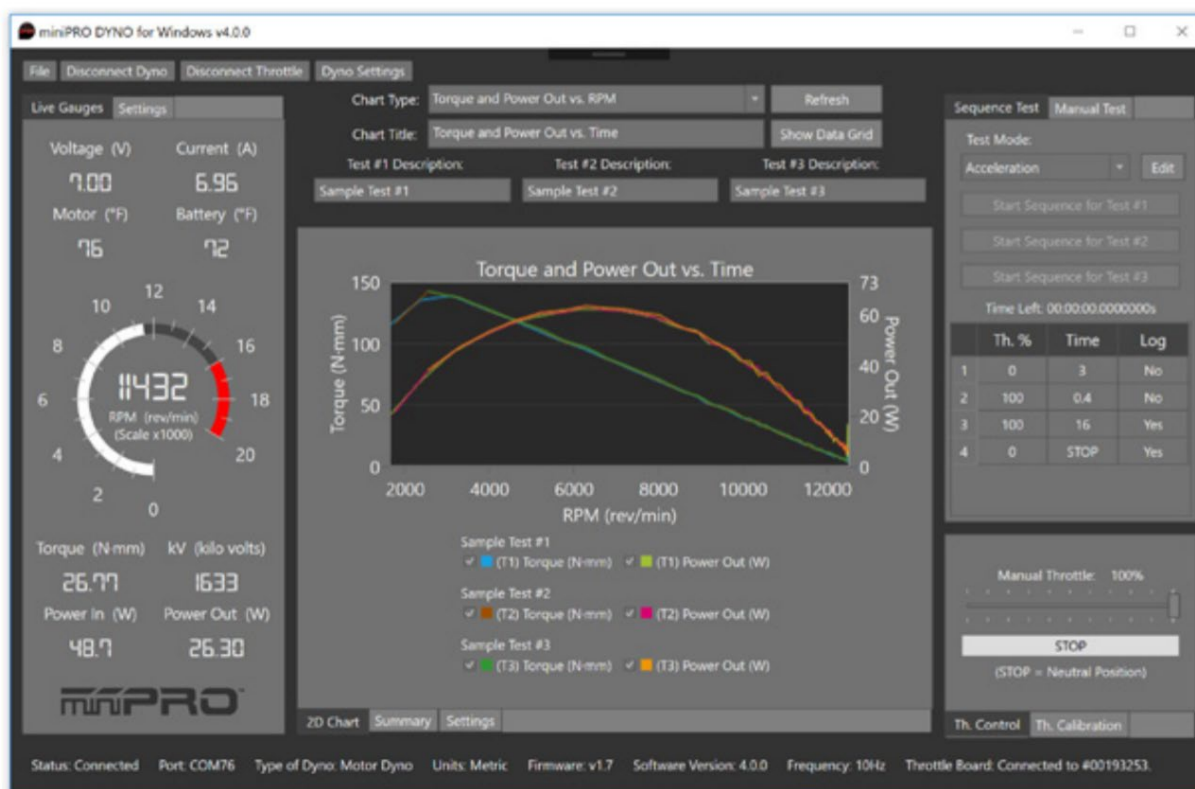


# MINIPRO<sup>®</sup> DYNO ANALYZER

## USER MANUAL



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## WARNING

The MINIPRO® Dyno Analyzer makes calculations based on equations and data found in various published and heretofore reliable documents. The program is designed for use by skilled professionals experienced with motors, rotating machineries and tests. The following processes are hazardous, particularly if done by an unskilled or inexperienced user:

- Obtaining data to input to the program
- Interpreting the program's results

Before making measurements of or modifications to any Test, engine or driving situation, **DO NOT FAIL TO:**

- Regard the safety consequences
- Consult with a skilled and cautious professional
- Read the entire user's manual
- Obey all federal, state & local laws
- Respect the rights and safety of others

## REVISIONS OF THIS MANUAL

The contents of this manual are subject to change without prior notice. Should revisions be necessary, updates to all MINIPRO® User's Manuals can be found at MINIPRO's website at <http://support.minipro.com/119376-Manuals>

Please compare the date of this manual with the revision date on the web site, then refer to the manual's Table of Revisions for any changes/updates that have been made since this edition.

Latest Manual Revision:

Revision No. 02

Table of Revisions:

Date	Revision	Changes
05/31/2018	00	Release of manual for v4.0 software
06/18/2018	01	Fix bugs and typos
04/25/2018	02	Installation and Legends update

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## **PREFACE**

### **PURPOSE OF THIS MANUAL**

This manual contains information required for the installation and general use of MINIPRO® Dyno Analyzer. To achieve maximum capability and ensure proper use, please read this manual in its entirety before operating. Keep the manual in a safe place for quick reference whenever a question should arise.

### **WHO SHOULD USE THIS MANUAL?**

This manual is intended for bench test operators who are going to use any MINIPRO® Dynamometer in order to determine the torque and power of a motor in relation to its speed. It is assumed that the user has enough knowledge in motors, rotating machineries and electronics to be able to install/operate these Dynamometers without risk.



## Chapter 1. Introduction

### 1.1 Overview of Features

The MINIPRO® Dyno Software is a state-of-the-art dynamometer testing program for Windows® based data acquisition. Used with a MINIPRO® Dynamometer Controller Board, Software provides the control of any MINIPRO® Dynamometer and runs test sequences in a manner best suited to the overall accuracy and efficiency of the Test System. The data that is generated by MINIPRO's Testing Software can be stored, displayed and printed in tabular or graphic formats, and can be easily imported into a spreadsheet. Written in C# and LabVIEW™ (Optional), MINIPRO® Dyno Analyzer has the flexibility to test a majority of motor types in a variety of ways. MINIPRO's Dyno Software is ideal for simulating loads, cycling the unit under test and motor ramping. Because it is easy to gather data and duplicate tests, the software is ideal for use in engineering labs. Tests can be programmed to run on their own and saved for future use allowing for valuable time savings in production testing and incoming/outgoing inspection. LabVIEW's version allows obtaining data from other sources (e.g. thermocouples), controlling motor power and providing audio/visual indicators relatively easy.

#### Basic Features:

- Capability to configure and calibrate the software for most any combination of sensors you have installed on the MINIPRO® Dyno Electronic Board.
- Capability to tailor the program to work with most any type of dynamometer, including inertia wheel types, absorber types (with load cells and lever arms), and even chassis dynamometers.
- User friendly, Windows interface, compatible with Windows 7 or later.
- Can print results using most any Windows compatible printer, many times in color.
- Save nearly unlimited number of tests for recall, comparison and analysis in the future.
- Allows several reporting and graphing options for analysis, either vs RPM or vs time in seconds.

#### Added Features for Custom Dynamometer Versions

- Customize reporting graphs
- Customize dynamometer inertia
- Increase sampling frequency

Please read Sections 1.2 "Before You Start" and 1.3 "A Word of Caution" before you turn on the computer. Then try running the program following the guidelines in 1.4 "Getting Started." When you feel a little familiar with the program, take time to read this entire manual. It will show you all the things you can do with this powerful tool.

## 1.2 Before you Start

What you will need:

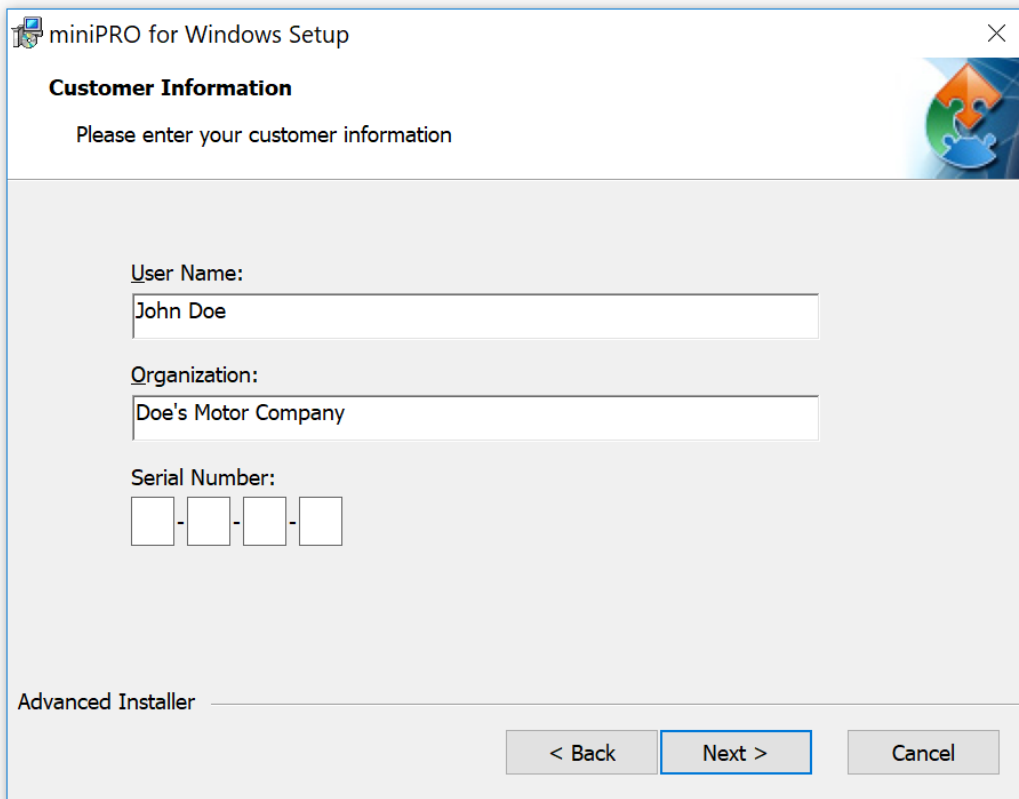
- Computer with AMD or Intel processor.
- 8 GB RAM Minimum.
- Hard disk 1 GB of available disk space. (More is required for storing large #s of tests.)
- Display 1280 x 800 screen resolution minimum
- Internet Connection (to unlock the software)
- Windows 7 or later

Many terms used by the MINIPRO® Dyno Analyzer and this user's manual are similar to terms used by other publications, i.e. Inertia, Correction Factor, etc. However, these terms may have different definitions. Therefore, read Chapter 2 to see what these terms mean to the MINIPRO® Dyno Analyzer.

Occasionally it will be necessary to identify "typos" in the manual, known "bugs" and their "fixes", etc. which were not known at the time of publication.

Unlocking Program Options:

The MINIPRO® Dyno Analyzer is equipped with copy protection. This ensures the legitimate users do not have to cover the costs for unauthorized distribution of the program. When you first download the program, it will ask for a serial number. An active internet connection is required to validate your serial number. Your software serial number (stamped) is in your MINIPRO® Dynamometer Datasheet. Type in the unlocking code number and click on OK. If you typed in the number correctly, you will be given a access to install the MINIPRO® Dyno analyzer. The program will only run on this one computer.

The image shows a Windows-style dialog box titled "miniPRO for Windows Setup". It has a standard Windows icon in the top-left corner and a close button (X) in the top-right corner. The main heading is "Customer Information" in bold, followed by the instruction "Please enter your customer information". Below this, there are three input fields: "User Name:" with the text "John Doe", "Organization:" with the text "Doe's Motor Company", and "Serial Number:" which consists of four empty boxes separated by hyphens. At the bottom left, it says "Advanced Installer". At the bottom right, there are three buttons: "< Back", "Next >" (which is highlighted with a blue border), and "Cancel". There is also a small graphic of four interlocking puzzle pieces in the top-right corner of the dialog box.

miniPRO for Windows Setup

**Customer Information**

Please enter your customer information

User Name:  
John Doe

Organization:  
Doe's Motor Company

Serial Number:  
- - - -

Advanced Installer

< Back   Next >   Cancel

Figure 1.1 MINIPRO® Data Analyzer Installation Authentication

If you want to run the program on another computer, you must call MINIPRO, LLC. for a new Serial Number Code for that computer. There may be a charge for additional computers. You may need to transfer the program to another computer, like when you buy a new computer. If so, then give MINIPRO, LLC. the information for the new computer and they will give you a new unlocking code free.

### 1.3 A Word of Caution

To use the MINIPRO® Dyno, you must install some sensors on the dyno. This is the Dynamometer Quick Start Guide.

**If you are not familiar with proper safety precautions when working on motors, or rotating machinery, HAVE A QUALIFIED MECHANIC OR ENGINE BUILDER HELP YOU. Dynamometer testing can be dangerous. Engines do fail. Take the proper precautions using shields. PLAN for the engine or even the dyno failing, and you will cut down on the chances they ever will.**

With any data acquisition and analysis, the computer can help the user by automatically doing various calculations, plotting the data easily, etc. However, the computer is not thinking for you. You, the user, are the key to properly understanding and using the data. If confusing results are obtained, take a minute to:

- Plot the Raw RPM data and see if that looks correct. See Appendix 3 on Troubleshooting.
- Refer back to this manual.
- Ask someone else skilled and experienced in the particular area.
- Give the retailer or MINIPRO, LLC's. Tech Help Line a call for an explanation. (Also, computer programs are written by people so it's always possible there may be an error in the calculations. Your phone call may help us correct it.)

Please also read the Warranty and Warning at the beginning of this manual.

## 1.4 Getting Started (Installation)

You must download MINIPRO® Dyno Analyzer and Drivers to a hard drive before it will run. To do this:

### 1.4.1 Software Installation:

Windows 7 or Later:

- Start your computer and open your Internet browser (e.g. Internet Explorer or Google Chrome)
- Go to [www.minipro.com](http://www.minipro.com)
- Hover to the downloads menu and select “Softwares”



Figure 1.2 Software Download Location

- Select the latest version of MINIPRO® Dyno Analyzer to download
- Save the downloaded file to your hard drive (take note for the location you saved the file)
- Double click on the downloaded file Icon to open and start the installation process
- Enter your User name, Organization and Serial Number and click Next.
- Follow the instructions of the Setup program.
- Then, to run the program once it is installed:
  - Go to your Desktop Window
  - Click on MINIPRO® Dyno Analyzer to run the application. Dynamometer drivers must be installed before operation.

### 1.4.2 I100 Dynamometer Driver Installation:

Windows 10:

- Plug your MINIPRO Dynamometer to a USB Port
- Drivers will be installed automatically

Windows 7 and 8:

- Start your computer and open your Internet browser (e.g. Internet Explorer or Google Chrome)
- Go to [www.minipro.com](http://www.minipro.com)
- Hover to the downloads menu and select “Drivers”



Figure 1.3 Drivers Download Location

- Select the latest version of MINIPRO Electronic Board Driver to download
- Save the downloaded file to your hard drive (take note for the location you saved the file)
- Right click on the downloaded file and click “Extract All”
- Select a destination and click “Extract”
- Take note of the destination folder location (e.g. File was saved in the desktop inside a folder named “Driver”)
- Plug your MINIPRO Dynamometer to a USB Port
- Open your Device Manager
- Locate the Folder “Other Devices”
- Right Click the “Unknown device”
- Click “Update Driver”
- Click “Browse My Computer”
- Click “Let me pick from a list”
- Click “Have a Disk” and select the destination folder extracted earlier.
- Follow the instructions of the Driver Setup
- If the driver setup was installed successfully, click on “Ports” and an icon “miniD Electronic Dyno” will appear.

#### 1.4.3 I200 (Custom) Dynamometer Driver Installation:

Windows 7 to Later:

- Plug your MINIPRO Dynamometer to a USB Port
- Drivers will be installed automatically

## Chapter 2 Definitions

Whenever you start the MINIPRO® Dyno Analyzer, you are brought to a Main Screen which will look like Figure 2.1.



Figure 2.1 MINIPRO® Dyno Analyzer Main Screen

### Legend:

- A. Menu Bar Commands
- B. Live Gauges Window
- C. Chart Window
- D. Test Mode Window (Start Dyno Test Runs)
- E. Status Bar



## 2.1 Menu Bar Commands:

The next section discusses some of the commands available at the top of the Main Screen. Most will not be discussed here in detail, as they are discussed in other sections of this manual.

### 2.1.1 File

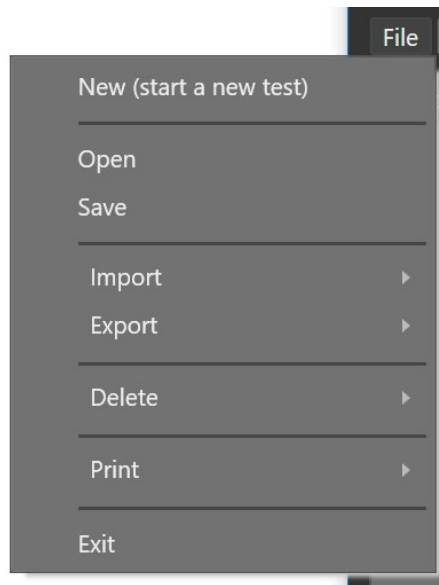


Figure 2.2 File Menu Options

#### **New (clear and start new test file)**

Click on File, then New to start a new test. This process will clear existing test runs in your main screen including chart, summary results, and data grid.

#### **Open**

This option opens a previously saved test file from most any place on the computer.

#### **Save**

Select Save if you want to save the current test and any recent changes to the same name as you are currently working with.

#### **Import**

Click on Import and Select the Test run you will like to place an exported test file in .CSV format.

## **Export**

Click on Export and Select the Test run you will like to save as a .CSV format.

## **Delete**

Click on Delete and Select the Test run you will like to delete. This process will clear the selected test run in your main screen including its chart, summary result, and data grid.

## **Print**

The Print command will produce a print preview printout of all the data on the Main Screen. Many users find this to be a convenient summary of a test.

## **Exit**

Click exit to close the application. Make sure you save your test before closing the application.

### **2.1.2 Connect Dyno**

Click Connect to start communicating with dynamometer electronic board. Make sure that your USB cable is connected to your Windows PC.

### **2.1.3 Disconnect Dyno**

Click Disconnect when you finish your testing.

### **2.1.3 Clear Serial Buffer**

Click Clear Serial Buffer if you experience delay in your live gauges or live graph plotting.

### **2.1.4 Setup**

Click Setup to change your dynamometer settings. For more information go to the dynamometer Quick Start Guide.

## 2.2 Live Gauges:

The MINIPRO® Dyno Analyzer displays live data received from the dynamometer in nine (9) customizable gauges.

### 2.2.1 Live Gauges Tab

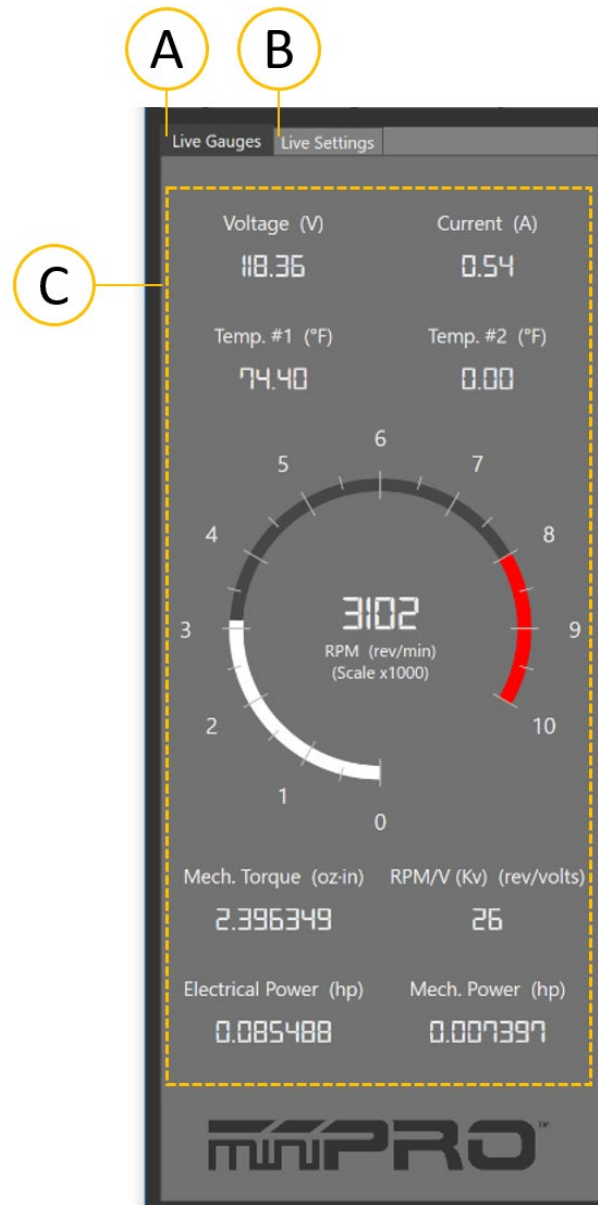


Figure 2.3 Live Gauge Window

#### Legend:

- A. Live Gauges tab
- B. Live Gauges Settings tab
- C. Digital and radial gauges

## 2.2.1 Live Gauges Settings Tab

The screenshot shows the 'Live Settings' tab of a software interface. It contains several sections for configuring live gauges and chassis dyno settings. Callouts A through H point to specific elements:

- A** points to the 'Voltage' title in the first gauge section.
- B** points to the 'Voltage' dropdown menu in the first gauge section.
- C** points to the 'Chassis Dyno Settings' section header.
- D** points to the 'Tire Diameter (mm)' input field.
- E** points to the '1st Gear Tranny Ratio' input field.
- F** points to the '2nd Gear Tranny Ratio' input field.
- G** points to the 'Tires Connected to Flywheel' checkbox.
- H** points to the 'Save Settings' button.

The interface includes the following settings sections:

- Voltage** and **Current** gauges, each with a dropdown menu.
- Temp. #1** and **Temp. #2** gauges, each with a dropdown menu.
- Max. Gauge Range** (set to 10,000) and **RPM** (set to Angular Speed) gauges.
- Mech. Torque** (set to Mechanical To) and **RPM/V (Kv)** (set to Kv) gauges.
- Electrical Power** (set to Electrical Powe) and **Mech. Power** (set to Mechanical Pc) gauges.
- Chassis Dyno Settings** section with input fields for Tire Diameter (mm), 1st Gear Tranny Ratio, and 2nd Gear Tranny Ratio, and a checkbox for Tires Connected to Flywheel.
- Save Settings** button.

Figure 2.4 Live Gauge Settings

### Legend:

- A. Title of the gauges
- B. Type of data to display in the gauge
- C. Chassis Dyno Settings
- D. Tire Diameter for linear speed calculations
- E. Tranny Gear Ratio for 1<sup>st</sup> speed transmission
- F. Tranny Gear Ratio for 2<sup>nd</sup> speed transmission

- G. To calculate linear speed if the tires are connected to the flywheel
- H. Save the settings changes

## 2.3 Chart Panel:

The MINIPRO® Dyno Analyzer chart panel displays up-to three (3) graphs simultaneously. Pre-defined charts types can be selected and customized.

### 2.3.1 2D Chart Main Screen

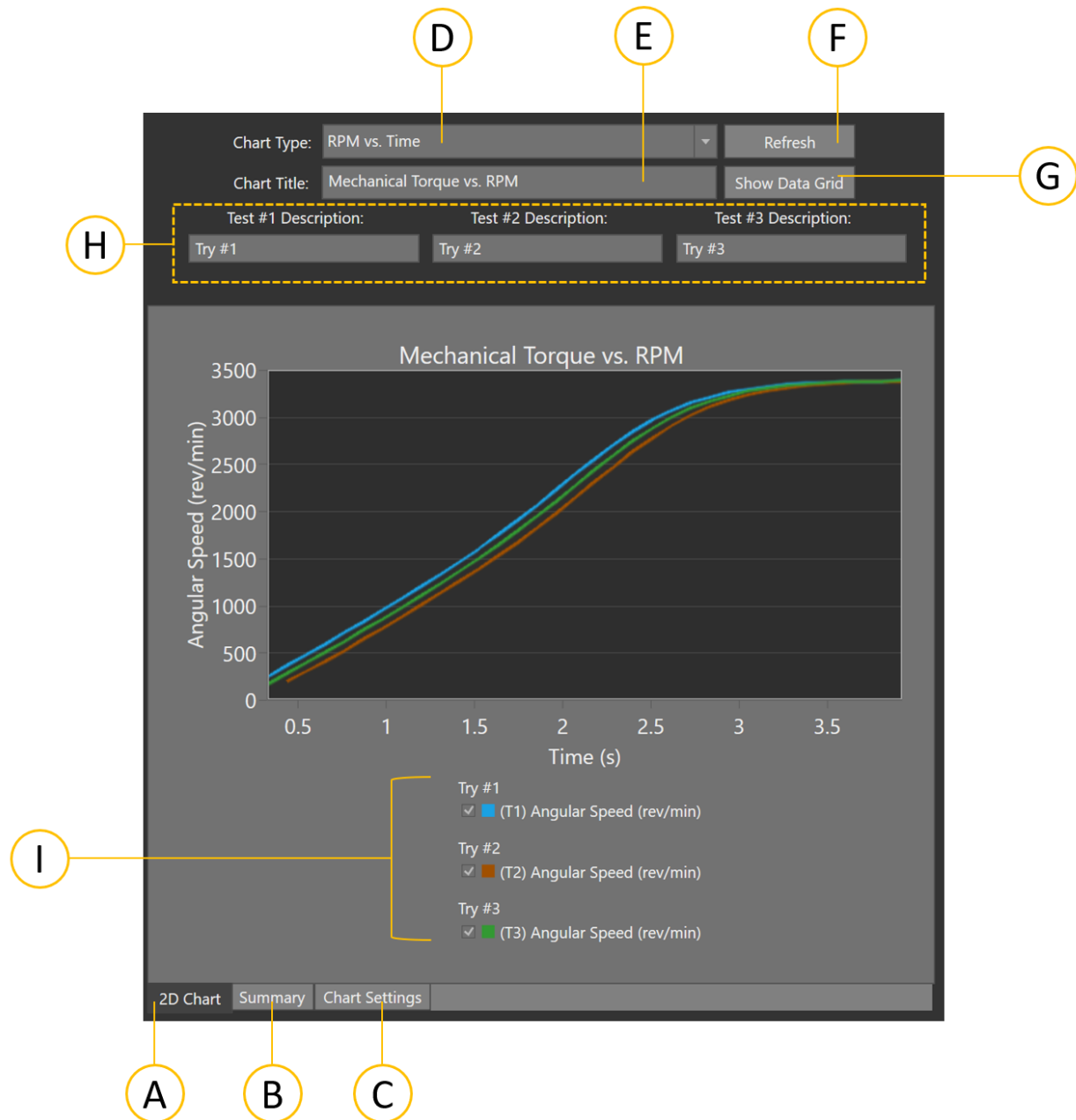


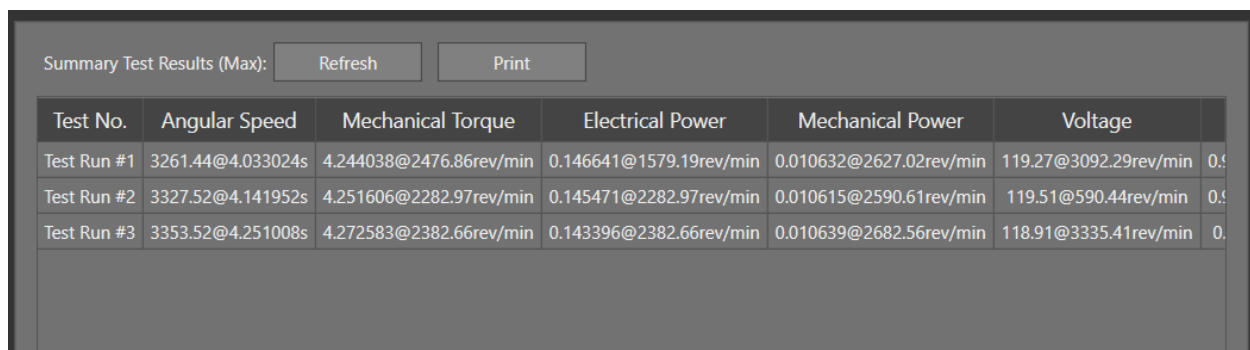
Figure 2.5 2D Chart Window

## Legend:

- A. 2D Chart Window Selection Tab
- B. Summary of Test Runs Window
- C. Chart Settings Window
- D. Pre-defined chart types
- E. Chart Title
- F. To re-load or refresh the chart and data grid.
- G. Shows the data grid table used to create the graph
- H. Legend titles
- I. Legends; a checkbox next to the legend title is used to show or hide that specific graph from the 2D Chart window

### 2.3.2 Summary (Test Results)

Click on Summary tab to display a summary table of all test runs (three runs maximum).



Test No.	Angular Speed	Mechanical Torque	Electrical Power	Mechanical Power	Voltage	
Test Run #1	3261.44@4.033024s	4.244038@2476.86rev/min	0.146641@1579.19rev/min	0.010632@2627.02rev/min	119.27@3092.29rev/min	0.9
Test Run #2	3327.52@4.141952s	4.251606@2282.97rev/min	0.145471@2282.97rev/min	0.010615@2590.61rev/min	119.51@590.44rev/min	0.9
Test Run #3	3353.52@4.251008s	4.272583@2382.66rev/min	0.143396@2382.66rev/min	0.010639@2682.56rev/min	118.91@3335.41rev/min	0.9

Figure 2.6: Summary Test Runs Window

#### Table Columns Information:

- Test Number
- Angular Speed: Maximum angular speed at that specific time in seconds
- Mechanical Torque: Maximum Mech. Torque at that specific angular speed
- Electrical Power: Maximum Electrical Power at that specific angular speed
- Mechanical Power: Maximum Mechanical Power at that specific angular speed
- Voltage: Maximum Voltage at that specific angular speed
- Current: Maximum Current at that specific angular speed
- Efficiency: Maximum Efficiency at that specific angular speed

## Refresh Button

To re-load or refresh the summary test runs in the table.

## Print Button

To print summary table results.

### 2.3.3 Chart Settings

Click on Chart Settings to format the graph window and chart types.

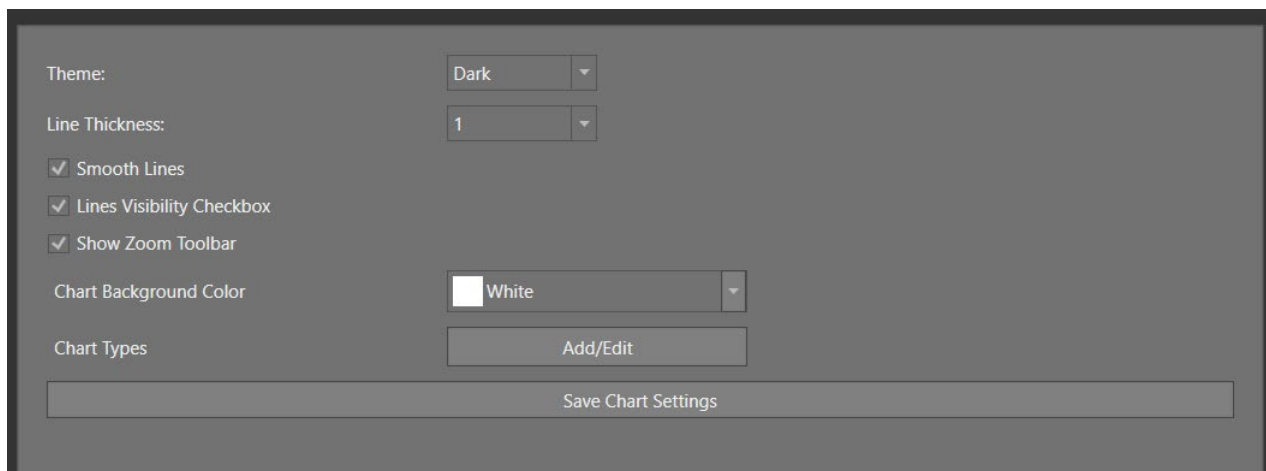


Figure 2.7: Chart Settings

- Theme: Changes the MINIPRO® Dyno Analyzer user interface color to Dark or Light.
- Line Thickness: Changes the thickness of all the graph curves
- Smooth Lines: Changes the appearance of all the graph curves.
- Lines Visibility Check Box: Allows the user to show and hide test curves in the legends
- Show Zoom Toolbar: Shows or hides zoom-in tool bar in chart window
- Chart Background Color: Changes the chart background color
- Chart Type: Allows to add and edit chart types

## 2.4 Test Modes (Start Dyno Test Runs):

MINIPRO® Dyno Analyzer have two test modes: (1) Sequence Testing (See Figure 2.8); and (2) Manual Testing (See Figure 2.10). Sequence testing allows you to control the motor using the MINIPRO® Dyno Analyzer. In contrast, Manual Test Mode requires the user to control the motor.

### 2.4.1 Sequence Testing

The MINIPRO® Dyno Analyzer can control the motor or rotating machinery using Sequence Testing. A Throttle Control sensor is required to use this test mode.

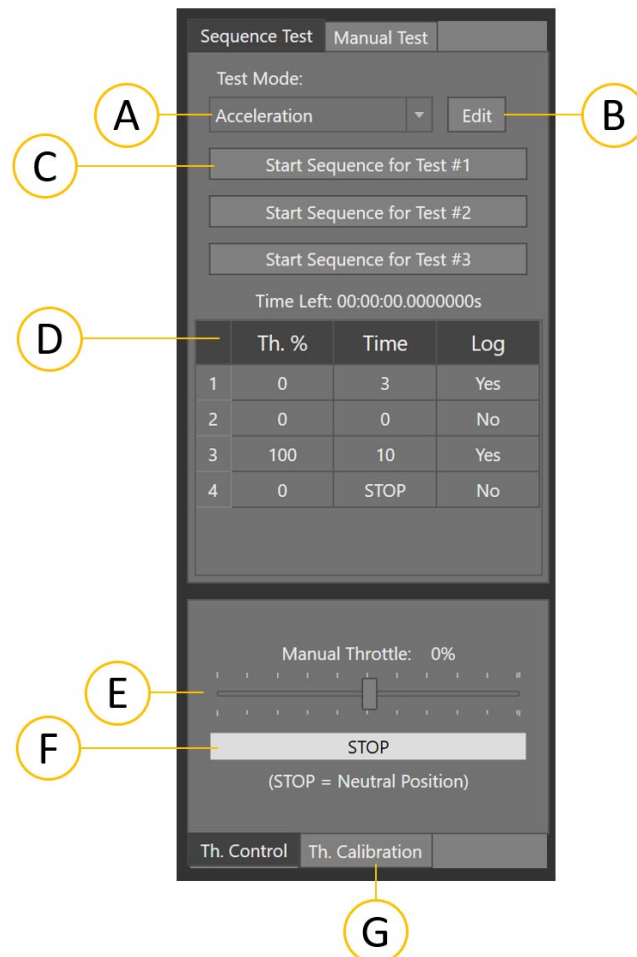


Figure 2.8 Sequence Test Window

#### Legend:

- A. Type of test sequence
- B. Edit the test mode sequence
- C. Start sequence testing
- D. Sequence Test Table
- E. Manual Throttle Control
- F. STOP – Set Throttle to neutral position
- G. Throttle Calibration



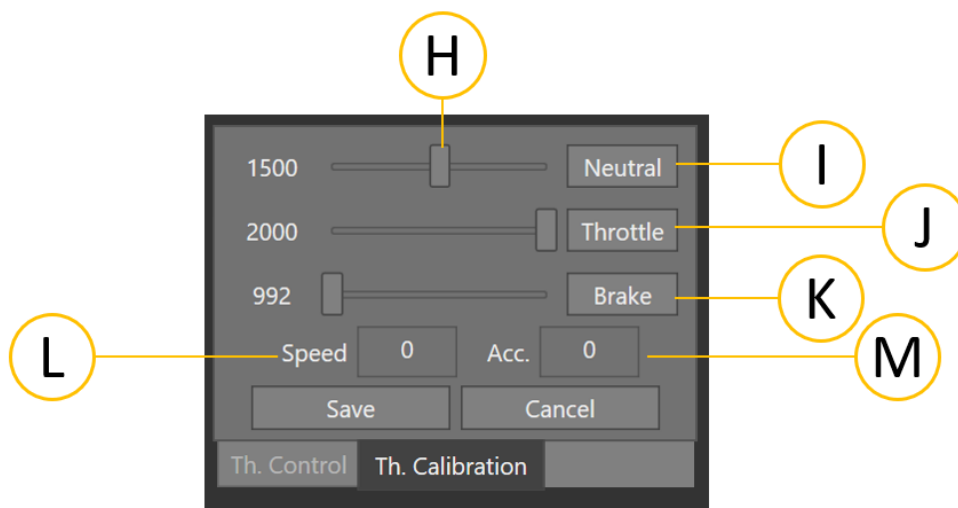


Figure 2.9 Throttle Calibration Window

- H. Scroll Bar is used to fine tune the PWM signal for the specific mode (ex. Neutral, Throttle or Brake)
- I. Neutral Position
- J. Max. Throttle Position
- K. Max. Brake Position
- L. Speed Settings (See below)
- M. Acceleration Settings (See below)

The “Speed” and “Acceleration” inputs allow the speed and acceleration of the servo or esc throttle to be adjusted in real time. The default values are zero.

#### Speed:

This option specifies the speed of the servo/esc in units of  $0.25 \mu\text{s} / (10 \text{ ms})$ . For example, with a speed of 4, the servo/esc throttle will change by at most  $1 \mu\text{s}$  per 10 ms, or  $100.00 \mu\text{s/s}$ . (Speed = 0 corresponds to unlimited speed)

#### Acceleration:

This option specifies the acceleration of the servo/esc throttle in units of  $(0.25 \mu\text{s}) / (10 \text{ ms}) / (80 \text{ ms})$ . For example, with an acceleration of 4, the speed of the servo/esc throttle will change by a maximum of  $1250 \mu\text{s/s}$  every second. (Acceleration = 0 corresponds to unlimited acceleration). All the input values must be integers. For example, acceleration of 1.5 can not be entered, it must be 1 or 2.

### 2.4.1 Manual Testing

Manual testing is used when the dynamometer is controlled by the user. Click “Start Logging in Test #” to start logging data from the dynamometer and click “STOP LOGGING DATA” to stop the test.

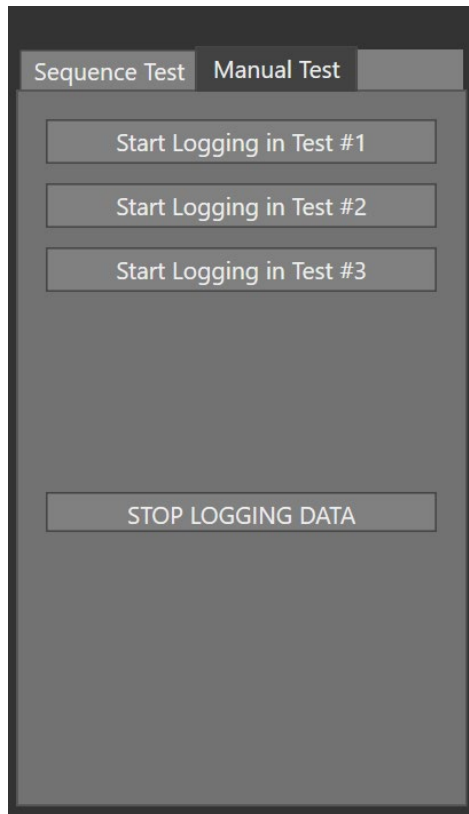


Figure 2.10 Manual Test Window

### 2.5 Status Bar

MINIPRO® Dyno Analyzer status bar displays live status information of the dynamometer.



Figure 2.11 Status Bar

#### Status

The connection status of the dynamometer.

#### Port

The computer's assigned port number for the dynamometer

### **Type of Dynamometer**

The type of dynamometer used

### **Units**

The type of units used in the dynamometer

### **Firmware**

The firmware version of the dynamometer electronic board

### **Software Version**

The MINIPRO® Dyno Analyzer version installed

### **Frequency**

The sampling rate per seconds

### **Throttle Board**

The connection status of the throttle controller board.

## Chapter 3 Output

The MINIPRO® Dyno Analyzer provides several ways to view and output the test results, including:

- High resolution graphs window
- Print graphs and summary tables
- CSV Data Export

### 3.1 High Resolution Graph Window:

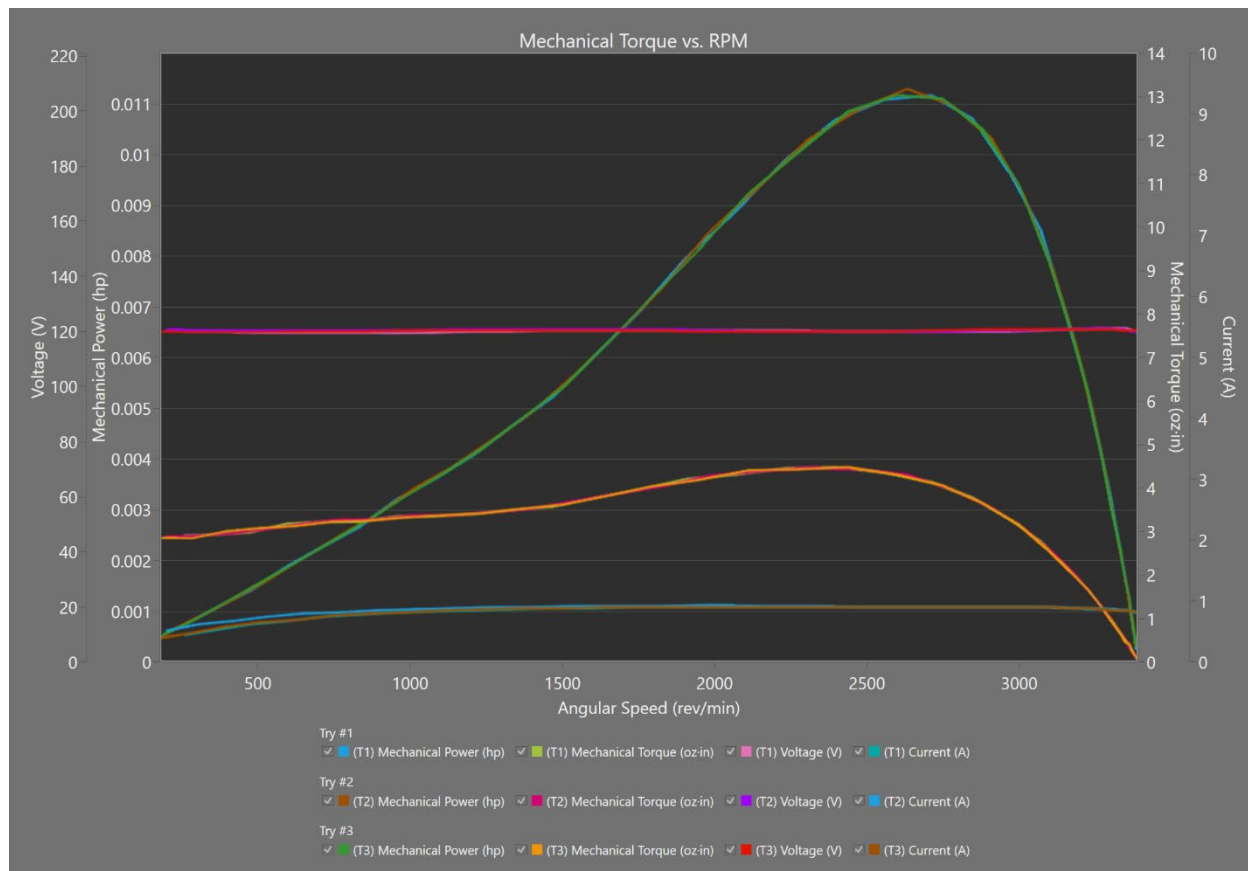


Figure 3.1 High Resolution Graph Window

## 3.2 Print Graph and Summary Test Results:

### 3.2.1 Print Preview Toolbar

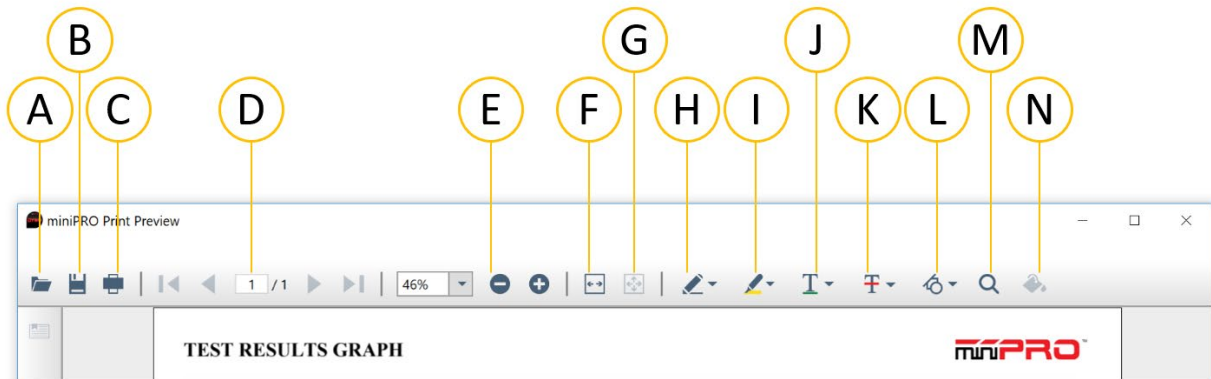


Figure 3.2 Print Preview Toolbar

#### Legend:

- A. Open Saved .PDF Test Result
- B. Save Test Report in .PDF Format
- C. Print Report
- D. Page Number
- E. Zoom Options
- F. Fill Page
- G. Show One page
- H. Draw Free Form
- I. Highlight Text
- J. Underline Text
- K. Strikethrough Text
- L. Drawing Shapes
- M. Search Text
- N. Color Picker

3.2.2 Chart Print Preview

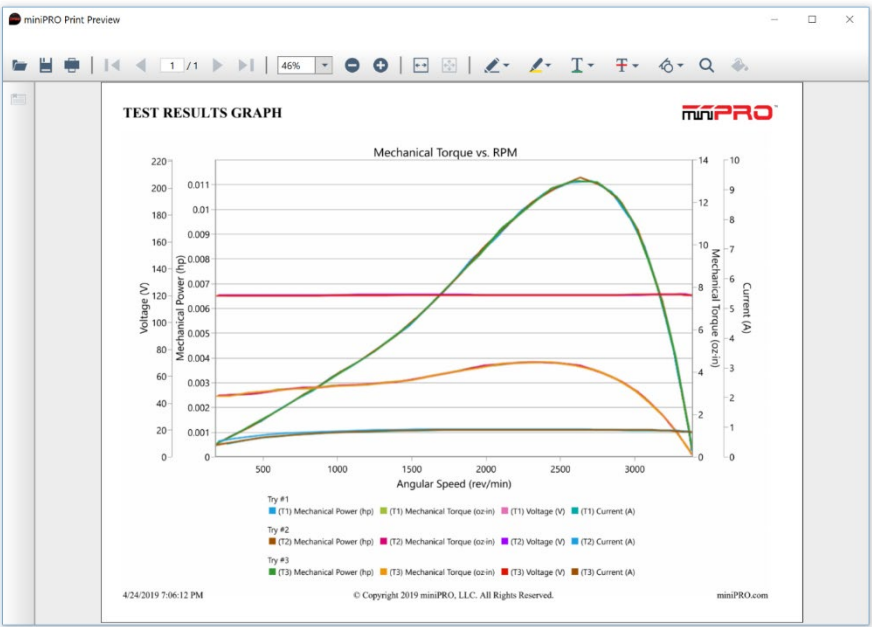


Figure 3.3 Chart Print Preview

3.2.3 Summary Table Print Preview

Description	Angular Speed (rev/min)	Mechanical Torque (oz-in)	Electrical Power (hp)	Mechanical Power (hp)	Voltage (V)	Current (A)	Efficiency (%)
Try #1	3386@3.92s	4.48@2398rev/min	0.15@2323rev/min	0.01@2711rev/min	221.7@3386rev/min	0.91@3355rev/min	7.7@2711rev/min
Try #2	3385@3.92s	4.48@2311rev/min	0.15@1533rev/min	0.01@2633rev/min	220.99@3248rev/min	0.93@1984rev/min	7.7@2633rev/min
Try #3	3386@3.92s	4.47@2448rev/min	0.15@1794rev/min	0.01@2599rev/min	220.75@3095rev/min	0.91@2111rev/min	7.7@2748rev/min

Figure 3.4 Summary Table Print Preview

### 3.2.3 Chart with Summary Table Print Preview

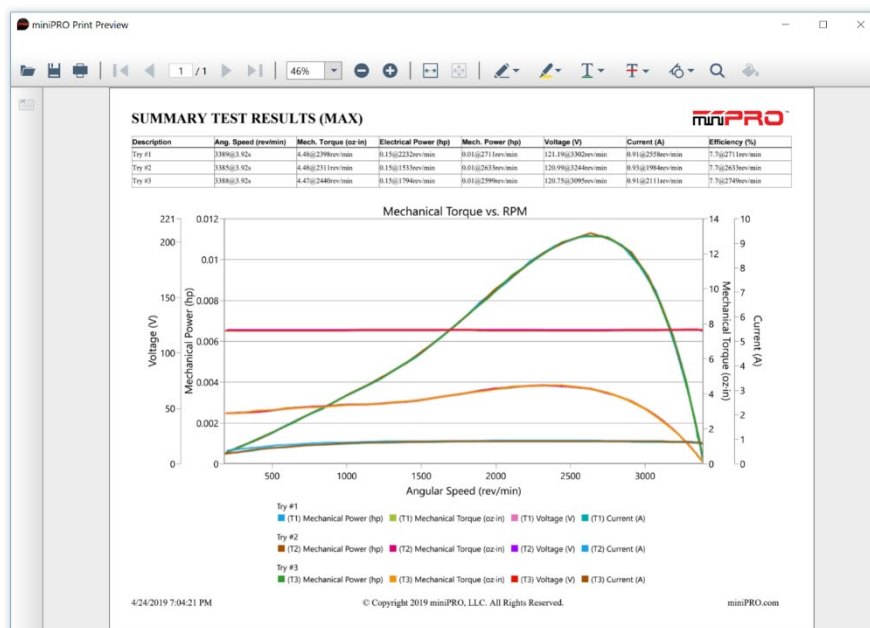


Figure 3.5 Chart and Summary Table Print Preview

### 3.3 CSV Data Export

The image shows a screenshot of a Microsoft Excel spreadsheet. The spreadsheet is titled 'Try #1.csv - Excel'. The data is organized into columns labeled A through V. The first column (A) is 'Chart Title:'. The second column (B) is 'Mechanica Test Descr Try #1'. The third column (C) is 'Angular Sp'. The fourth column (D) is 'Kv (rev/v)'. The fifth column (E) is 'Linear Spe'. The sixth column (F) is 'Mechanica'. The seventh column (G) is 'Electrical f'. The eighth column (H) is 'Mechanica'. The ninth column (I) is 'Voltage (V)'. The tenth column (J) is 'Current (A)'. The eleventh column (K) is 'mAh'. The twelfth column (L) is 'Temp. #1'. The thirteenth column (M) is 'Temp. #2'. The fourteenth column (N) is 'Temp. #3'. The fifteenth column (O) is 'Temp. #4'. The sixteenth column (P) is 'Units'. The seventeenth column (Q) is 'Type of Dy'. The eighteenth column (R) is 'Efficiency'. The nineteenth column (S) is 'Time (s)'. The twentieth column (T) is 'Effective I'. The twenty-first column (U) is 'Pulse Cou'. The twenty-second column (V) is 'Tranny Ra'. The twenty-third column (W) is 'Pulse/Rev'. The twenty-fourth column (X) is 'Dummy'. The data is organized into rows, with the first row (A1) being the header row. The data rows start from row 2 (A2) and continue down to row 33 (A33). The data is organized into columns, with the first column (A) being the header column. The data columns start from column 2 (B) and continue down to column 33 (V). The data is organized into rows, with the first row (A1) being the header row. The data rows start from row 2 (A2) and continue down to row 33 (A33). The data is organized into columns, with the first column (A) being the header column. The data columns start from column 2 (B) and continue down to column 33 (V). The data is organized into rows, with the first row (A1) being the header row. The data rows start from row 2 (A2) and continue down to row 33 (A33).

Figure 3.6 Exported Data to .CSV Format

## Chapter 4 Examples

### 4.1 How to run a test sequence?

1. Connect the dynamometer to the PC and the Throttle Controller Board to the PC
2. Open the MINIPRO® Dyno Analyzer and click “Connect”
3. Click “Connect Throttle”
4. Click the Sequence Test Tab

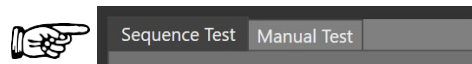


Figure 4.1 Sequence Test Tab

5. Click “Sequence Test Tab” following the Test number you would like the graph)
6. The dynamometer will start testing automatically

**NOTE: You can cancel the Sequence Test at any time by clicking the “STOP” button.**

### 4.2 How to edit a test sequence?

1. Connect the dynamometer to the PC and the Throttle Controller Board to the PC
2. Open the MINIPRO® Dyno Analyzer and click “Connect”
3. Click “Connect Throttle”
4. Click the Sequence Test Tab
5. Select the Test Mode and Click “Edit”

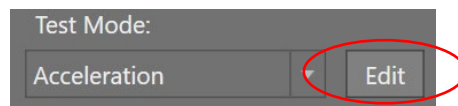


Figure 4.2 Edit Sequence Button

6. Modify the Throttle %, Time, and Log.

**NOTE: The inputs in the sequence table are case sensitive. Ex. For logging you must use “Yes” or “No” (First letter capitalized); and the last row must have “STOP” (all capitalized) in the Time column.**

7. Click Save when finish



### 4.3 How to calibrate an ESC?

1. Read your ESC's manufacturers manual on how to calibrate it.
2. Click on "Th. Calibration Tab" below the Manual Throttle Slider.

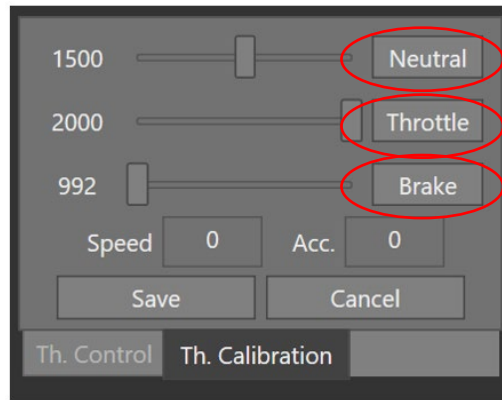


Figure 4.3 Calibration Tab

3. Set your ESC to Calibration Mode; and click once the "Neutral, Throttle, and Brake buttons when your ESC's requires it.
4. Click Save

### 4.4 How to calibrate Servo?

1. Make sure the servo is powered externally.
2. Click on "Th. Calibration Tab" below the Manual Throttle Slider.

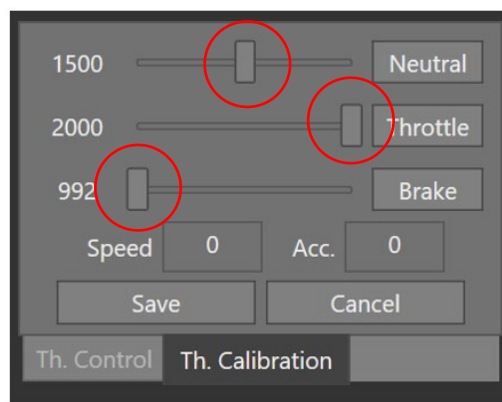


Figure 4.4 Calibration Tab

3. Set your Servo to "Neutral, Throttle, and Brake by dragging each slider to the desired position.
4. Click Save

#### 4.4 How run manual test?

1. Connect the dynamometer to the PC using a micro USB Cable
2. Open the MINIPR O® Dyno Analyzer and click “Connect”
3. Click the Manual Test Tab

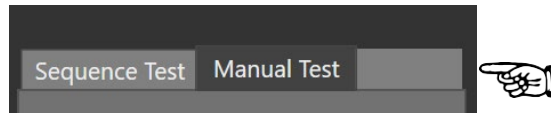


Figure 4.5 Manual Test Tab

4. Move the motor and try to keep a constant angular speed (ex. RPM)

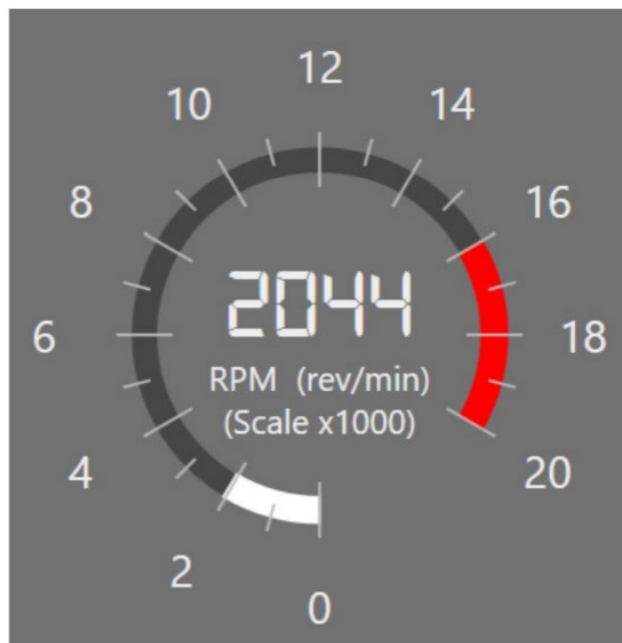


Figure 4.6 Constant Angular Speed

5. Click Test number (Start Logging) you would like the graph to show and quickly increase the throttle to max. speed

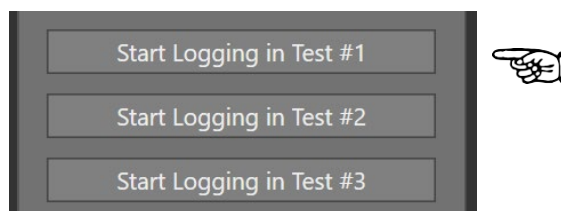


Figure 4.7 Logging Options

- When you reach maximum RPM, click “Stop Logging Data.”

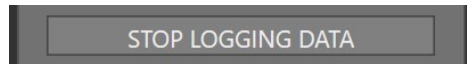


Figure 4.8 Stop Logging Data Button

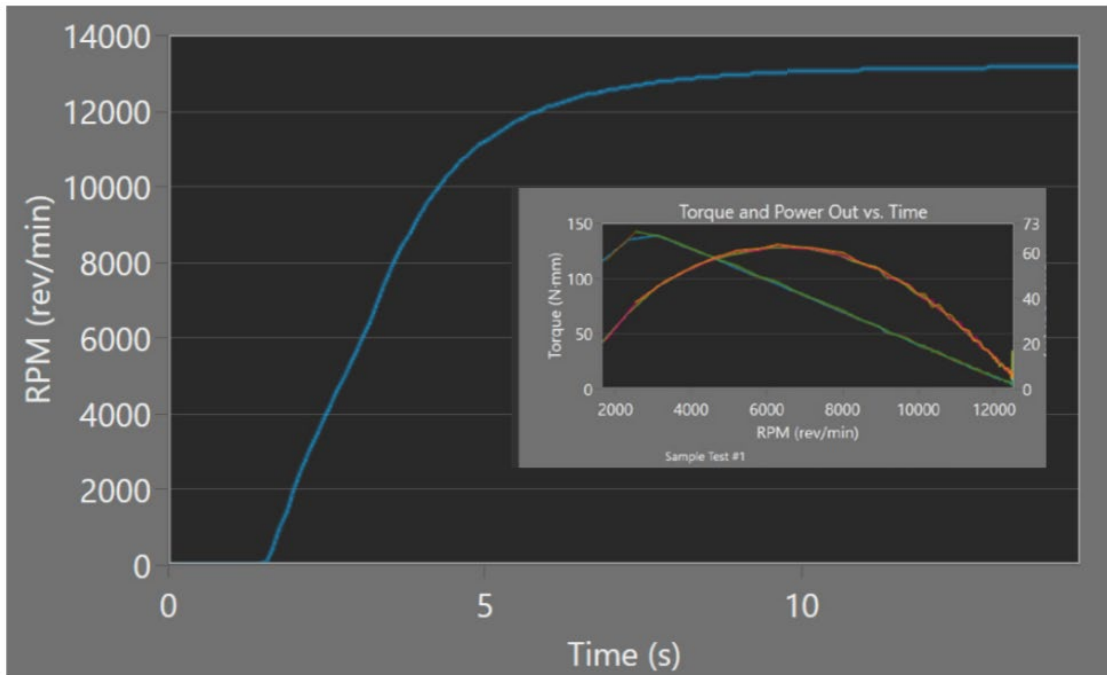


Figure 4.9 Maximum Angular Speed

#### 4.5 How to detect and delete an outlier data point ?

1. Select the type of chart you like to review.

Ex. In this case the "Efficiency"



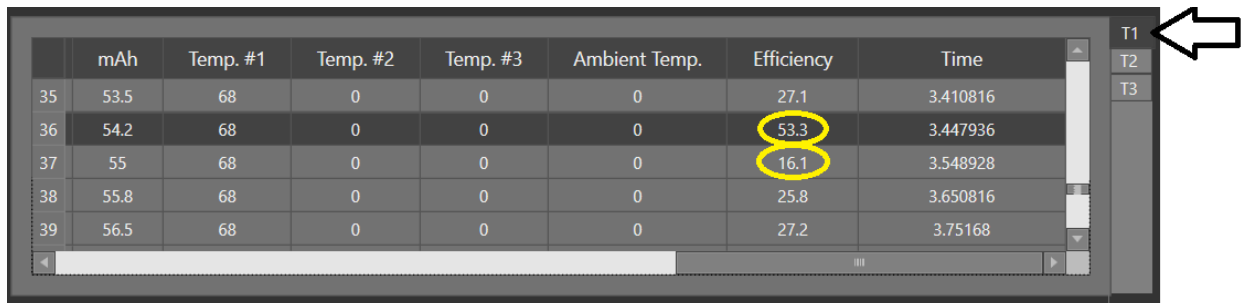
Figure 4.10 Efficiency graph showing outliers

2. Approximate the X and Y values you will like to delete.

Ex. In this I will like to delete only two points ( X = ~ 15-16K; and Y = ~51%, ~18%.)

3. Select "Show Data Grid" button and the test no.

Ex. In this case T1.



	mAh	Temp. #1	Temp. #2	Temp. #3	Ambient Temp.	Efficiency	Time
35	53.5	68	0	0	0	27.1	3.410816
36	54.2	68	0	0	0	53.3	3.447936
37	55	68	0	0	0	16.1	3.548928
38	55.8	68	0	0	0	25.8	3.650816
39	56.5	68	0	0	0	27.2	3.75168

Figure 4.11 Data Grid with outliers

4. Scroll the data grid and find the points and review the trend.

Ex. In this case is very easy to notice that the trend is between ~25-28% efficiency. The grid shows two points: 53.3% and 16.1% - BINGO!

5. Highlight the row and select "DEL" from your keyboard.

6. Done

## Chapter 5 Troubleshooting

### 5.1 International Users

When opening the MINIPRO® Dyno Analyzer, an error will pop-up, or the gauges won't display the RPM.

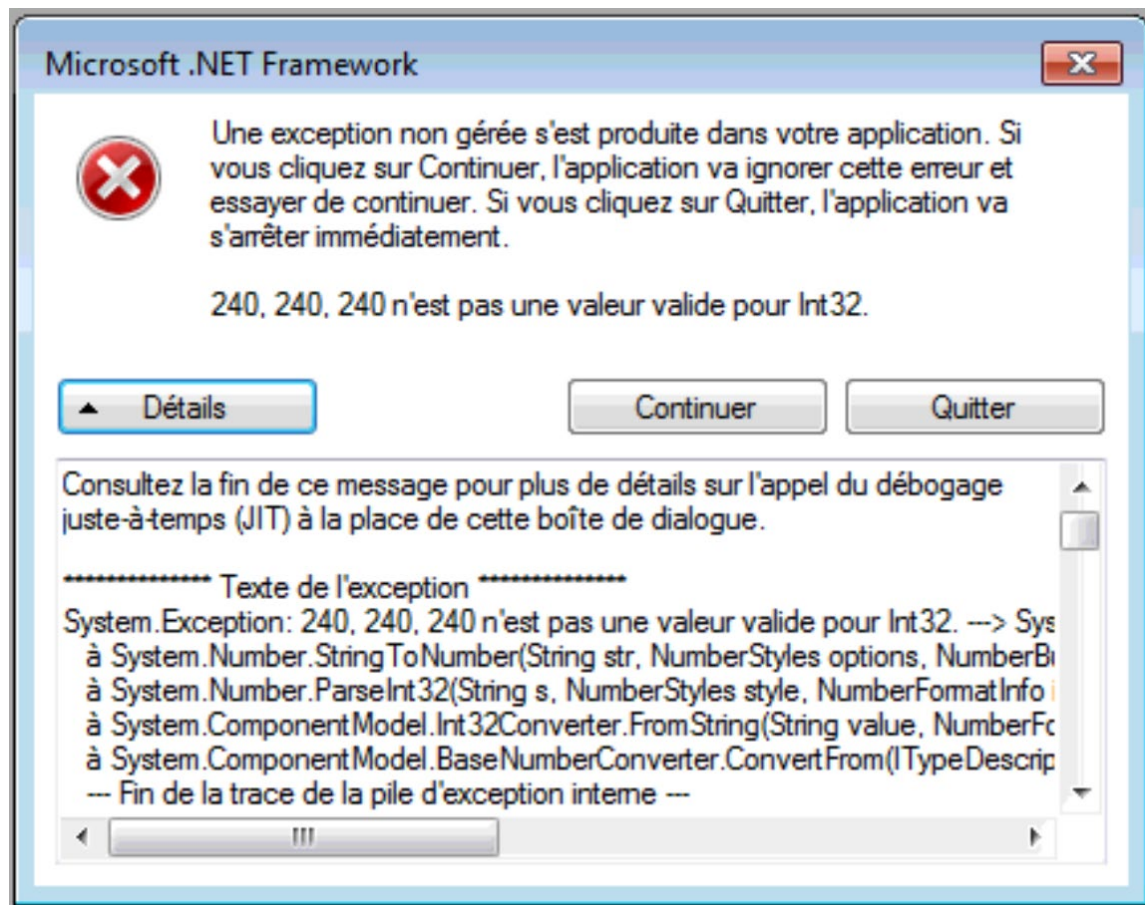


Figure 5.1 .NET Error for International User

How to Fix:

- Go-to Control Panel
- then select "Regional Settings"
- then select "Additional Settings"
- Match the following settings and click OK.

Customize Format

Numbers Currency Time Date

Example

Positive: 123,456,789.00 Negative: -123,456,789.00

Decimal symbol: .

No. of digits after decimal: 2

Digit grouping symbol: ,

Digit grouping: 123,456,789

Negative sign symbol: -

Negative number format: -1.1

Display leading zeros: 0.7

List separator: ,

Measurement system: U.S.

Standard digits: 0123456789

Use native digits: Never

Click Reset to restore the system default settings for numbers, currency, time, and date.

Reset

OK Cancel Apply

Figure 5.2 Regional Settings Required