with the Radio Equipment Directive 2014/53/EU. This equipment contains a Raspberry Pi Compute Module 4 with an integrated RPI-RM0 radio module (Wi-Fi / Bluetooth). Operating frequency band: 2.4 GHz ISM band (2400–2483.5 MHz). The maximum radio-frequency output power transmitted in this band does not exceed 20 dBm (EIRP), in accordance with the applicable ETSI requirements.

– The crossed-out wheeled bin symbol with a solid bar shown on this equipment indicates that it must not be disposed of as unsorted municipal waste at the end of its life. It must be collected separately and sent for recycling in accordance with applicable WEEE regulations. For information on the return, collection and recycling of this product, please contact the manufacturer or your local supplier.

– LABA7 complies with the applicable obligations of the REACH Regulation (EC) No 1907/2006. If any component of this equipment contains a substance of very high concern (SVHC) in a concentration above 0.1 % w/w, information in accordance with REACH Article 33 will be provided on request.

# 17. Maintenance

If any of the filters are more than 1/3 full of liquid, press the pin located at the bottom to release the contents.

To clean the bottle, unscrew it, empty the collected water, and securely screw it back into place.

Figure 71

# 18. Warranty Information

LABA7 Shock Dyno EMA 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.

# 19. 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**

**Address:** Vakarinė st. 10, Vilnius LT-06298, Lithuania

**Email:** info@laba7.com

**Mobile phone:** +37065715336

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# EU Declaration of Conformity

Date of Issue 4th November 2024 Vilnius, Declaration Number 2024-11-04/01

| | |
|---|---|
| **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:** | Electromagnetic shock dyno EMA |
| **Identification code of the object:** | EMA2-00002 |
| **Description of the object:** | Electromagnetic shock dyno EMA is an electromagnetically actuated damper test system that delivers remarkably accurate results. The main features of the electromagnetic shock dyno EMA include: a digital position sensor that samples data at a frequency of 20 kHz with an accuracy of 50 nm; support for all standard waveforms, such as sine, triangle, square, pulse, or custom; the ability to import and replicate telemetry data; inputs capable of sequentially reading other analog sensors at 20 kHz for comprehensive testing; control unit integrated with a data logger on a single board; innovative power supply system that relies on supercapacitor packs; pre- and post-test editing of data; integration with additional testing equipment; cloud-based service. Main specifications: stroke ~ 0/250 mm; maximum velocity with no load ~ 7 m/s; maximum acceleration ~ 40G; minimum velocity ~ 0.1 mm/s; load cell resolution and sampling rate – 20 bit/20 kHz; temperature sampling rate and resolution – 12 bit. |
| **Object of the declaration described above is in conformity with the relevant Union harmonisation legislation:** | – Machinery (MD) Directive 2006/42/EC<br>– Electromagnetic Compatibility (EMC) Directive 2014/30/EU<br>– Low voltage (LVD) Directive 2014/35/EU<br>– Radio Equipment (RED) Directive 2014/53/EU<br>– Restricts hazardous substances in electrical and electronic components (RoHS) Directive 2011/65/EU |
| **References to the relevant harmonized standards used or references to the other technical specifications in relation to which conformity is declared:** | – EN IEC 61000-6-2:2019<br>– EN IEC 61000-6-4:2020<br>– EN IEC 61000-3-2:2019<br>– EN IEC 61000-3-3:2013<br>– ETSI EN 301 489-1:2019<br>– ETSI EN 301 489-17:2020 |

| | |
|---|---|
| **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<br>CEO |
| **Signature of the manufacturers' representative:** | |

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