YourDyno Software user manual

This user manual is an integral part of the YourDyno dynamometer controller system. This product and all its components are custom built devices designed for professional use, and to be used solely at research and development facilities for such purposes.

This manual is furnished for informational use only, is subject to change without notice, and should not be construed as a commitment by YourDyno.

YourDyno assumes no responsibility or liability for any error or inaccuracies that may appear in this manual.

Manufacturer / Service / Warranty:

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For more information, visit yourdyno.com

1 Contents

2 Hardware setup

Please refer to the relevant YourDyno hardware manuals on how to install the YourDyno hardware.

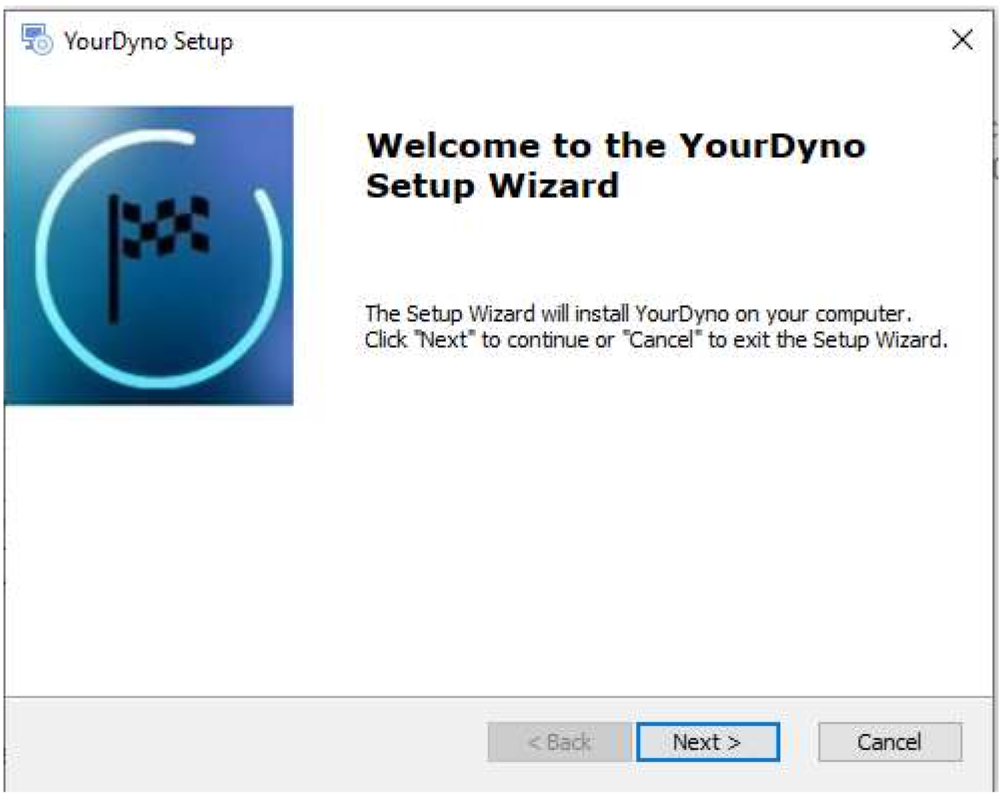
3 Software installation

To install the YourDyno software please download the latest installation package from www.yourdyno.com website.

1. After downloading the installation package please execute the file "YourDynoinstaller_x.x.xx.exe".

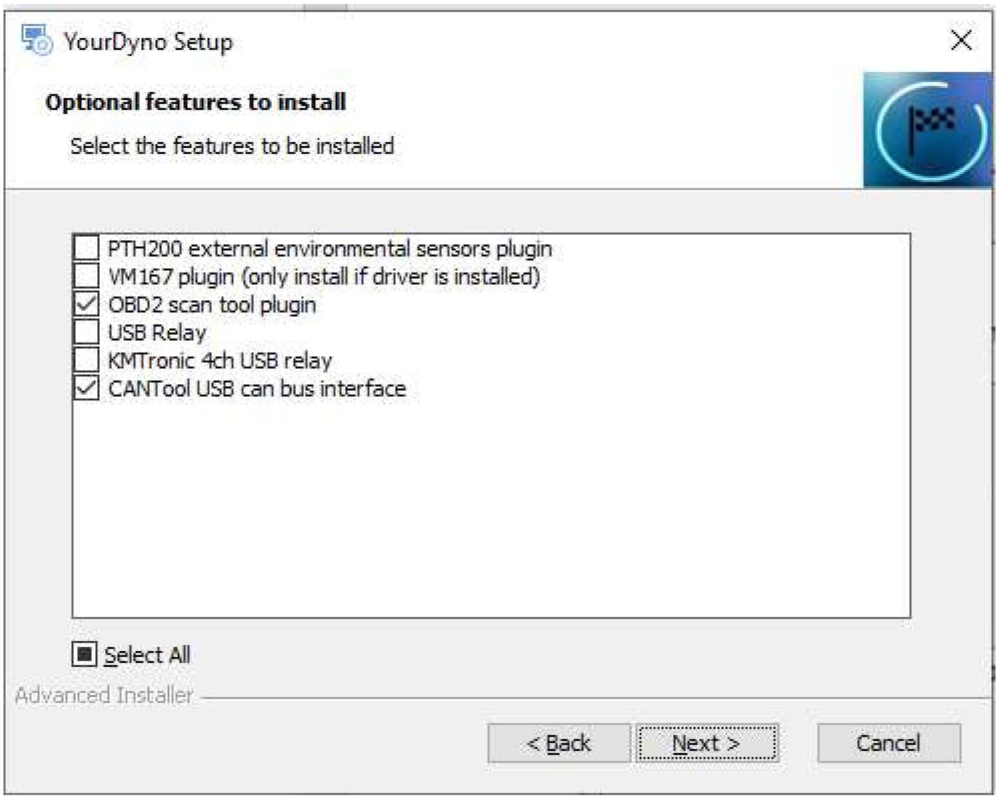
NOTE: x.x.xx stands for version number.

Press the button "Next" to start the installation wizard.

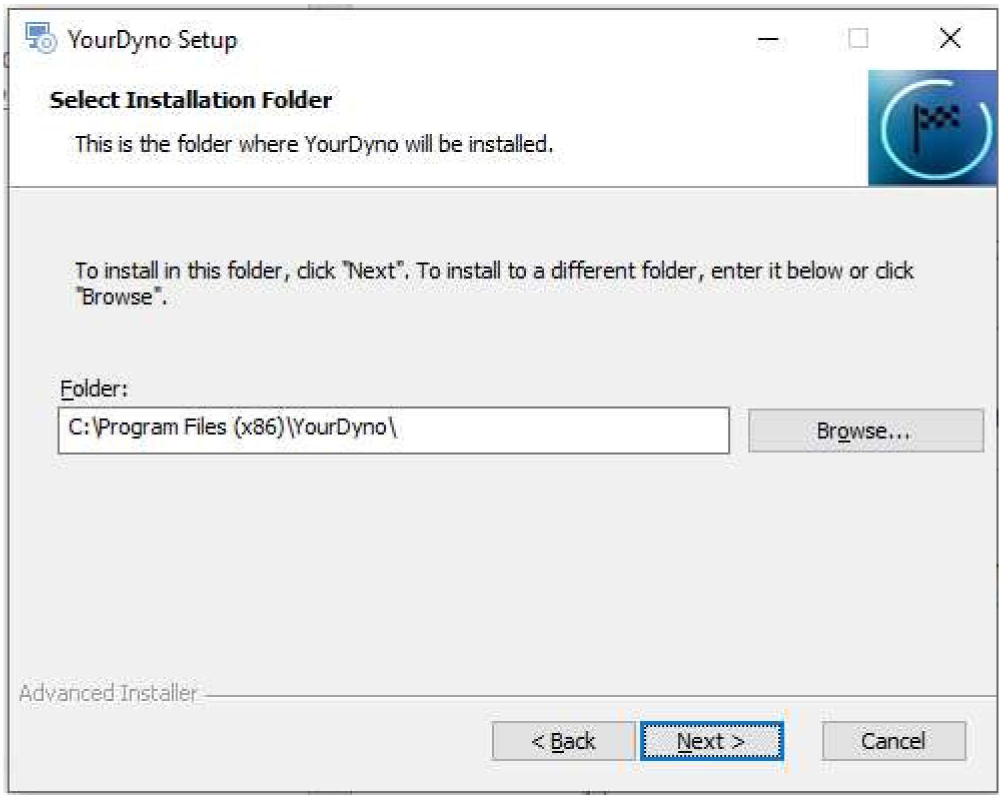


2. Please select the preferred plugins from the list. Do not install plugins you will not use, as they may consume CPU and memory resources.

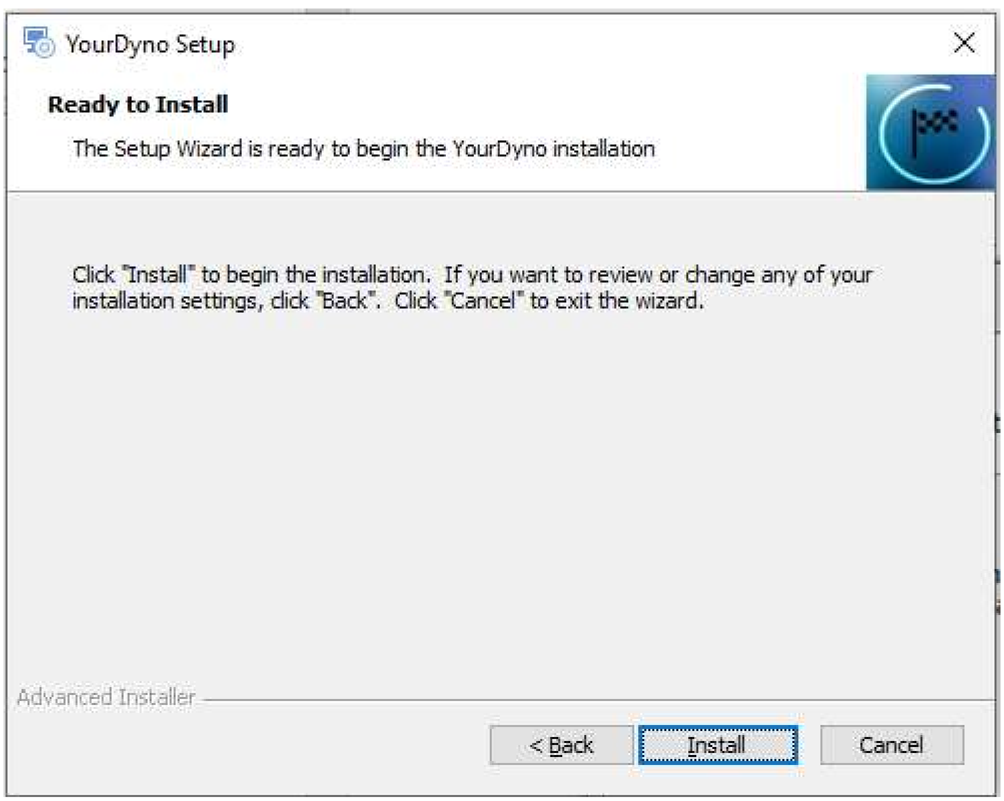
Press button "Next" to continue.



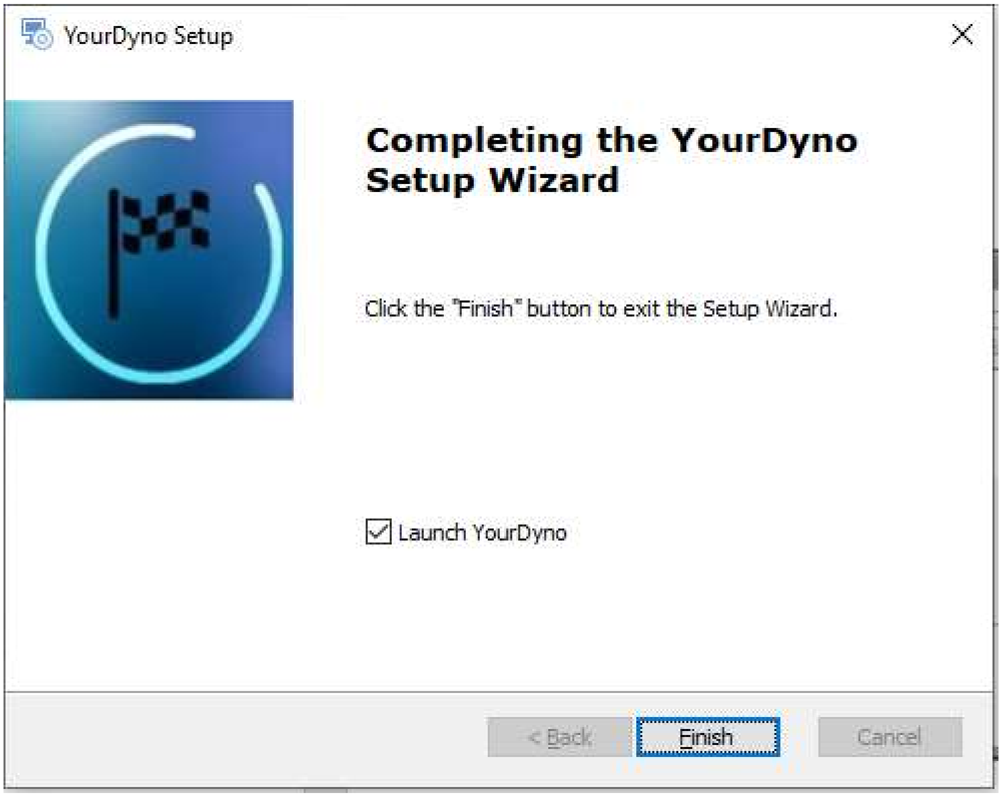
3. Select installation directory or keep default location.
Press button "Next" to continue.



4. Press the "install" button to start installation.



5. After the installer has completed the job please press button "Finish" to close the wizard.



4 What is the YourDyno software

YourDyno is a highly customizable dynamometer control, data acquisition and data analysis software. The YourDyno Software allows users to perform manual or half-automated test and measure various parameters of vehicles and engines. Additionally the YourDyno Software offers ability to expand functionality using the built-in plugin system.

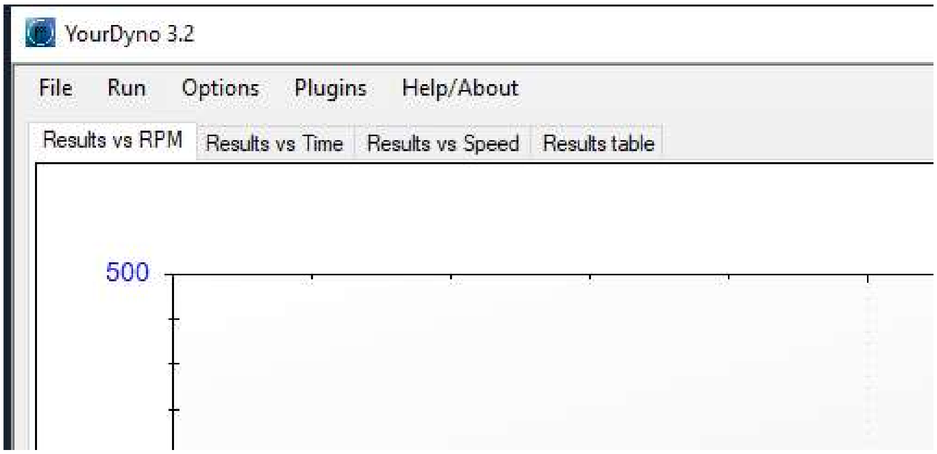
The YourDyno Software is under constant development and many new features are regularly being added. Please periodically review this manual and check for updates.

5 Main window

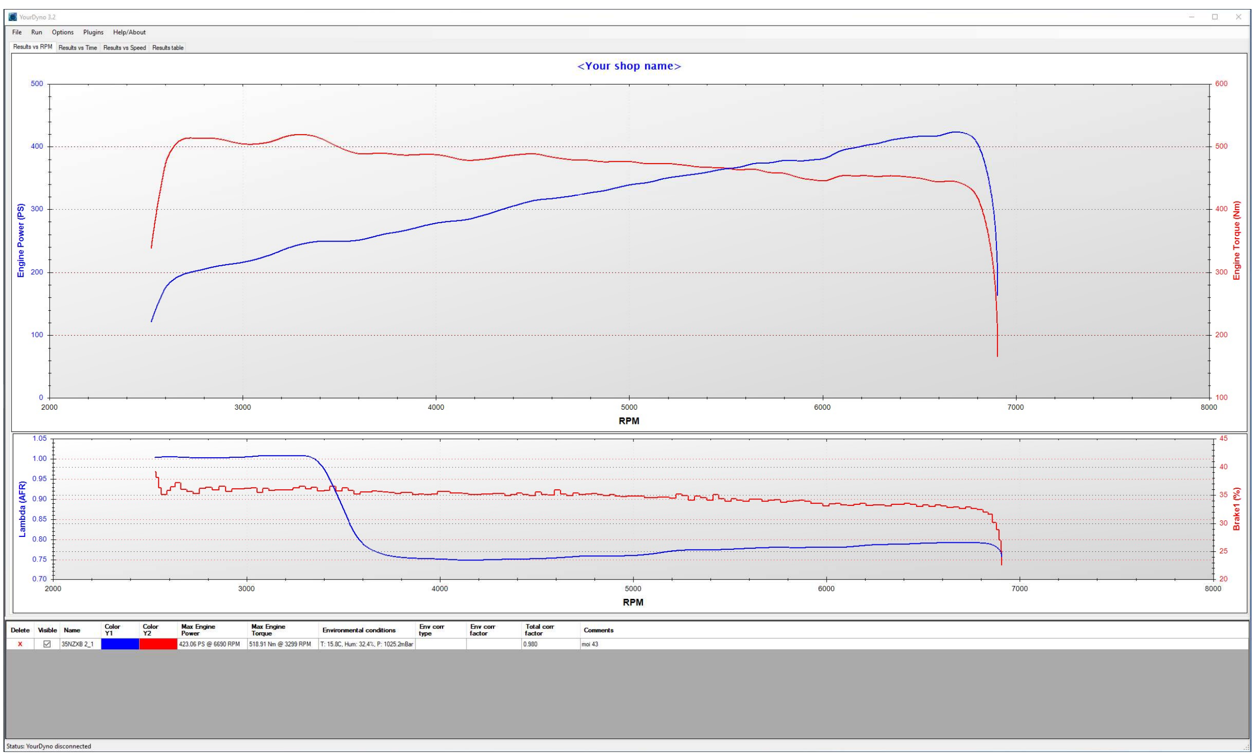
5.1 Overview

The main window consists of four main sections:

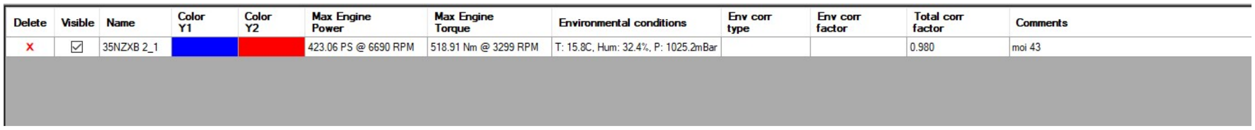
1. Top menu bar:



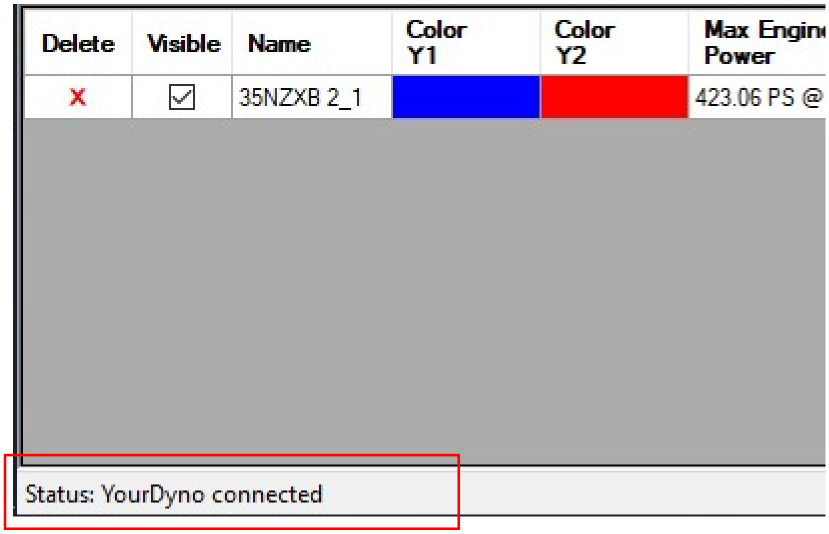
2. Graph area:



3. List of recorded test Runs:



4. Status bar:



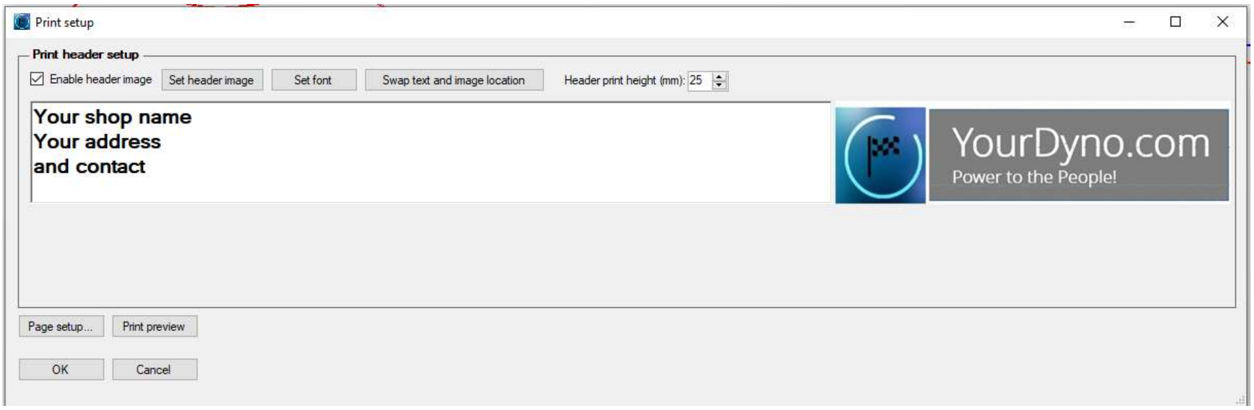
6 Menu: File

The following functions are available in this menu:

Clear all runs - this function will remove all test runs from the Runs List below the graph area.
Open runs - open previously recorded test.
Save runs - save file with recorded test runs.
Print page setup - opens dialog window with settings for graph print-out.
Print... - opens printer dialog.
Exit - close the software.

6.1 Print page setup

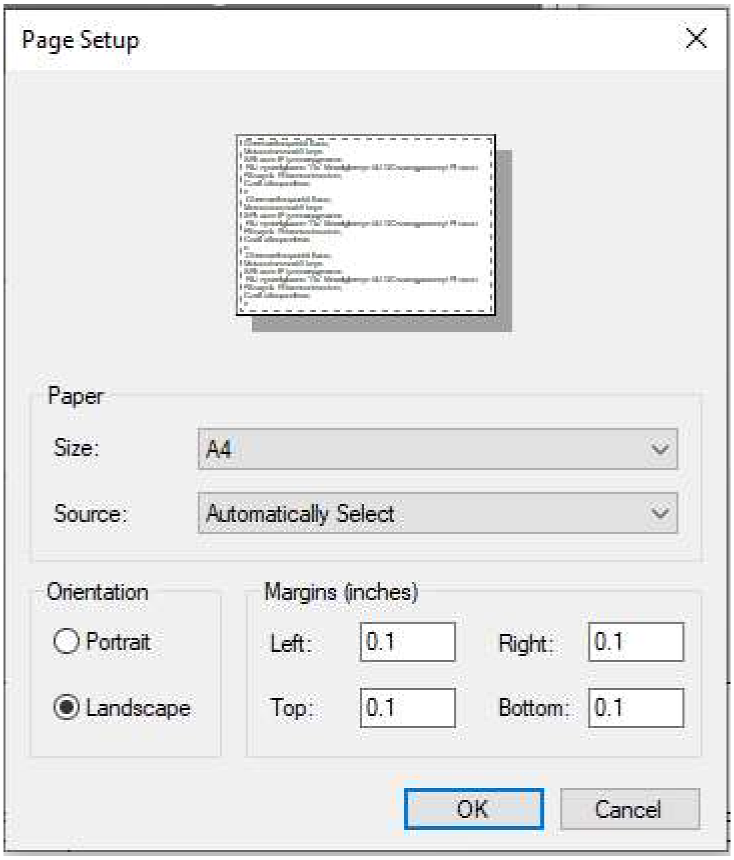
This function opens following setup window:



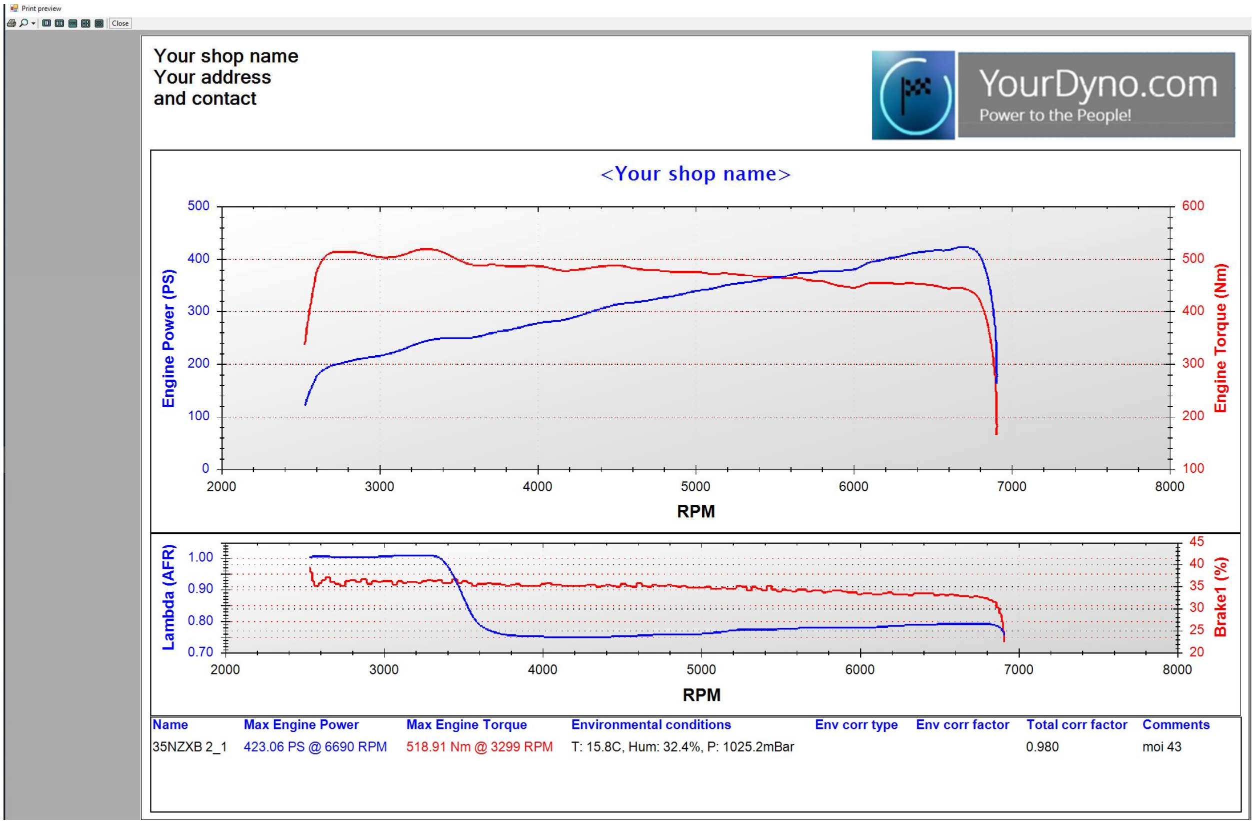
Use this window to adjust your print-out page.

6.1.1 Customizing print-out header. Company logo

1. To upload your logo please activate the check-box "Enable header image".
2. Click on "Set header image" and use the following dialog window to navigate and upload your image file with logo.
3. Use the "Swap text and image location" button to position the logo either on left or right side of the page.
4. Adjust the "Header print height (mm)" to your liking. The higher the header the more room for text and logo.
5. You may use the multi-line text box to enter your company name and contact details.
6. Click and move left or right the vertical divider to adjust the width of the text box and logo area.
7. To change page orientation (Portrait or Landscape) and adjust margins please press "Page setup..." button.



8. Use "Print preview" button to verify the settings.



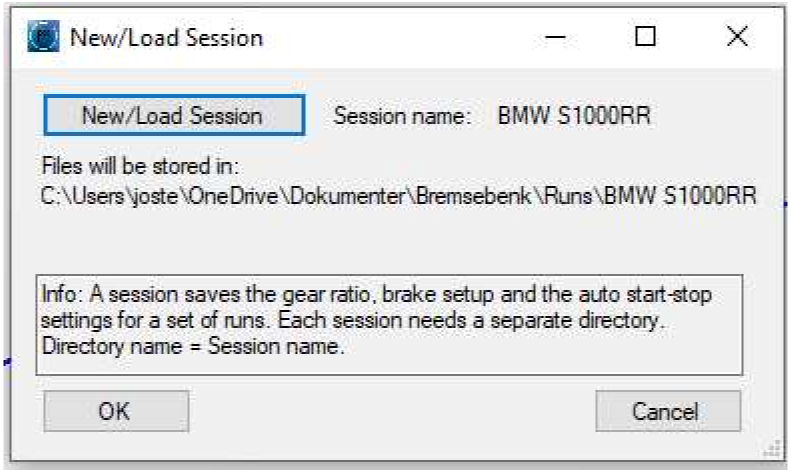
7 Menu: Run

7.1 New/Load Session

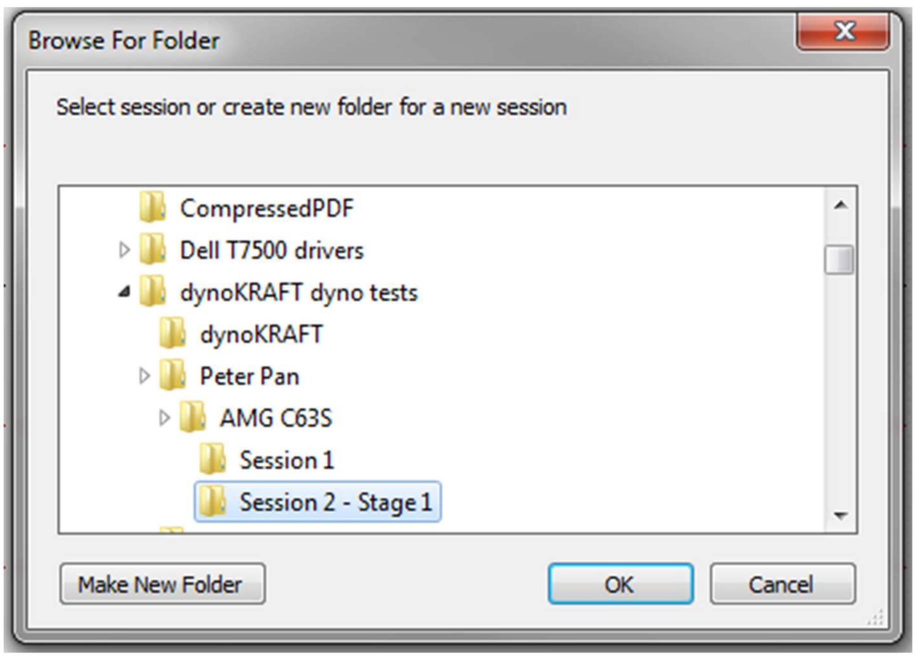
Use this function to start a new testing session. A session may contain multiple test runs. You typically use a separate session for every new car or engine.

A Session stores information about gear ratio, brake setup and auto start-stop settings for a set of test Runs. Please create a new directory for each session (Directory name = Session name). All test Runs recorded within one Session are stored in single .csv file on your hard drive under the directory you created. The raw .log files are also stored in the Session folder.

To start a new session / load existing one please open this window:

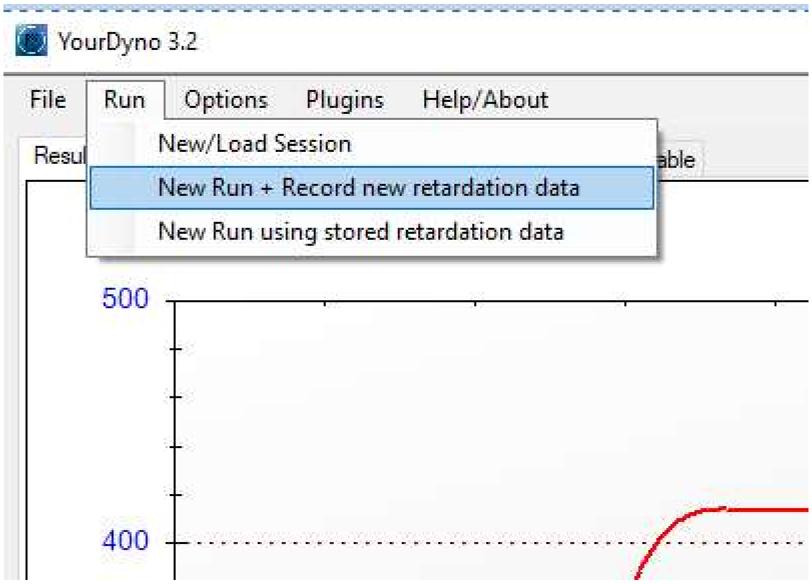


Press the "New/Load Session" button to set the directory where you want to save your file containing test Runs. You can create a sub-folder structure to organize your customers database, for example:



New Runs will be added to any existing Runs already open in main window.

If the option “Enable correction for rolling resistance…” is on then whenever a new Run is started the software offers the option to use previously recorded Retardation data (friction losses) or record new Retardation data. It is recommended to always record new Retardation data if the transmission and other components allow it. If the retardation takes very long, you can add brake during retardation.



7.2 New Run

Use this function to record a new test Run using the current Session. This function will directly open the Run (gauges) window. Check all relevant settings prior to recording the Run. The recorded Run will be added to the list of Runs.

8 Menu: Options

8.1 Get the connections right first

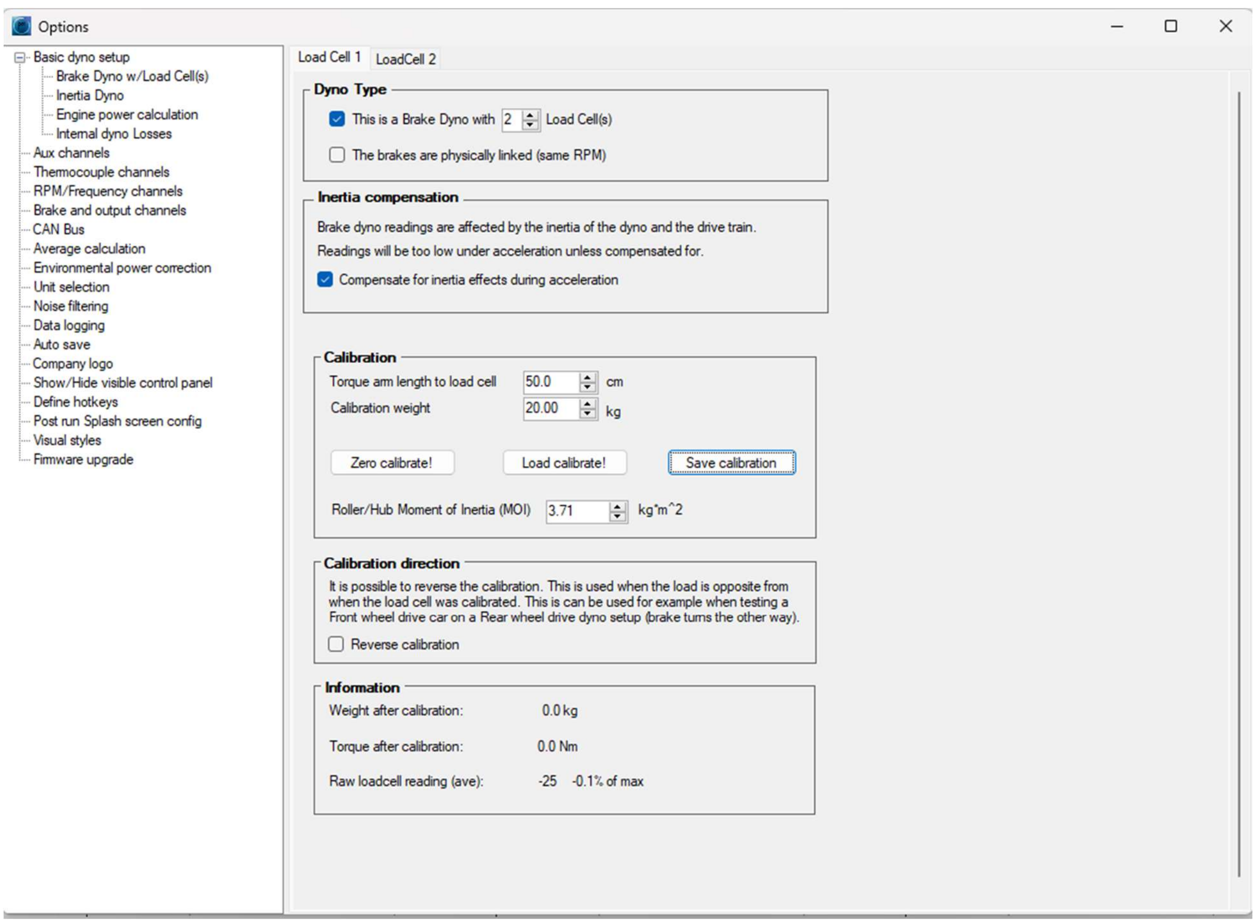
The YourDyno Standard and Ultimate have several RPM inputs, Load cell inputs and Outputs. There is a logic as to which is used for what.

In general, RPM1 works together with Load Cell1 and Out1, RPM2 works together with Load Cell2 and Out2, etc. You cannot mix and match the numbers randomly. It gets a bit more complicated when there are linked brakes and when stepper motors are used, since each stepper uses 2 outputs. See the following table for correct assignment of channels:

Dyno type	Number of load cells	Load cell channel	RPM Configuration	Output brake channel(s)
Inertia dyno	0	None	RPM1 = Load cell 1 RPM	None
1 eddy brake	1	Load cell 1	RPM1 = Load cell 1 RPM	Out1
2 eddy brakes	2	Load cell1 Load cell 2	RPM1 = Load cell 1 RPM RPM2 = Load cell 2 RPM	Out1 Out2
2 eddy brakes with 1 RPM sensor	2	Load cell1 Load cell 2	RPM1 = Load cell 1+2 RPM or RPM2 = Load cell 1+2 RPM	Out1 Out2
4 eddy brakes (2WD Hub w/2 brakes each)	4	Load cell1 Load cell 2 Load cell 3 Load cell 4	RPM1 = Load cell 1+2 RPM RPM3 = Load cell 3+4 RPM	Out1 Out2 Out3 Out4
4 eddy brakes (4WD Hub)	4	Load cell1 Load cell 2 Load cell 3 Load cell 4	RPM1 = Load cell 1 RPM RPM2 = Load cell 2 RPM RPM3 = Load cell 3 RPM RPM4 = Load cell 4 RPM	Out1 Out2 Out3 Out4
1 water brake	1	Load cell 1	RPM1 = Load cell 1 RPM	Out1 + Out2
1 hydraulic brake	1	Load cell 1	RPM1 = Load cell 1 RPM	Out1 + Out2
1 water brake w/2 valves	1	Load cell 1	RPM1 = Load cell 1 RPM	Out1 + Out2 (main valve) Out3 + Out4 (secondary valve)
2 linked water brakes	2	Load cell 1 Load cell 2	RPM1 = Load cell 1+2 RPM	Out1 + Out2 Out3 + Out4

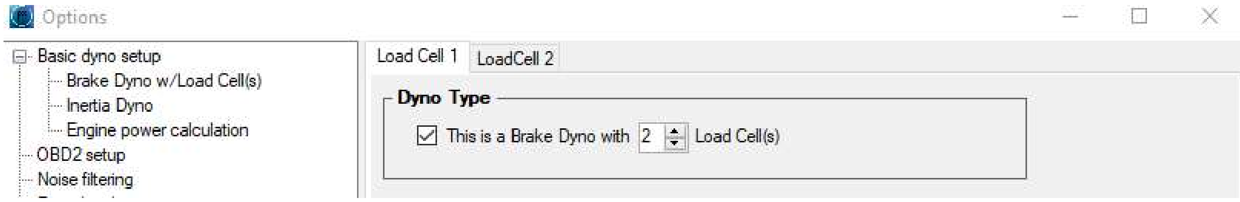
8.2 Basic dyno Setup

This function opens the main software settings window.



8.3 Brake Dyno w/Load Cell(s)

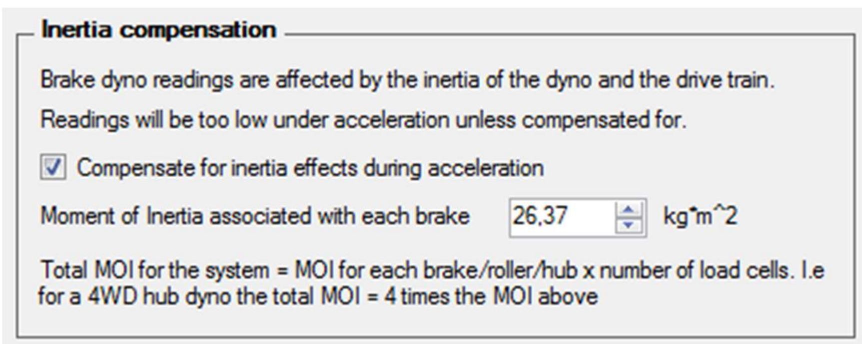
If your dynamometer is equipped with brakes (any type) activate the "This is a Brake Dyno with...." checkbox. Adjust the count of load cells in use using up and down arrows (1, 2 or 4 load cells).



8.3.1 Inertia compensation

The option "Compensate for inertia effects during acceleration" should normally always be on. This makes YourDyno calculate the power and torque used to accelerate the rotating components, which is an important component. Then enter correct value in the "Moment of Inertia..." filed in correct unit (kgm²).

The inertia value needs to be entered under each load cell tab. The effective inertia is typically the same for each brake but does not need to be in case different brakes and or rollers are used on front and rear.



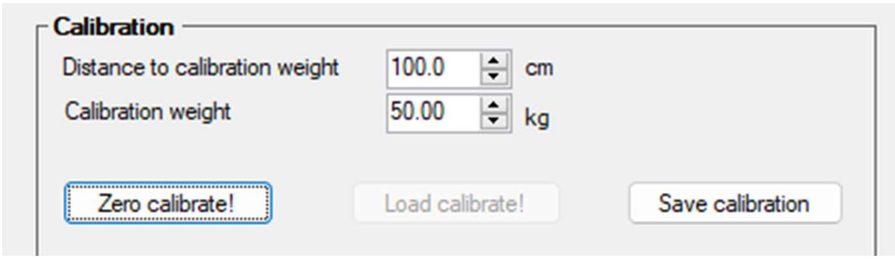
The MOI entered in Options represents the dyno inertia (which is constant) and the MOI entered in the MOI Setup in the Run window represent the vehicle MOI (which varies from vehicle to vehicle). The numbers are added together. It is the total MOI that matters, so in practice it does not matter where the values are entered

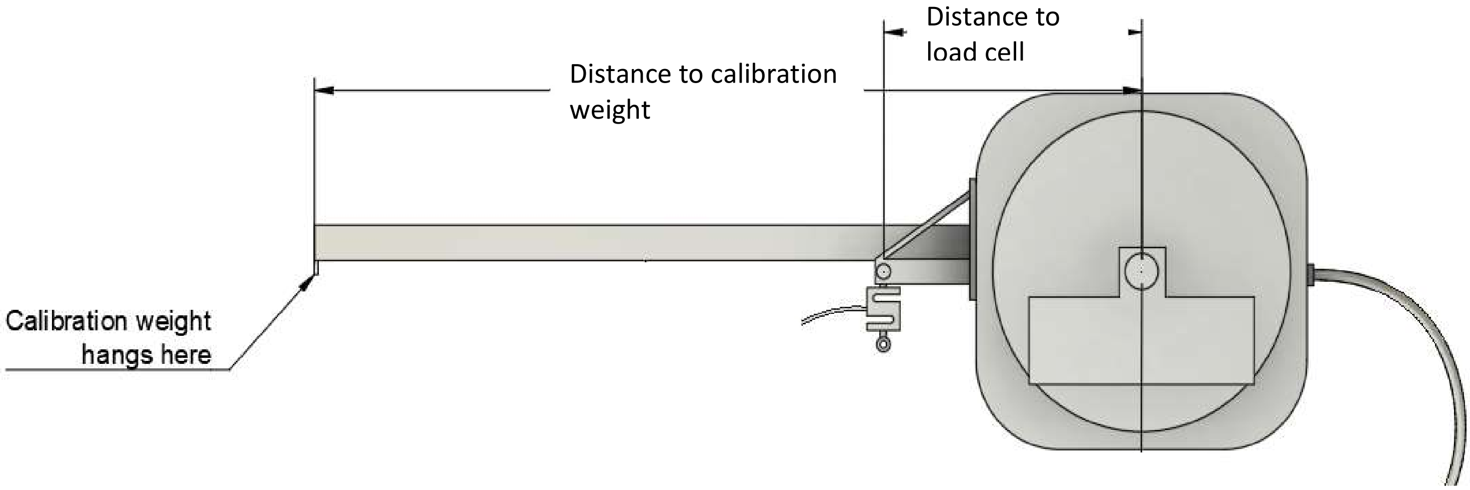
8.3.2 Load Cell calibration

There are a few ways to calibrate the load cell. The recommended way is described below.

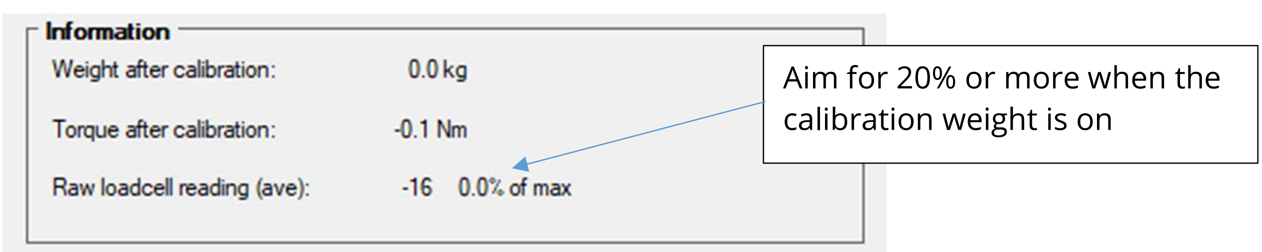
8.3.2.1 Using a calibration arm

Often large capacity load cells require the use of a long calibration arm to put enough weight on it. In the following, it is assumed that a calibration arm is used. The procedure is the same if the weight is placed directly on top of the load cell, but this often will not give enough weight on the load cell.





Calibration weight is the load you use to calibrate the load cell. The more accurate the value the more precise the wheel torque measurement will be. Aim for a combination of calibration weight and calibration arm length that produces of minimum 20% of the max rating of the load cell for accurate calibration.

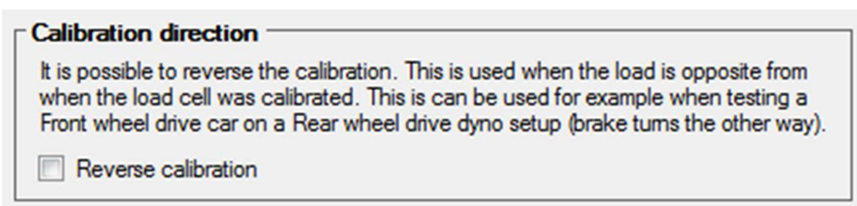


8.3.2.2 Calibration procedure

1. Make sure that the load cell is correctly installed in the dynamometer and that nothing obstructs the sensor nor the torque arm
2. Make sure the Distance to calibration weight and Calibration weight are correctly entered
3. Mount the calibration arm if used
4. Press the "Zero calibrate!" button to set Load Cell zero. The numbers may still dance around, this is normal if the system has not been calibrated before
5. Install the Calibration Weight either by hanging it from the calibration arm or placing it on top
6. Press "Load calibrate". Verify that the Weight after calibration reads the calibration weight. Verify that the Raw load cell reading is > 20%. If not, it is recommended to use a larger calibrating weight
7. Remove the calibration weight and calibration arm (if used)
8. Press “Zero Calibrate” again
9. Press "Save calibration"

8.3.2.3 Calibration direction

Use this setting to invert the calibration of the load cell.
This is useful when you would like to run the dynamometer in opposite driving direction.



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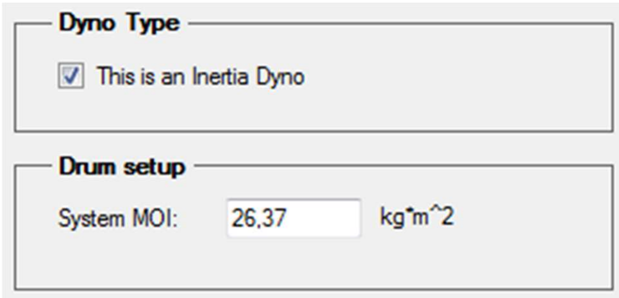
Not all load cells are perfectly bi-directional and have exactly same calibration factors in both compression- and tension- directions. To assure highest possible measurement precision you should perform a "negative" calibration (use negative "Calibration weight" value).

8.4 Inertia Dyno

This section allows you to setup the Rotational Inertia for inertia-only dynos.

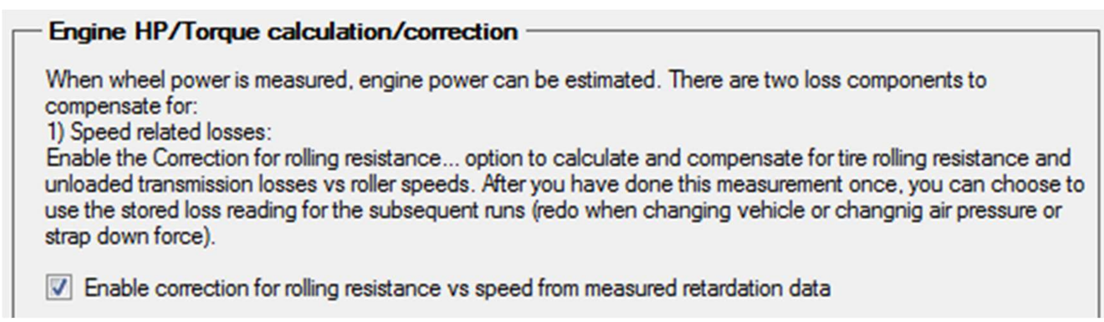
To use the inertia-only dyno type please activate the checkbox "This is an Inertia Dyno" and enter the correct Mass Moment of Inertia in the field below.:



8.5 Engine power calculation for hub and roller dynos

Roller and Hub dynamometers measure power and torque at the wheels. There is no physical possibility to measure actual Clutch or Crank power on roller and hub dynamometers.

To be able to estimate the engine power, friction losses of the drivetrain must be measured during so called coast-down phase. To enable friction losses measurement please activate the "Enable correction for rolling resistance vs. speed from measured retardation data" checkbox.:

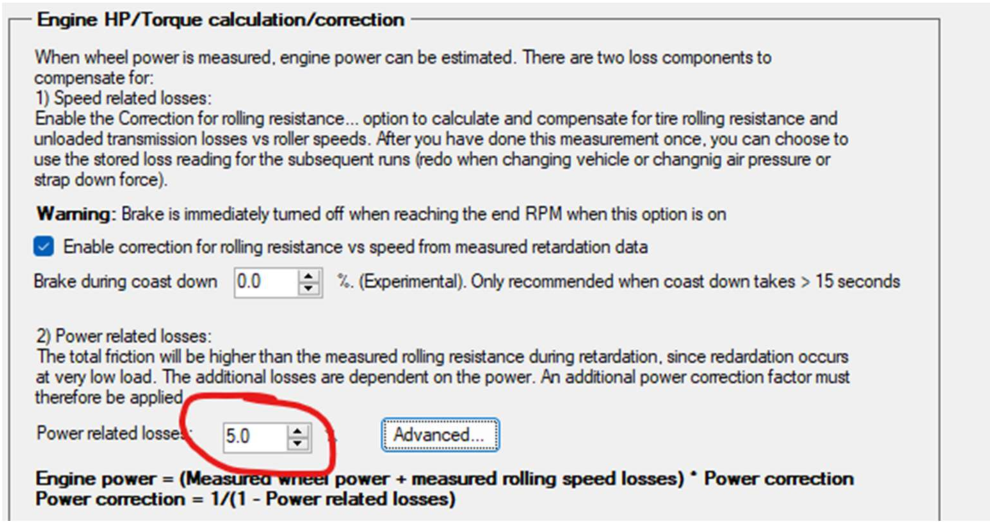


WARNING: The brake is abruptly turned off when the end RPM is reached when this option is on. DO NOT TURN THIS OPTION ON FOR ENGINE DYNOS!

Please note that the power losses in the drivetrain cannot be measured during coast-down phase. The coast-down phase can measure solely coasting friction losses!

Measuring friction losses gives a good estimation of Clutch (or Crank) power, but it is still burdened with a measurement error since the drive train will have higher losses at full power compared with at coast down. A roller dynamometer can therefore only measure parts of the losses, the total losses will be higher than the measured retardation losses. To accurately determine these losses, it is necessary to compare power readings between engine and roller dynamometer.

To enable power-train losses correction, modify the "Power related losses" value:



There is no way to know exactly what the number shall be since the efficiency of the tires and drive trains vary. 5% can be a good starting point.

8.6 Aux channels

The YourDyno Ultimate controller offers 8 analog analog input channels (Aux 1 … Aux 8) and the YourDyno Standard has 3.

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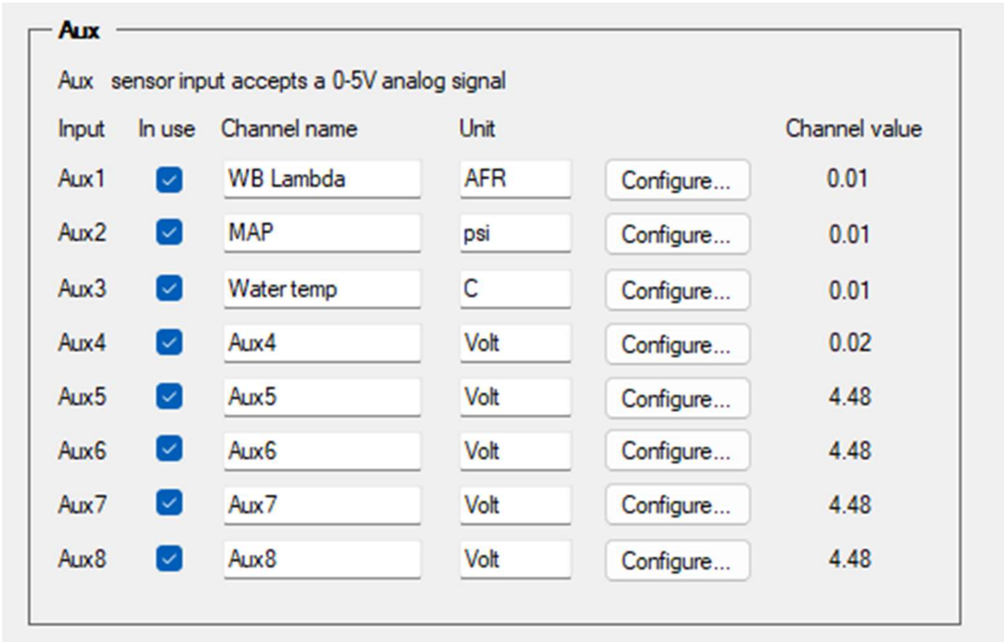
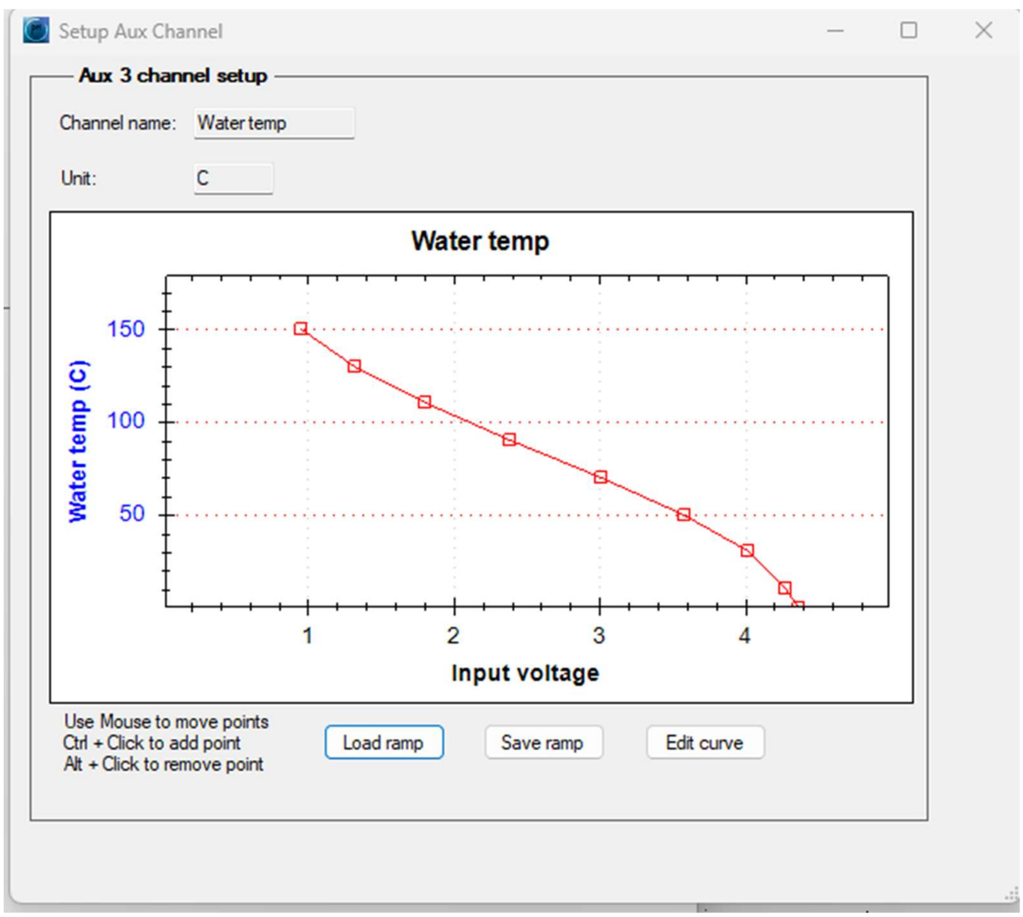
All Aux channels can accept max. 5V DC. Connecting higher voltage to any of these inputs will damage the electronic circuit board and void warranty!

To activate each channel, enable the checkbox. Click Configure to specify the analog input interpolation curve (relationship between input voltage and sensor reading). Sensor type and Unit are free text, and anything can be written here.

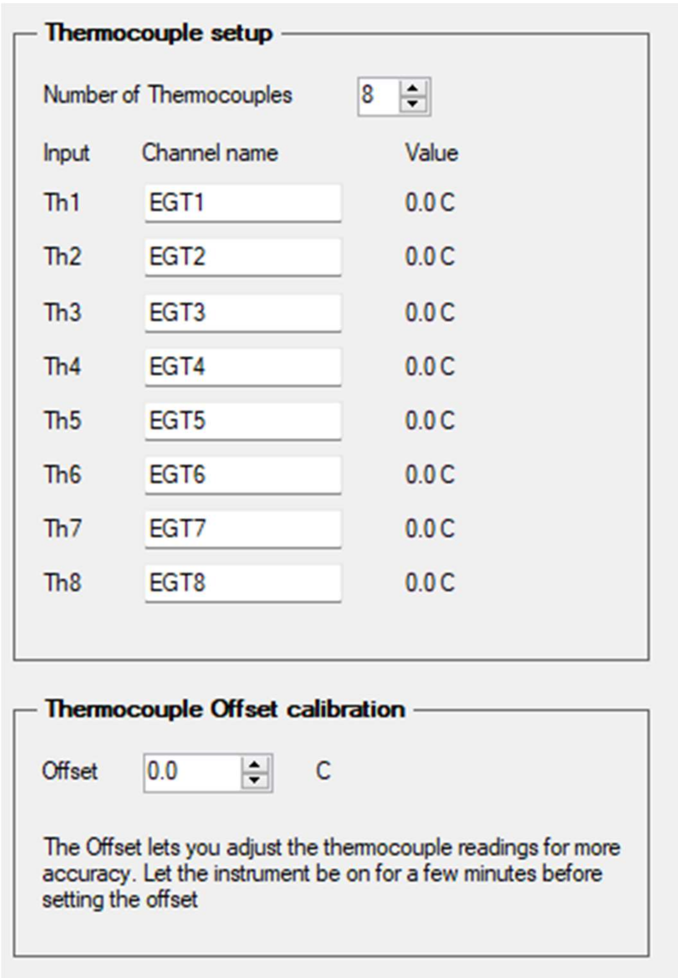

Aux
Aux sensor input accepts a 0-5V analog signal
Input
In use
Channel name
Unit
Channel value
Aux1
WB Lambda
AFR
Configure...
0.01
Aux2
MAP
psi
Configure...
0.01
Aux3
Water temp
C
Configure...
0.01
Aux4
Aux4
Volt
Configure...
0.02
Aux5
Aux5
Volt
Configure...
4.48
Aux6
Aux6
Volt
Configure...
4.48
Aux7
Aux7
Volt
Configure...
4.48
Aux8
Aux8
Volt
Configure...
4.48


Setup Aux Channel
Aux 3 channel setup
Channel name:
Water temp
Unit:
C
Water temp
Water temp (C)
150
100
50
1
2
3
4
Input voltage
Use Mouse to move points
Ctrl + Click to add point
Alt + Click to remove point
Load ramp
Save ramp
Edit curve

The relationship between voltage and signal can be defined in the curve, by either modifying points on the graph or editing it in a table. For the sensors that YourDyno sell, predefined curves are available using the Load ramp.

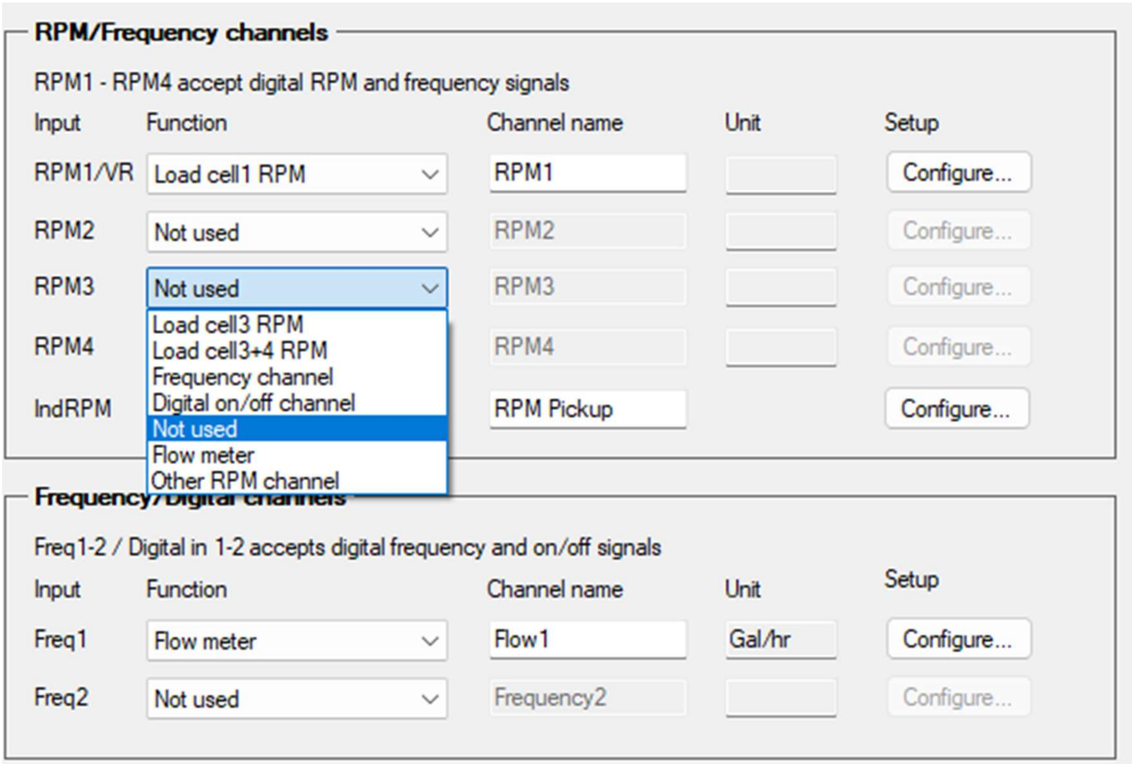
8.7 Thermocouples

The YourDyno Ultimate controller offers 8 Thermocouple Type-K inputs. The YourDyno Standard controller offers one. Select the number of thermocouples attached and rename them to your liking.



8.8 RPM/Frequency channels

YourDyno Ultimate has 6 digital channels and YourDyno Standard has 4. In addition, both have a dedicated Engine RPM inductive pickup channel.



The digital channels can be defined as Load Cell RPM, Frequency channel, Digital on/off, Flow meter and Other RPM.

8.8.1 Load cell RPM channels

First ensure each Load cell has an associated RPM channel. If a load cell does not have an RPM channel associated, it is ignored. For RPM channels, set number of pulses per revolution.

Inertia dyno rollers use the Load Cell1 RPM (yes, this can be somewhat confusing).

Ensure to write the correct number of pulses per revolution. This is the same as the number of teeth on the trigger wheel. Getting this number wrong will result in wrong results (even if RPM correct)

Individual (unlinked) brakes need individual RPM sensors assigned. If two brakes share the same RPM sensor, then select LoadCell1+2 (for example) as the Function.

8.8.2 Frequency channels

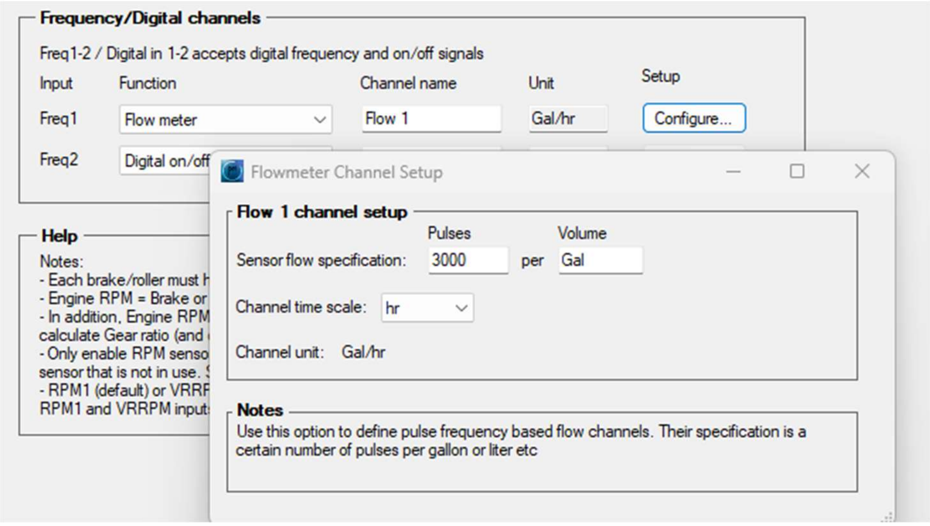
This option is used to configure channels that measure the frequency of the input signal.

8.8.3 Digital On/off channels

This option is used to configure channels that measure on/off signals like a zero position sensor of a water brake. A high (voltage > ca 2.5V) on the input = 1, otherwise it is 0.

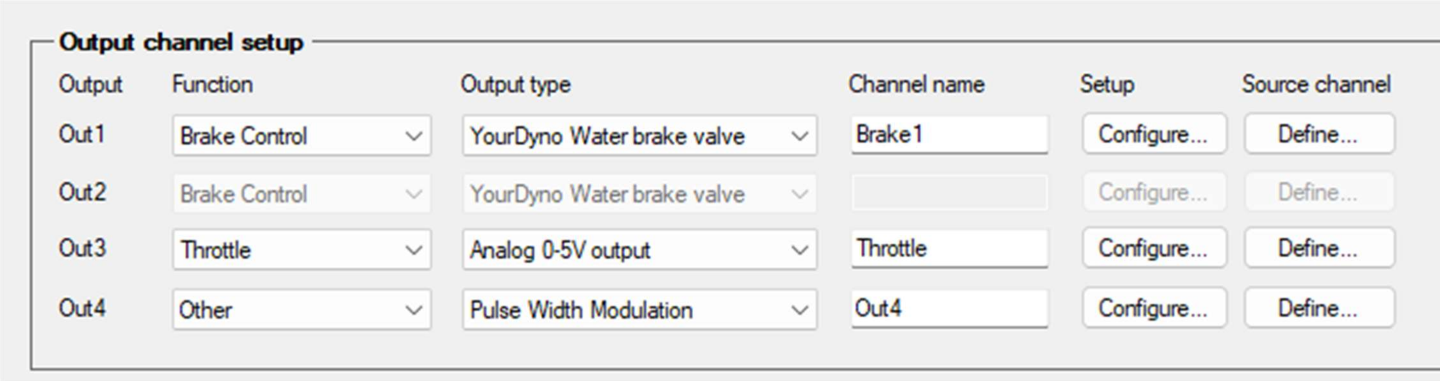
8.8.4 Flow meter channels

Flow meters typically use a digital frequency based signal, meaning higher frequency = more flow. You need to know the number of pulses per volume to configure the channel. For example, a flow meter with 3000 pulses per gallon is configured like this. You can also define the time scale, hours, minutes, or seconds. The volume can be anything; liters, cubic feet, gallon, etc, as long as the pulses per volume match.



8.9 Brake controller and other outputs

YourDyno Ultimate has 4 outputs and Standard has 2. They can be used to control brake(s), throttle or other.

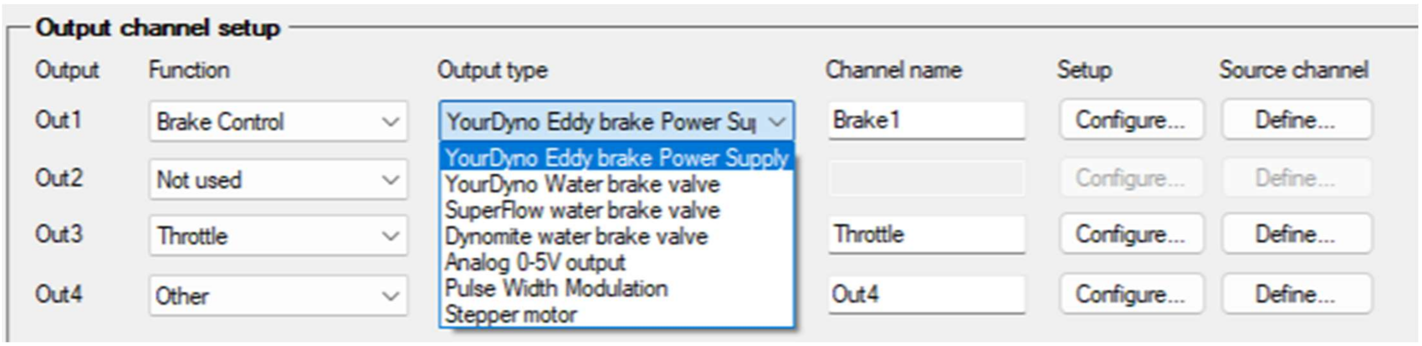


Each Stepper motor/servo control uses 2 outputs, while Analog and Pulse Width Modulation (PWM) uses 1.

8.9.1 Brake controller setup

The physical connection(s) to the brake(s) are setup here.

Several predefined brake control outputs exist, as well as generic Analog 0-5V, PWM and Stepper options. See below. Select the one appropriate to your setup.



8.9.1.1 Eddy brake power supply

Choose the YourDyno Eddy brake power supply if your setup has this power supply. Set max voltage to the correct value. Optionally connect using Bluetooth to the PS to be able to read current and temperature. This is purely optional; the system works fine without.

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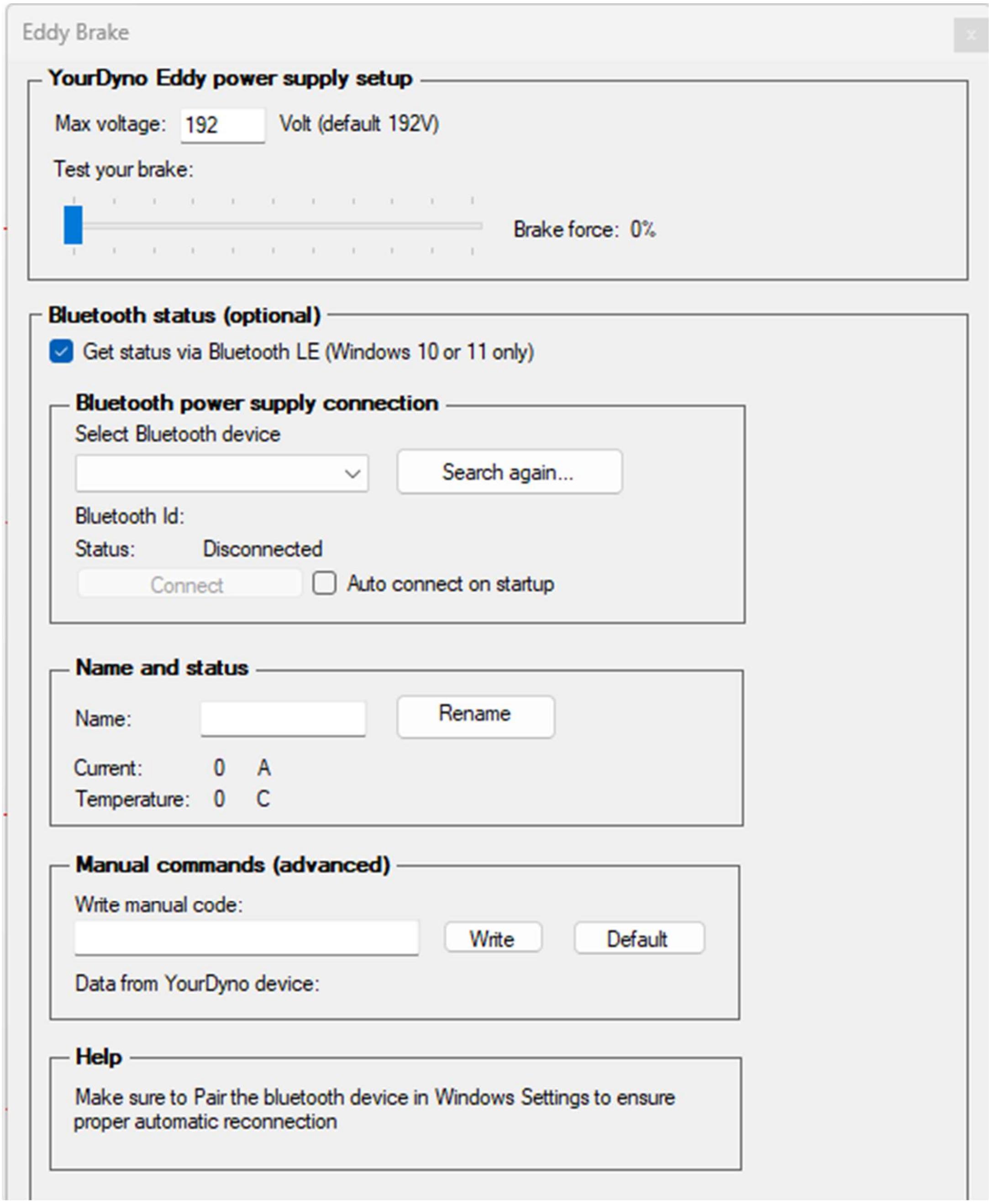
Make sure to know the max voltage rating of your brake. Large 16 coil brakes can be checked by measuring the resistance on the power terminals:
16 coils 192V = ca 10 Ohm
16 coils 96V = ca 2.5 Ohm
It is recommended to wire the brake to 192V if possible (all coils in series).



You may use the "Test your brake" slider to manually set the brake output control signal and verify retarder operation. When powered up the Retarder is making characteristic "whining" noise.

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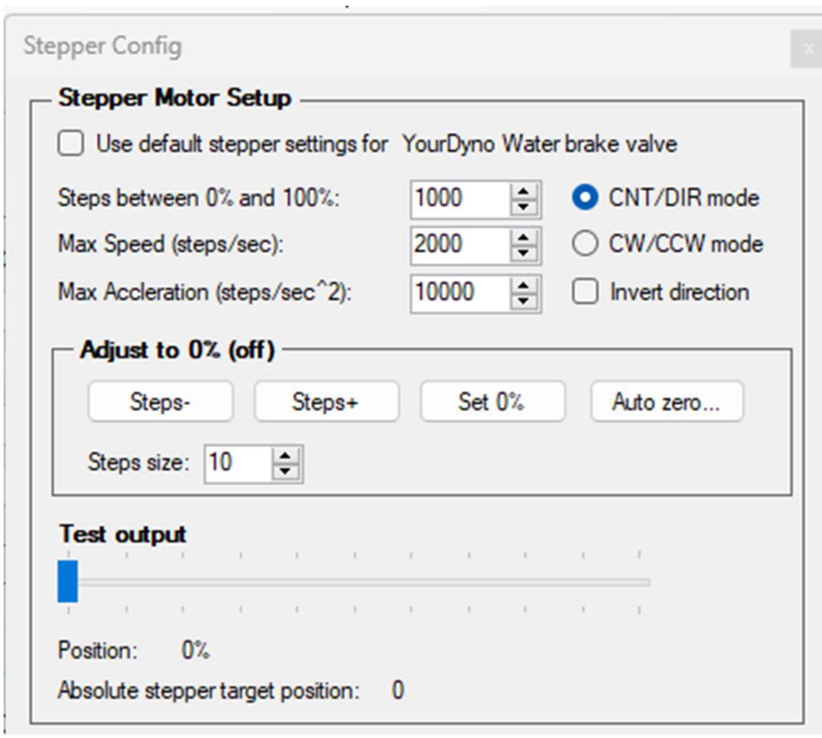
Note 1: This procedure will directly apply the output voltage regardless of current condition of your dynamometer

Note 2: The output only works if a brake (or something else like a light bulb) is connected. You cannot measure the output voltage if nothing is connected.

WARNING: Potentially lethal voltages!

8.9.1.2 Water brake valves

Select the appropriate water brake type and under Configuration, select Use default stepper settings (unless good reason not to).



See individual manuals for the valves for the detailed setup.

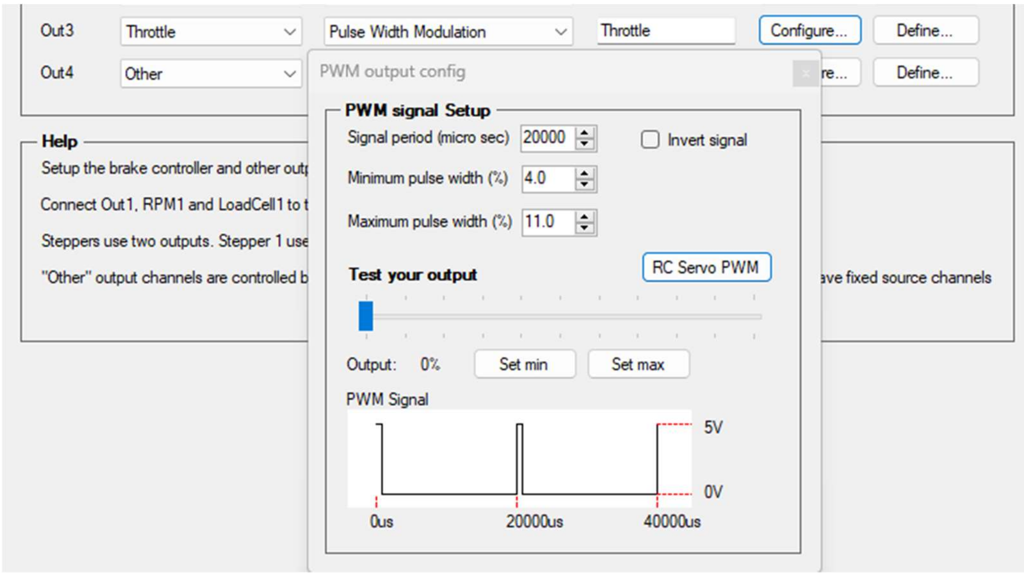
8.9.1.3 PWM and Analog out

If your brake controller uses Analog or PWM signal, then select that from the drop-down list.

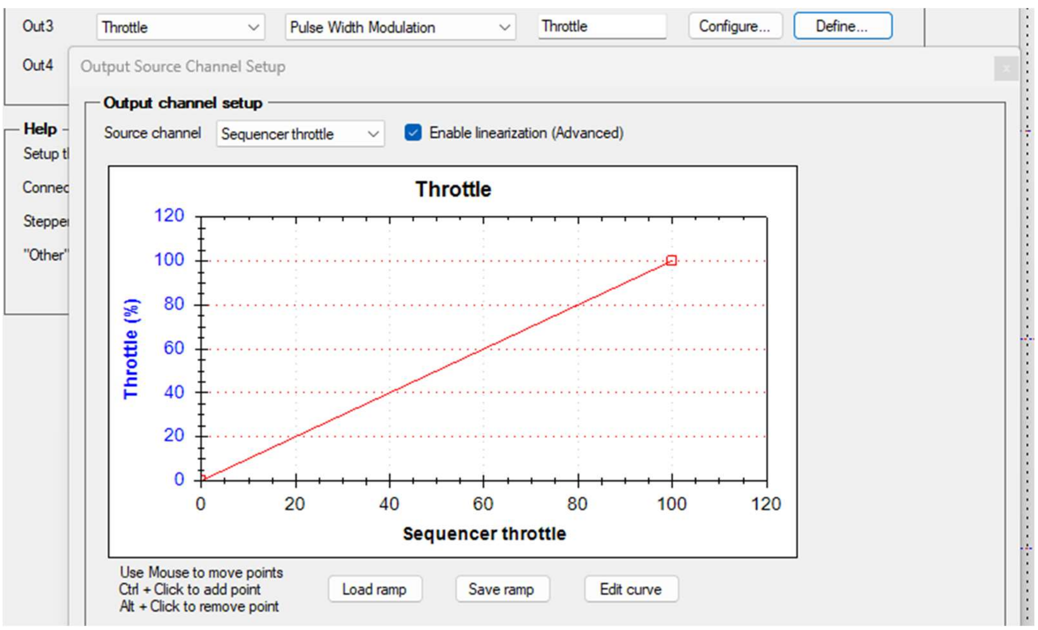
Analog output requires to move a jumper inside the YourDyno box to the analog position

8.9.2 Throttle output

The throttle can be controlled by for example an RC servo. They typically use PWM. Use the configuration to set up the min and max positions and check that it works.



The throttle can be controlled by the Sequencer (a brake mode) or any other channel, also math channels and CAN bus channels.



8.9.3 Generic outputs

Select Other for generic outputs. Configuration is as for the Throttle.

8.10 CAN bus

Both the YourDyno Ultimate and the YourDyno Standard include built in CAN bus support. The Standard needs a license to enable it, while the license is always included in the Ultimate. Both CAN input and output are supported, as well as a CAN bus analyzer.

8.10.1 CAN bus basics

A CAN bus is a very common communication protocol between different parts of the engine and sensor components. Most aftermarket ECUs have CAN bus support, which means you can log internal ECU parameters like RPM, pressures, temperatures, ignition angle, etc together with the other dyno data and plot them together. Very useful!

Many off the shelf sensors also have CAN bus support, which means you can easily extend the functionality of the dyno. Finally, you can also send channels data out to displays, the ECU, external logger or whatever on the CAN bus.

The data format for CAN messages consists of an CAN ID (address) and the data. The data is formatted a certain way, and you need to know that format in order to decode the data.

8.10.2 The CAN bus analyzer

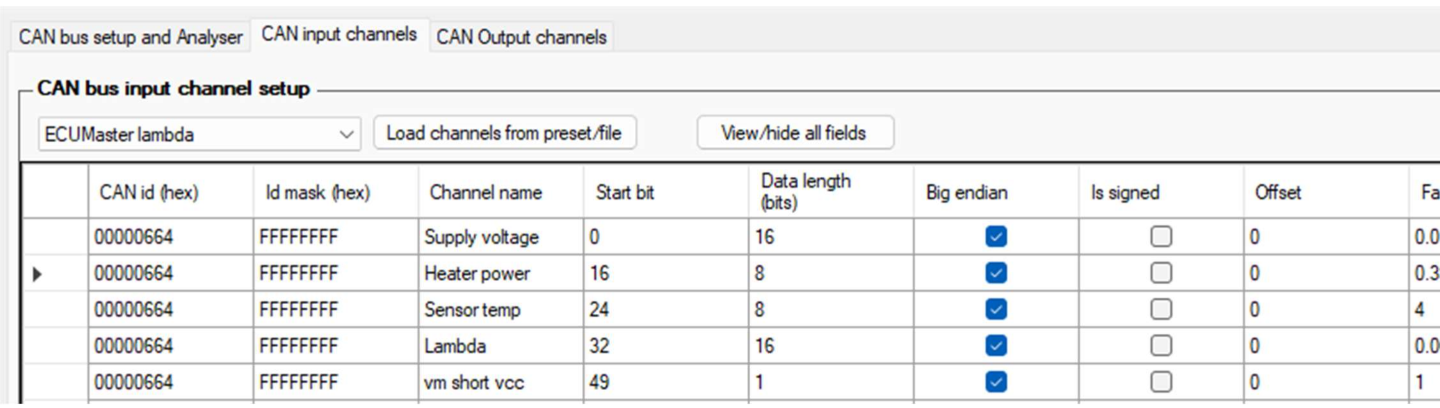
The CAN bus analyzer is useful to see what is happening on the CAN bus. All data going in and out of the YourDyno box is displayed. If no data is seen, try a different baud rate or swap CAN+/- (also called CANH/CANL).

The analyzer will show the CAN ID and 8 bytes of raw data for each ID.

8.10.3 CAN Inputs

To convert the data on the CAN bus into data channels, their format needs to be defined. There are two ways to do this.

1. Using a .dbc file, which includes all data definitions you need. Some .dbc files are included in the YourDyno installation, and you can also read your own .dbc file. Some ECUs can write their CAN configuration as a .dbc file, and in that case you can just read it in and click Log data on the channels you are interested in. Don't click on those you are not interested in as it will increase CPU load and clutter the system with unused channels.
2. Define the channels manually



Id mask: used to match one or more than CAN IDs. Normally it is FFFFFFFF, then it matches only 1 address.

Channel name: User defined name of the channel

Start bit: This is the position for the first bit in the data channel. Each CAN Id includes 8 bytes (64 bits) and can include several data channels. For example, the channel Lambda above starts from bit position 32 and is 16 bits long

Data length: The size of the data channel in bits. This is typically 8 or 16 bits but can be anything

Big Endian: Whether the data is Big endian or Little endian

Is signed: Whether the data is signed. For example, a signed 8 bit number is -128 to 127 while an unsigned 8 bit number is 0 to 255

Offset and Factor: The Channel value = Raw CAN value * Factor – Offset

Raw CAN value: The data directly read from the CAN bus using the CAN Id, Start bit, Length, Endian and Signed setting

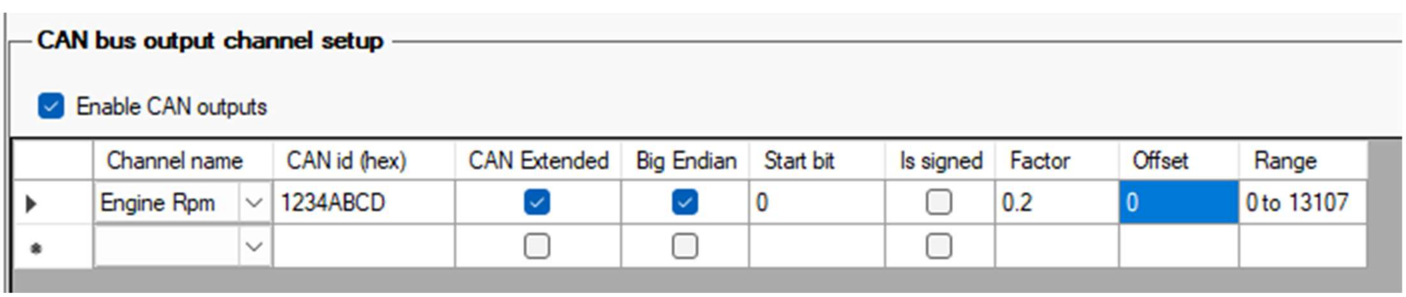
Channel Value: The translated data value

Unit: User defined unit

Configure: Use this to translate further between the Raw value and channel value (for example for non-linear translations)

8.10.4 CAN Outputs

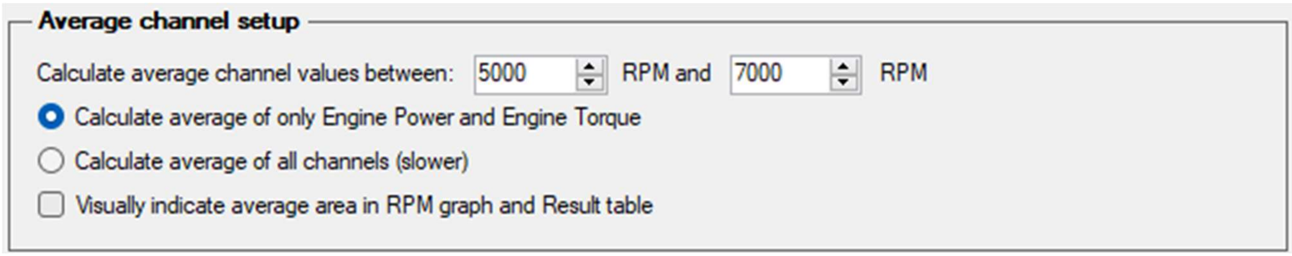
Any channel can be output on the CAN bus. All data are represented as 16 bit numbers.



The columns are similar in function as for CAN inputs.

8.11 Average calculation

Sometimes it is useful to compare the average power within an RPM range, rather than just the max power. Use this option to set the RPM range of interest and whether all channels or just Power/Torque are to be calculated. The results are available in the table below the runs and in Results tables. It can also be shown in the splash screen after the run.



8.12 Environmental (weather) correction

8.12.1 About environmental correction

If it is hot, humid and low pressure one day and the next it is cold, dry and high pressure, the exact same engine will show much better performance on the second day unless compensated for. The correction formulas all define the “standard” environmental conditions and make a correction factor to compensate for the difference the actual conditions make relative to the standard.

To enable power/torque correction calculation based on environmental conditions please select the correction of choice. YourDyno supports:

- SAE J1394-2004
- DIN 70020
- ISO 1585-2020
- EWG 80/1269
- JIS D1001
- STD (J607) / STD (J607)+
- User defined

8.12.2 Which correction factor to choose

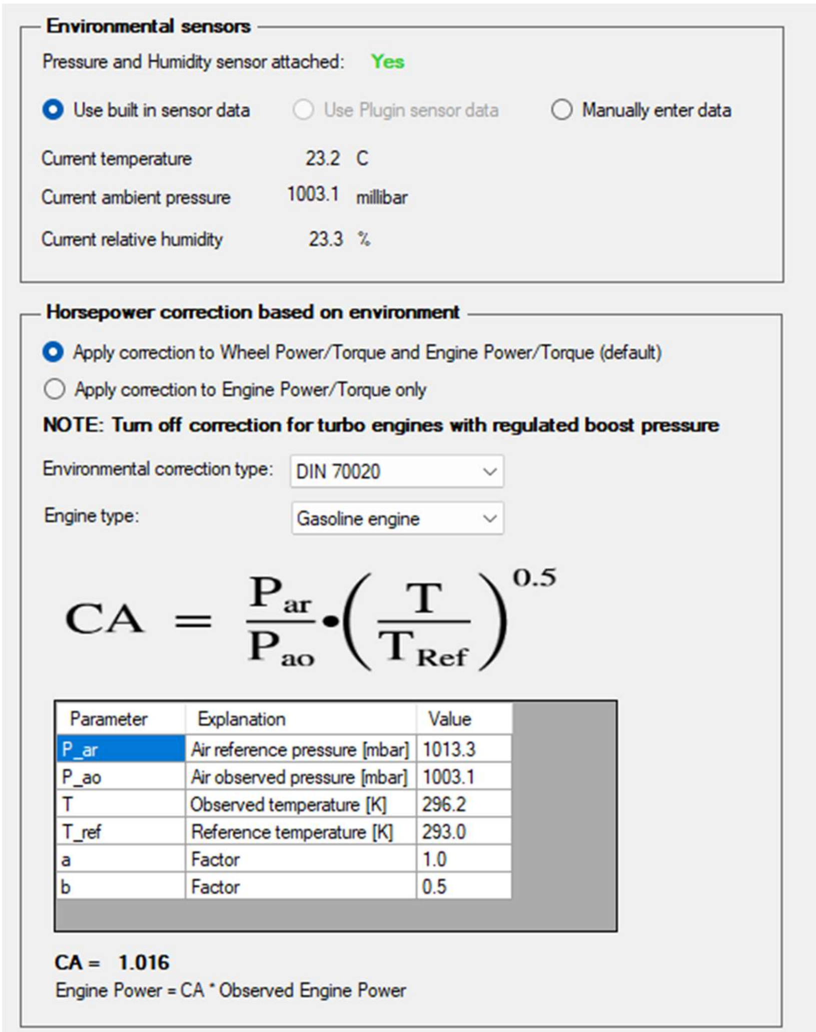
Some correction factors use standard conditions that are very favorable (= results will be higher) and some are unfavorable. The most favorable is the STD+. DIN is also very favorable. SAE is on the opposite side.

The STD correction is very popular in the US, while the DIN or SAE is more popular in Europe.

There is no right or wrong choice but be aware of the differences and compare apples to apples.

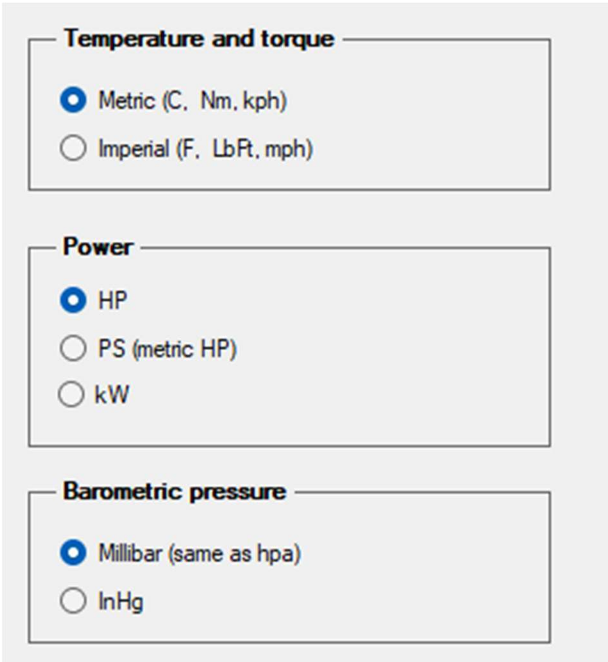
8.12.3 Source of data

You can choose between the YourDyno environmental sensor, use an off the shelf sensor (Dracal PTH200) or enter the values manually. The Dracal is mostly used for older YourDyno Standard that had the sensor built into the box, which was not ideal if the box was placed in a cabinet. Newer (v5) version of the Standard, and the Ultimate have external environmental sensor, so there is no point in using the Dracal.



8.13 Unit selection

You can choose between different units in this section:

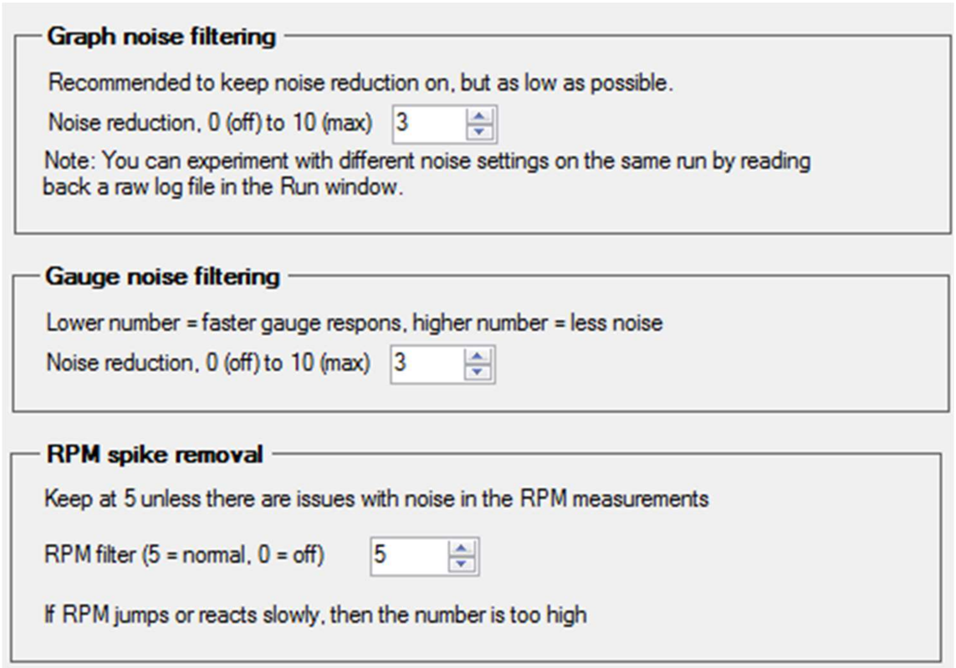


8.14 Noise filtering

To modify the Noise filtering settings, adjust the three fields to desired level.

We strongly advise to use lowest possible settings that allow good results and graph smoothing.

⚠ Too smooth graphs will obstruct the ability to find faults in engine operation.



Note that individual data channels can override the default noise filtering setting. This is setup in the Options->Visual settings section.

8.14.1 RPM spike removal

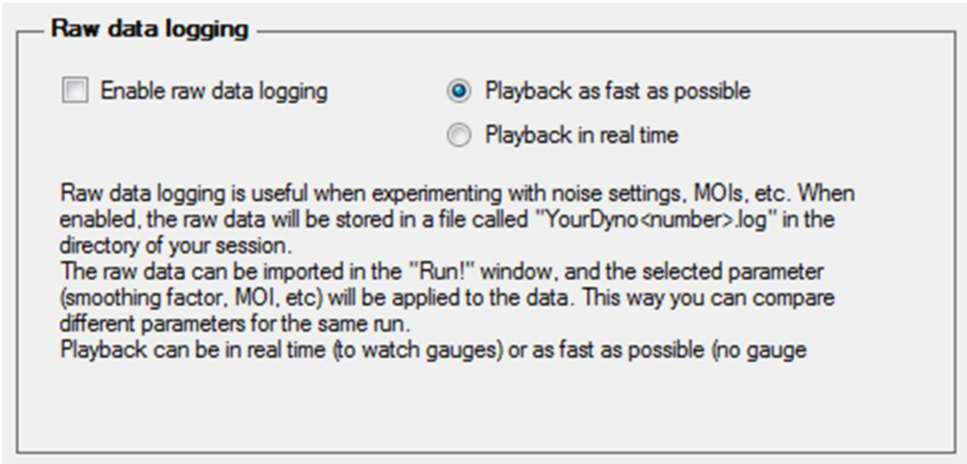
Occasional RPM spikes are removed by the RPM spike removal filter.

⚠

If you see flat spots in the RPM, try turning off the RPM spike removal by setting it to 0. The amount of tooth to tooth jitter in an the RPM signal varies from setup to setup.

8.15 Raw data logging

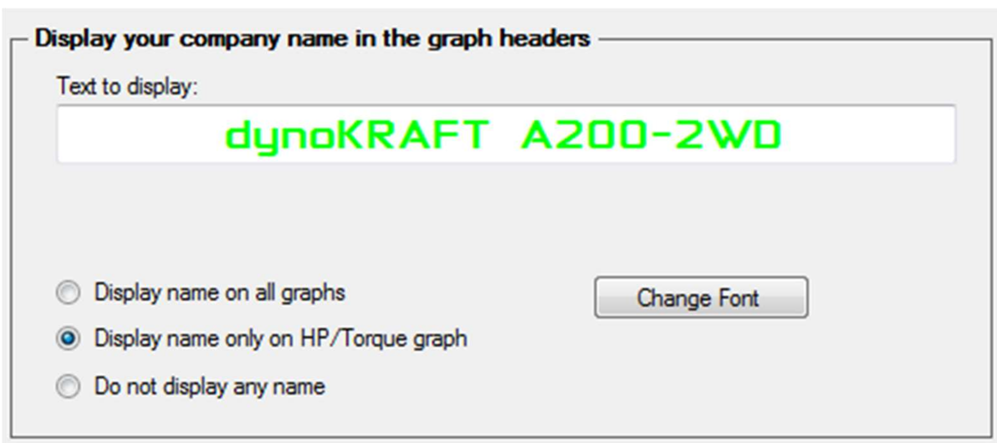
This feature enables raw data logging capability of the YourDyno Software. It can be used to troubleshoot and adjust dynamometer settings after a recorded test Run. To use this feature please enable checkbox "Enable raw data logging".



8.16 Company logo

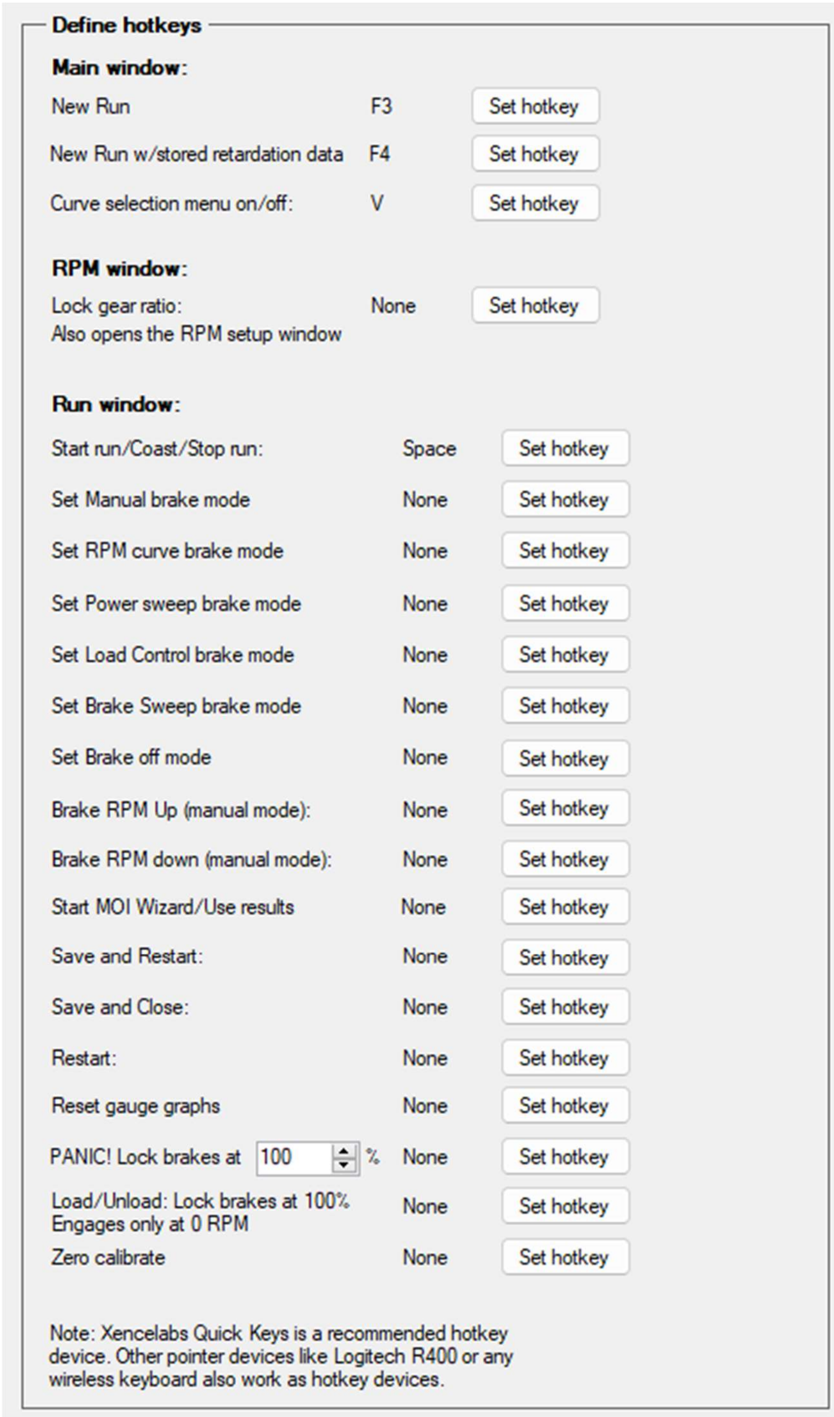
You may choose to setup your company name or any other text to be displayed above Graph Area.

This text will also be visible on print-out.



8.17 Define hotkeys

Use this section to define hotkeys on a keyboard.



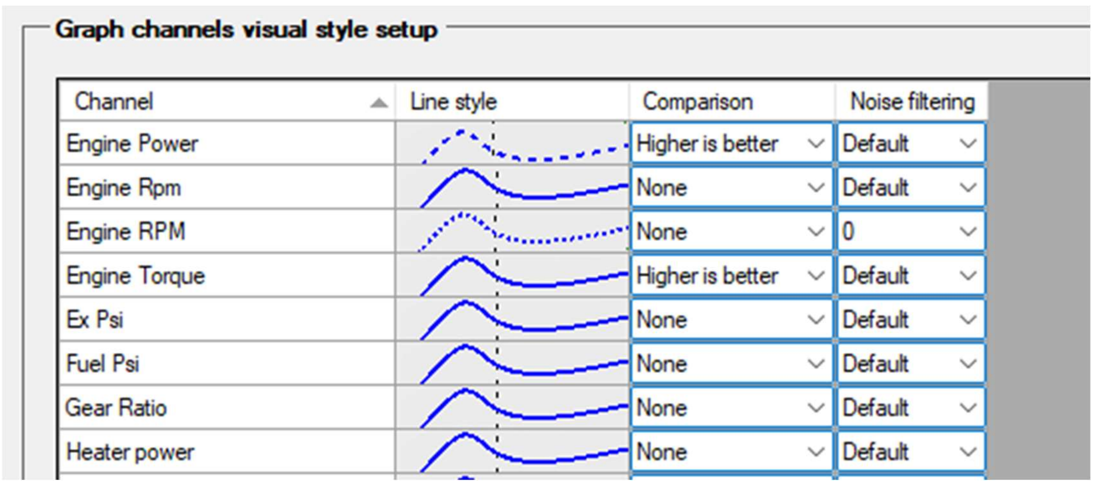
A wireless keyboard or wireless “clicker” such as the Logitech R400 or a more fancy Xencelabs Quick Keys is recommended, and its buttons can be configured with hotkeys.

8.18 Visual styles

The line styles of individual channels can be set here. Click on the curve and select the style you prefer.

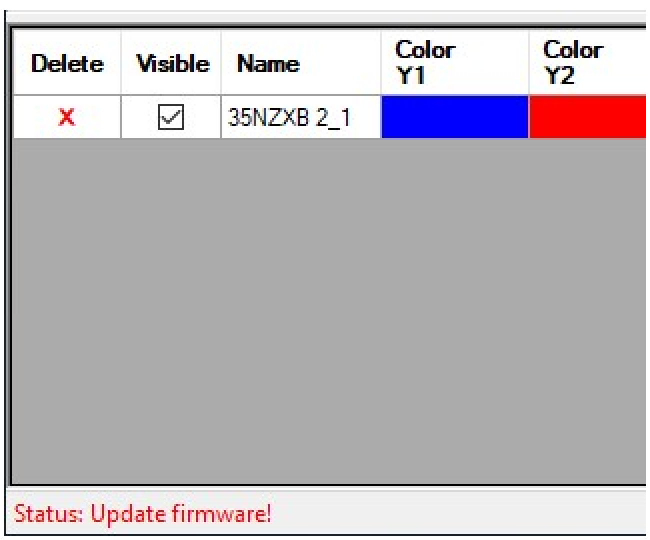
Comparison is used when several runs are compared in the Live results table. It will show shades of red and green depending on which result is better and worse.

Noise filtering provides an override of the default noise filtering. This is useful for example to turn off filtering of some individual channels, for example Brake%.



8.19 Firmware upgrade

This section allows you to perform Firmware update of the YourDyno controller.



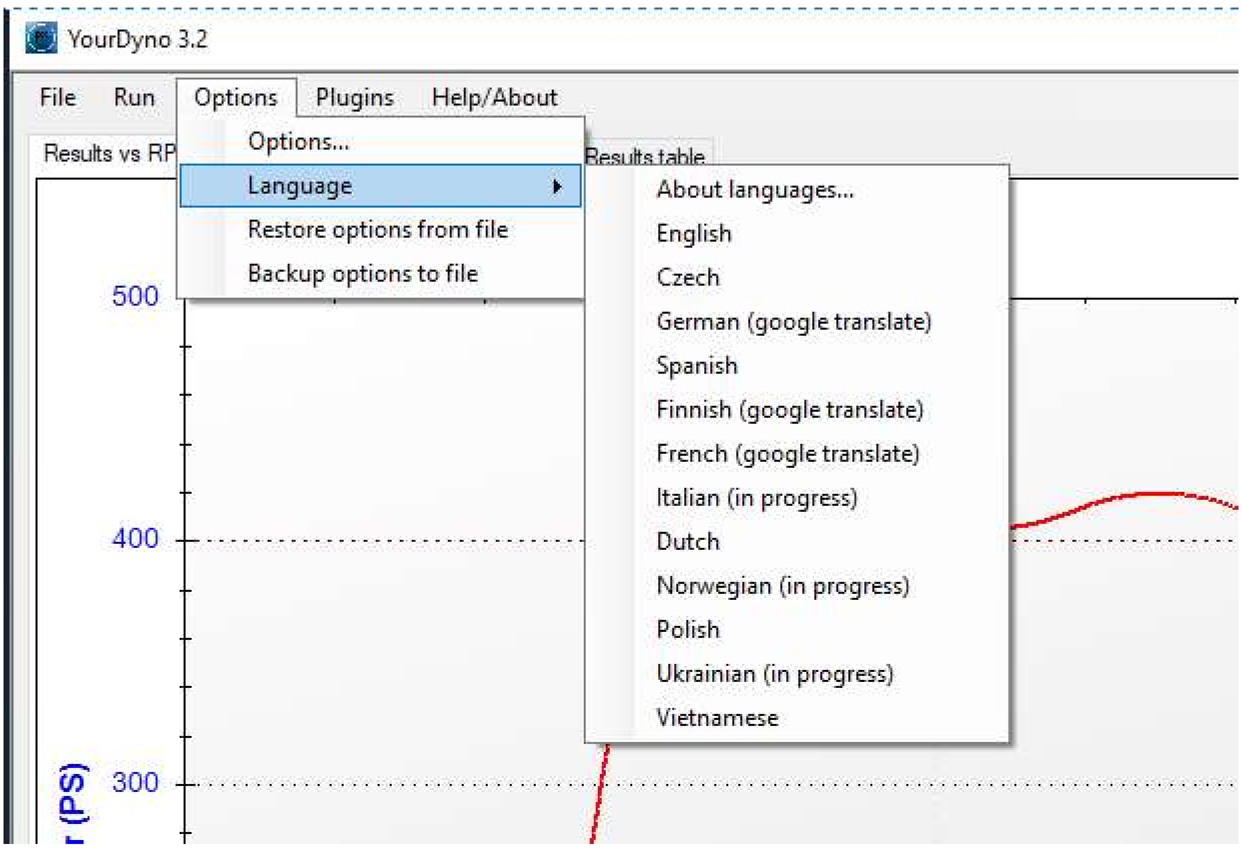
⚠

Whenever “Update firmware” is shown in the status bar at bottom left, you must update the firmware. The firmware update system includes a failsafe mode such that it will revert to the previous firmware if an update was unsuccessful. There is also a second failsafe option; a button inside the box that can be pushed to force the unit into bootloader mode such that it is ready for firmware download in case a firmware upgrade failed.

8.20 Language

To change the interface language please select it from the menu list.

The YourDyno Software will restart automatically.



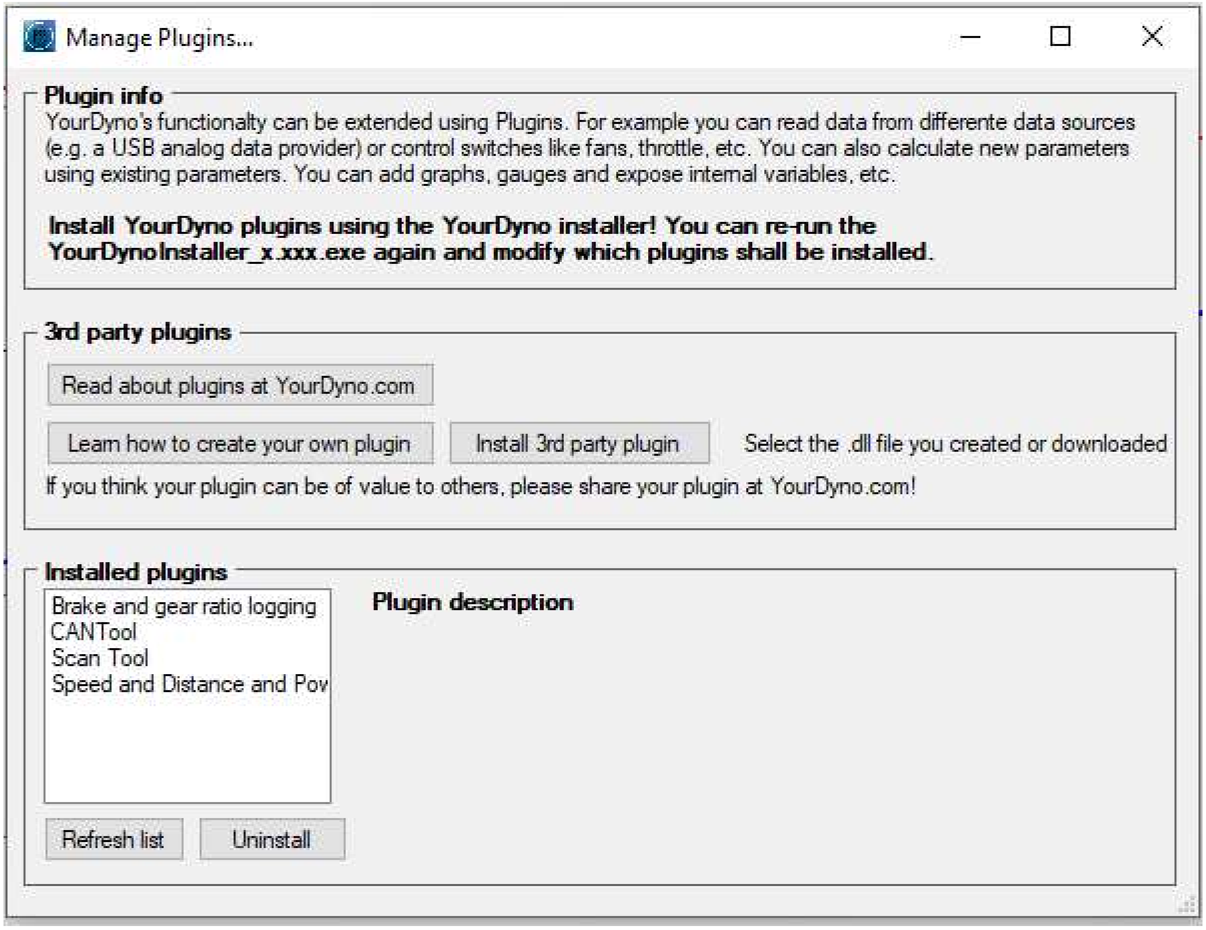
8.21 Restore and Backup options

All settings in the YourDyno software are stored in an internal configuration file. You can “Backup the options to file” and use "Restore options from file" function to load the configuration file.

9 Menu: Plugins

9.1 Mange plugins...

This window allows users to add or delete plugins.



All plugins are complied .dll files and stored in: C:\ProgramData\YourDynoPlugins

9.2 Installing new plugin

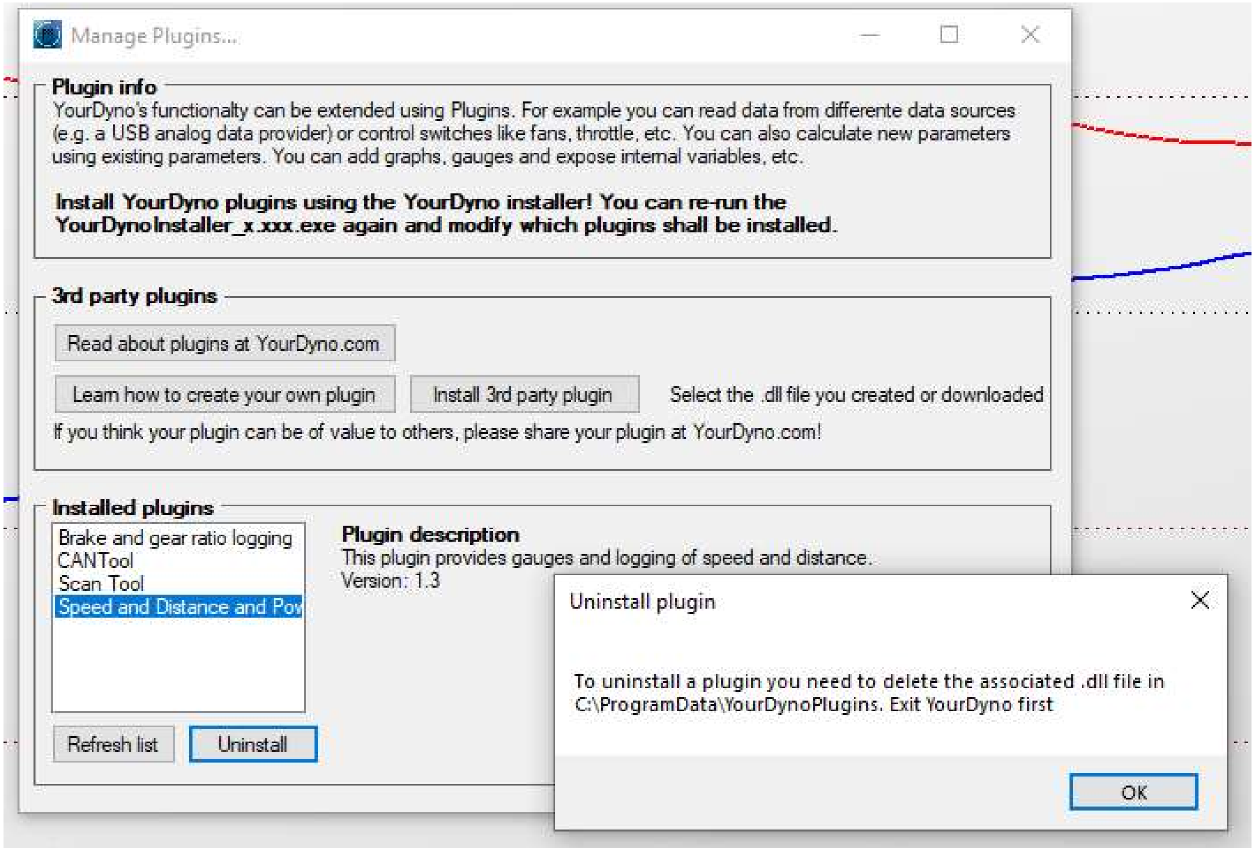
Installing official YourDyno plugins are done during installation of YourDyno. Do not download .dlls and install manually, since they are version dependent.

To install 3rd party plugins please press the "Install plugin…" button in "Install new plugin" section. Then navigate to folder where your .dll file is saved. Select the file to install and press "Open"

Your Plugin is now installed and ready to use.

9.3 Removing plugins

To remove any plugin, the associated .dll file must be manually deleted from the C:\ProgramData\YourDynoPlugins folder. Exit the YourDyno software first:

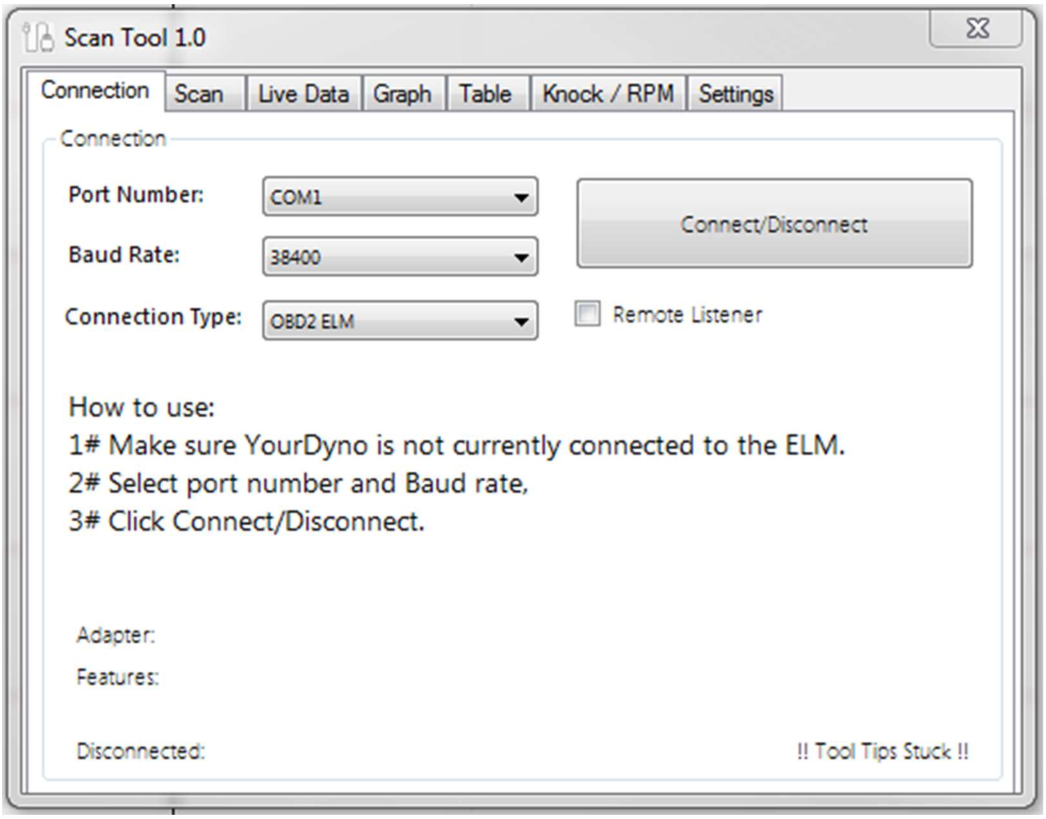


9.4 Scan Tool (OBDII plugin)

To use the Scan Tool plugin make sure that the built-in OBD functionality is deactivated (**see: Menu: Options -> OBD2 setup**)

An ELM327 Bluetooth or USB OBD2 adapter can be used. First install the software if any that accompany the adapter. If the ELM327 adapter is Bluetooth based, then connect to it first. Verify that you can see the adapter in the Device Manager. They appear as COM ports.

Open YourDyno Software and navigate to Plugins -> Scan Tool. In the Connection tab please select which COM Port is in use, select Baud Rate (use 9600) and Connection type (OBD2 ELM) and press Connect. It may take up to one minute to connect to car's OBD interface.



9.4.1 Logging OBD parameters during test run

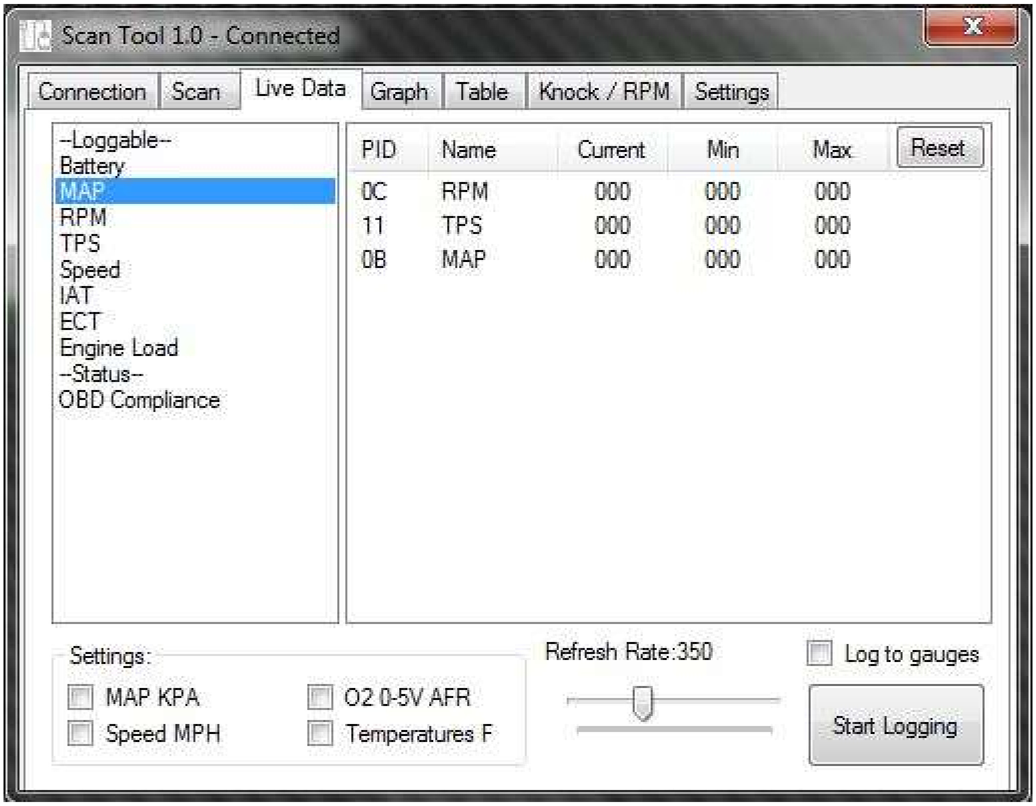
1. Please navigate to "Live Data" tab in Scan Tool Plugin and select which channels you wan't to record (double-click)

2. Activate checkbox "Log to gauges"

3. Press "Start Logging" button. You may now close the Scan Tool plugin window.

4. In Run window you may now add new gauges with respective OBD channels.

Please note that the data logging from OBD-Adapter will work only with YourDyno hardware connected to PC.



9.5 Speed and distance

This plugin is adding new data channels: driving speed and driving distance. This is installed by default.

To use the speed and distance channels setup the roller circumference (i.e. diameter in meters * 3.14).

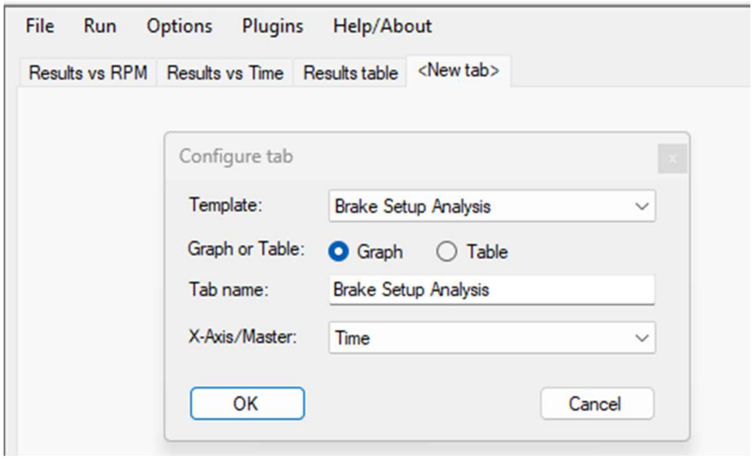
9.6 More plugin information

Information on how to create your own plugins can be found here:
https://yourdyno.com/plugin-system/

10 Data Graph/Table area. Data analysis. Test Run list.

10.1 Graph/Table tabs

Results are presented in graphs and data tables. Different tabs contain a configurable graph view or a table view. Tabs are individually configured and tabs can be added or removed or renamed.



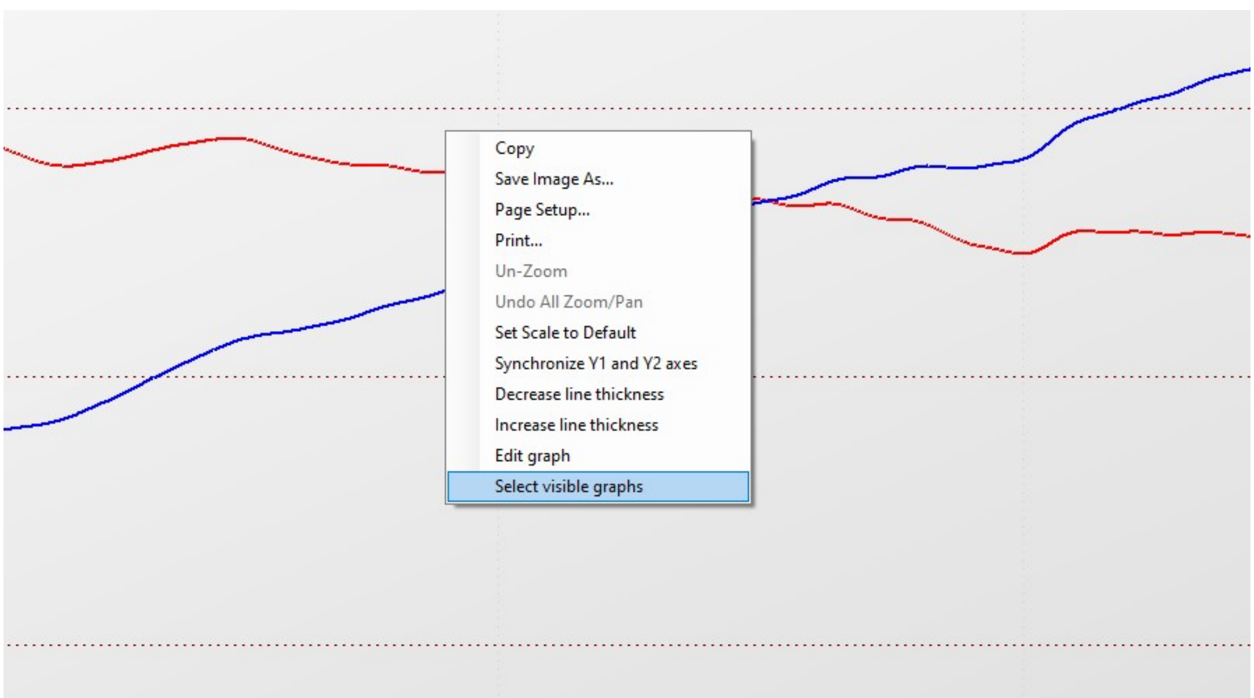
This creates a new tab with a graph view with Time as the X-axis. There are some predefined templates, in this instance Brake Setup Analysis, which will plot relevant channels for analyzing the brake control performance. Other channels can be added and removed as needed.

There is no limit to the number of tabs you can define, and their setups are stored.

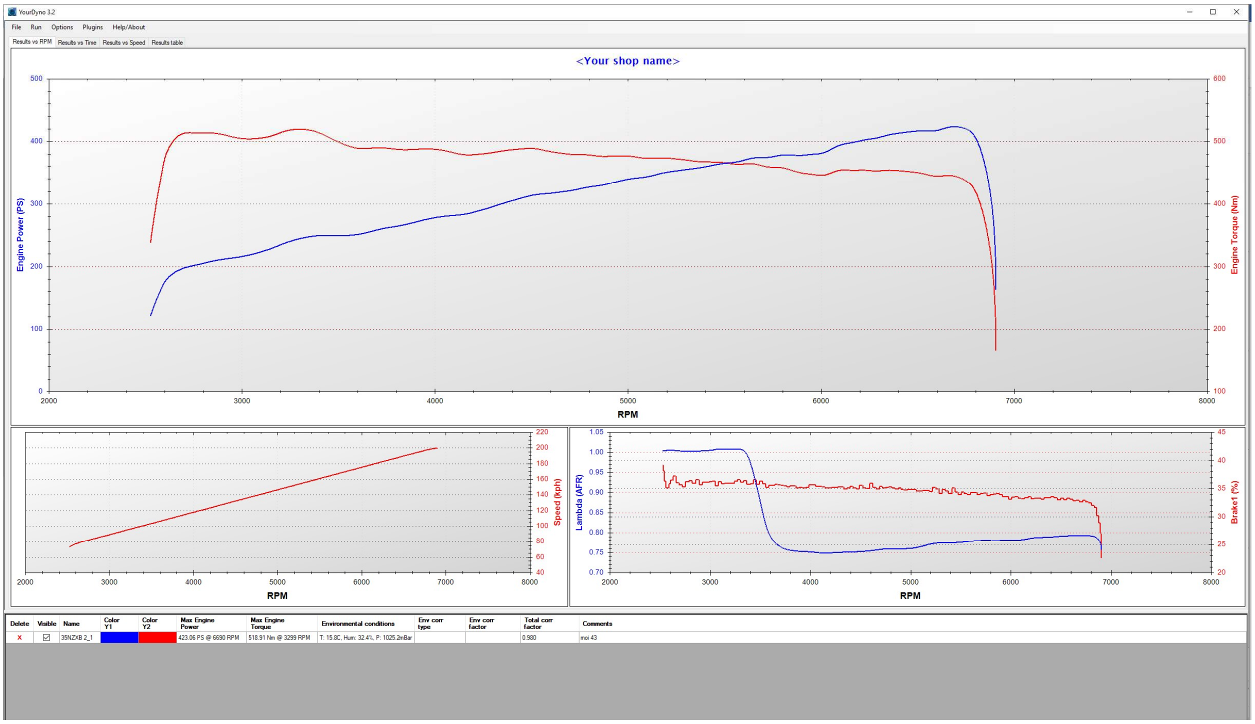
10.2 Graph views

The Graph area can be divided into maximum three sections and channels can be plotted in any graph.

To add and remove channels to the graph areas, press the 'v' button or right-click and select "Select visible graphs". To split the graph area, add new channels into view.:

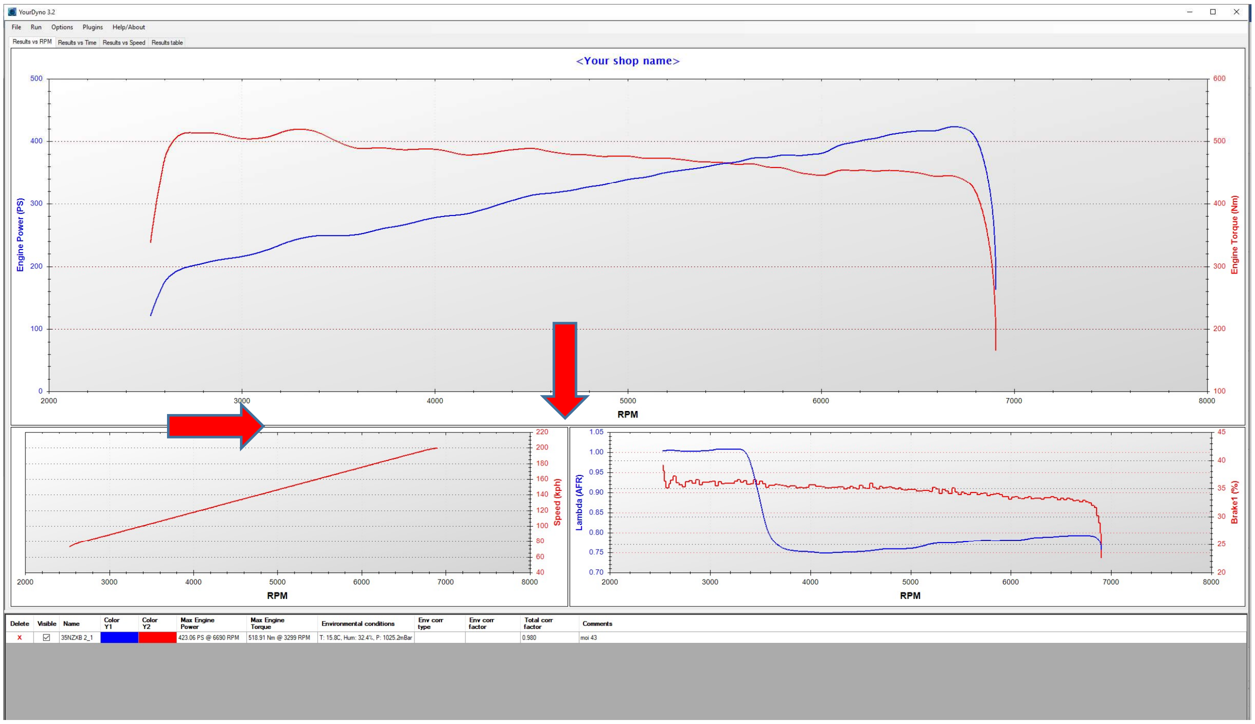


After adding additional channels like Lambda the Graph area is split horizontally:



To relocate the channels between graphs use "Drag-and-Drop" technique. Left mouse button on the label and drag it over to another graph/axis.

You can adjust the size and position of the horizontal and vertical dividers by dragging them with mouse cursor:



10.2.1 Manipulating the graph area. Context menu.

LMB - LEFT mouse button
MMB - MIDDLE mouse button
RMB - RIGHT mouse button

1. **Quick reference guide:**
   1. To move/drag the graph use MMB.
2. Press and hold LMB to drag an Zoom-Area rectangle.
3. Press RMB to open context menu.
4. Use mouse wheel to Zoom In and Out.

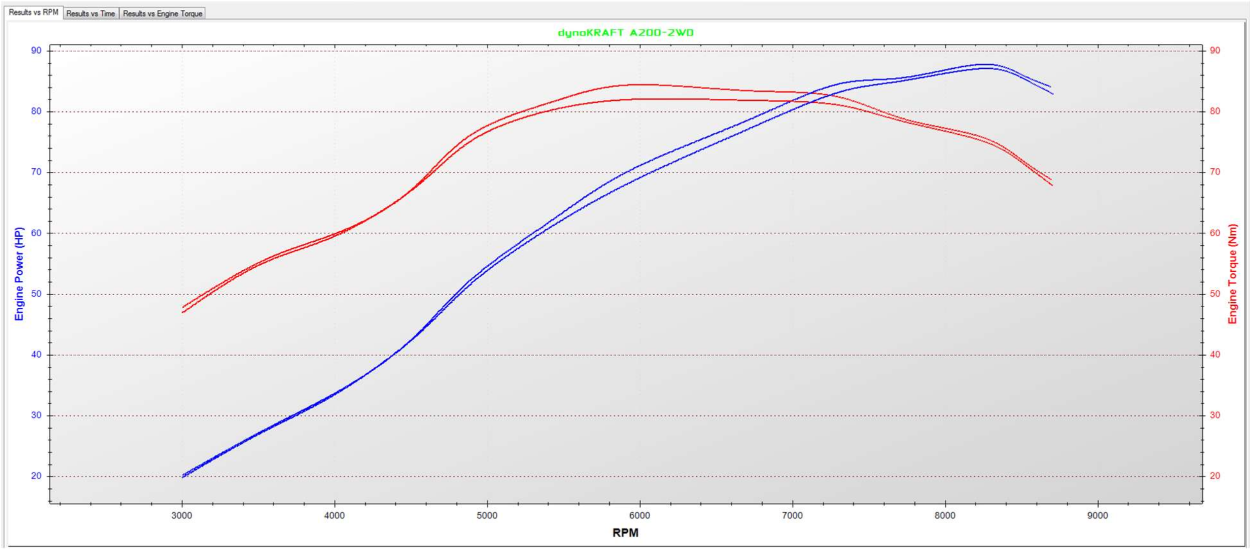
10.2.2 Context menu

Un-Zoom / Undo All Zoom/Pan - use this function to reposition the graph back to normal view.
Set Scale to Default - changes the channel scale back to standard value
Synchronize Y1 and Y2 axes - synchronizes Y-axis for all channels in the selected graph
Increase / Decrease line thickness - use this function to change graph thickness. The changes is applied only in the section where the RMB menu was activated

Edit graph - Use Ctrl key and LMB to select which graph area you want to cut. This change cannot be undone. The software will lineally interpolate the graph if you remove a center portion of it.

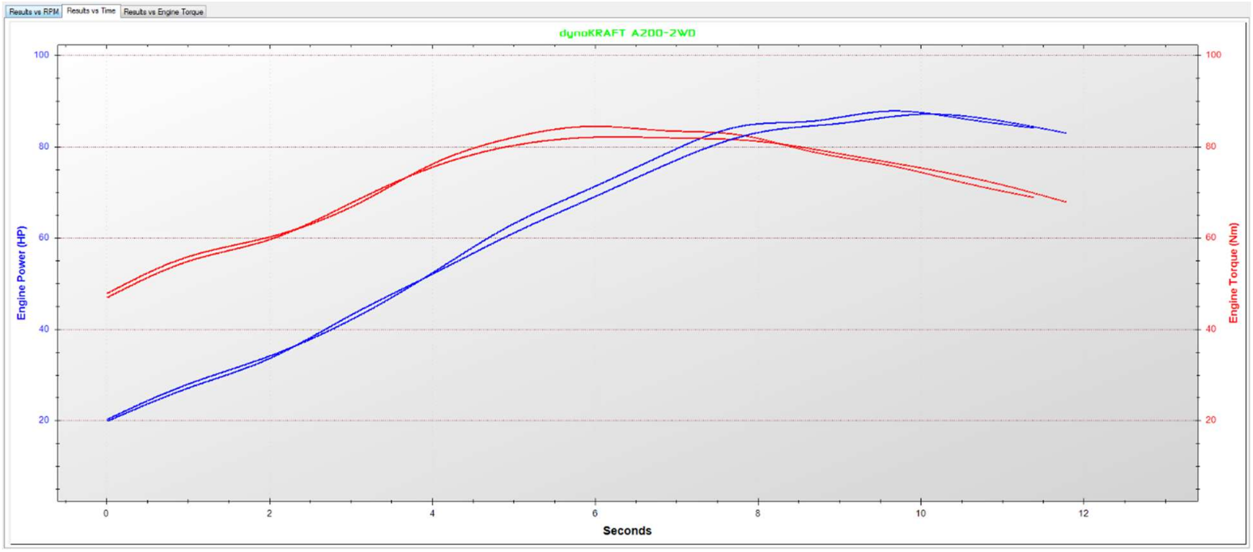
10.2.3 Results vs RPM

This is a default graph view, and most typical use scenario for Power Test runs. In this view all channels are plotted against the Engine RPM channel. Use this view to print dyno sheets for customers.



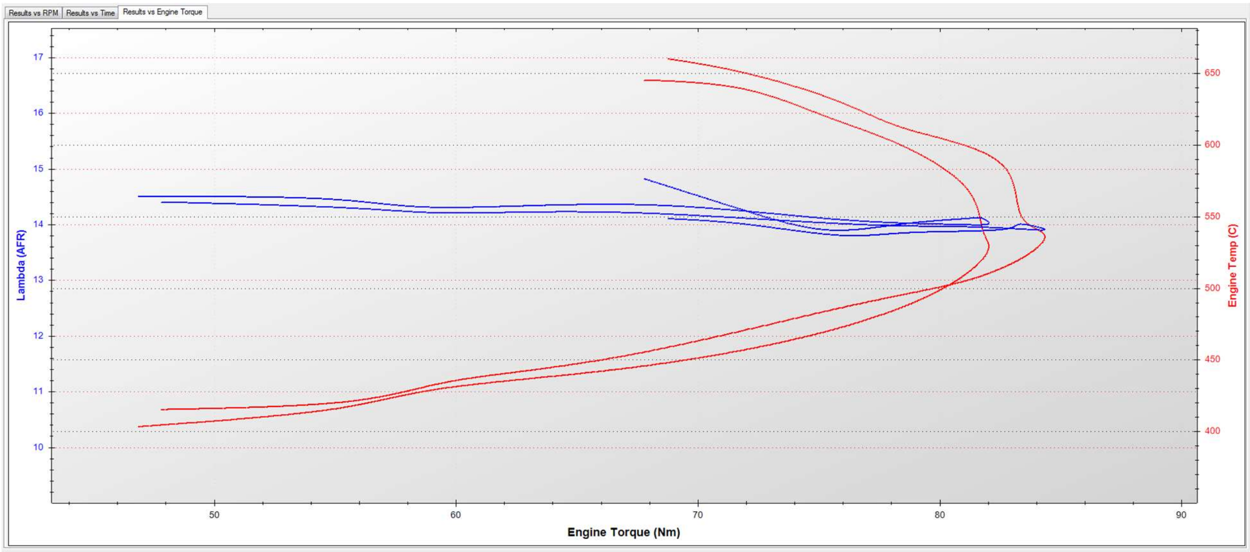
10.2.4 Results vs Time

This is another default view. All channels in every Run are recorded in Time function, and this view shows the data as it was recorded.



10.2.5 Other X-axis

In the <New tab> definition, any axis can be used as the X-axis. All recorded data will be plotted against that selected channel. This view is very useful to find best possible calibration of the tuned engine (for example when using Engine Torque as function, or Torque vs Ignition angle):



10.3 Results table views

Data Tables allow users to analyze the recorded data in a spread-sheet format:

Results vs RPM | Results vs Time | Results table | <New tab>

Master

Engine RPM	Engine Power (HP)	Engine Torque (Nm)	Brake1 (%)	Gear Ratio	Time (s)
3200	71.46	158.4	18.63	2.268	0.299
3400	82.97	174.0	20.93	2.268	0.659
3600	94.55	186.7	19.21	2.268	1.152
3800	101.7	190.6	21.10	2.268	1.521
4000	106.1	188.8	19.47	2.268	1.978
4200	98.34	166.8	16.66	2.268	2.435
4400	91.18	147.5	12.45	2.268	2.900
4600	111.6	171.4	17.62	2.268	3.199
4800	133.2	197.2	25.60	2.268	3.393
5000	164.1	232.7	25.06	2.268	3.929
5200	184.3	252.7	27.96	2.268	4.254
5400	199.4	262.3	28.01	2.268	4.737
5600	211.1	268.9	30.08	2.268	5.080
5800	224.6	275.5	30.04	2.268	5.537
6000	227.0	269.7	32.28	2.268	5.889
6200	236.2	271.1	30.45	2.268	6.372
6400	243.3	270.5	29.38	2.268	6.803
6600	247.6	267.3	29.73	2.268	7.181
6800	251.5	263.3	28.04	2.268	7.620
Average	**220.1**	**265.2**			

Set master: Time
Show only increasing da
Show only decreasing d
Interval: 200
Select visible data
Open in Excel
Copy

Some tips for result tables:

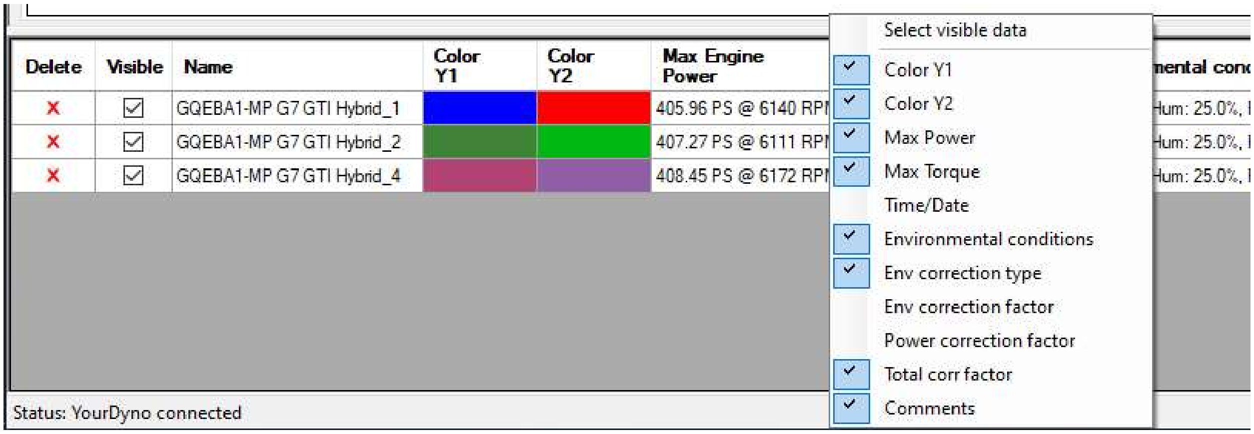
- The context menu (right click) lets you change the master channel, set the interval (a row for every 200 RPM in the example above), Select visible data. You can also copy the data or open it in Excel
- The columns can be sorted by drag/drop
- The highest power and torque figures are shown in green
- You can have multiple tabs with Results tables with different setup and channels

10.4 Test Run List

Below the Graph Area you'll find list of Runs.
You may change the Name and comments by clicking and editing the respective field.

Delete	Visible	Name	Color Y1	Color Y2	Max Engine Power	Max Engine Torque	Environmental conditions	Env corr type	Total corr factor	Comments
x	☑	GQEBA1-MP G7 GTI Hybrid_1			405.96 PS @ 6140 RPM	487.20 Nm @ 5496 RPM	T: 32.5C, Hum: 25.0%, P: 900.0mBar	None	0.000	
x	☑	GQEBA1-MP G7 GTI Hybrid_2			407.27 PS @ 6111 RPM	503.84 Nm @ 5365 RPM	T: 32.5C, Hum: 25.0%, P: 900.0mBar	None	0.000	
x	☑	GQEBA1-MP G7 GTI Hybrid_4			408.45 PS @ 6172 RPM	504.39 Nm @ 5298 RPM	T: 32.5C, Hum: 25.0%, P: 900.0mBar	None	0.000	

Different columns shown/hidden by right-clicking:



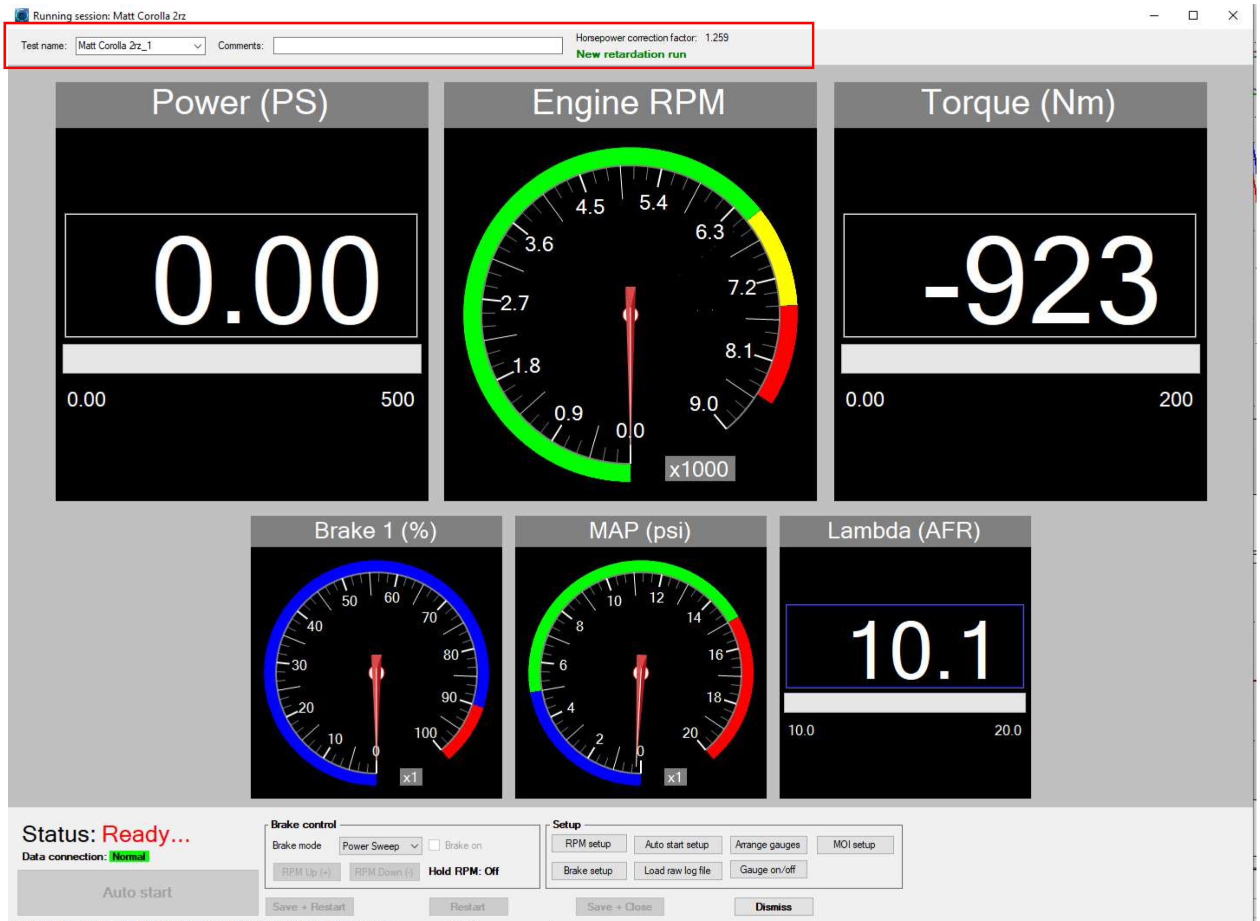
Rows can be sorted by clicking on the header.

11 Run window

11.1 Overview

The Run window consist - like main window - of three main areas:

1. Test name and comments section



Use these fields to set Name for the Run and add Comments if necessary.

On the right side of the Comments field current you will also see the current "Horsepower correction factor" and type of Session (either with or without Friction Losses / Retardation data measurement)

2. Gauges

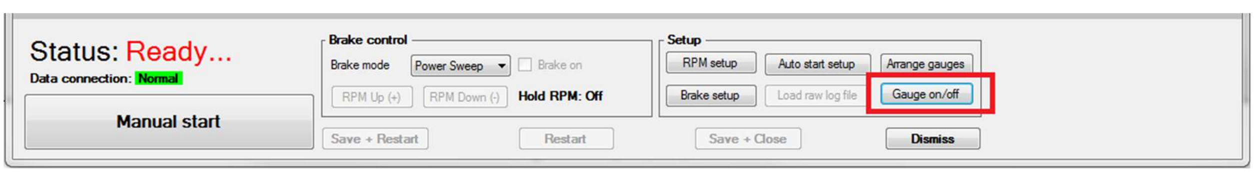

Running session: Matt Corolla 2rz
Test name: Matt Corolla 2rz_1
Comments:
Horsepower correction factor: 1.259
New retardation run
Power (PS)
0.00
0.00
500
Engine RPM
x1000
Torque (Nm)
-923
0.00
200
Brake 1 (%)
MAP (psi)
Lambda (AFR)
10.1
10.0
20.0
Status: Ready...
Data connection: Normal
Auto start
Brake control
Brake mode
Power Sweep
Brake on
RPM Up (+)
RPM Down (-)
Hold RPM: Off
Setup
RPM setup
Auto start setup
Arrange gauges
MOI setup
Brake setup
Load raw log file
Gauge on/off
Save + Restart
Restart
Save + Close
Dismiss

3. Controls:

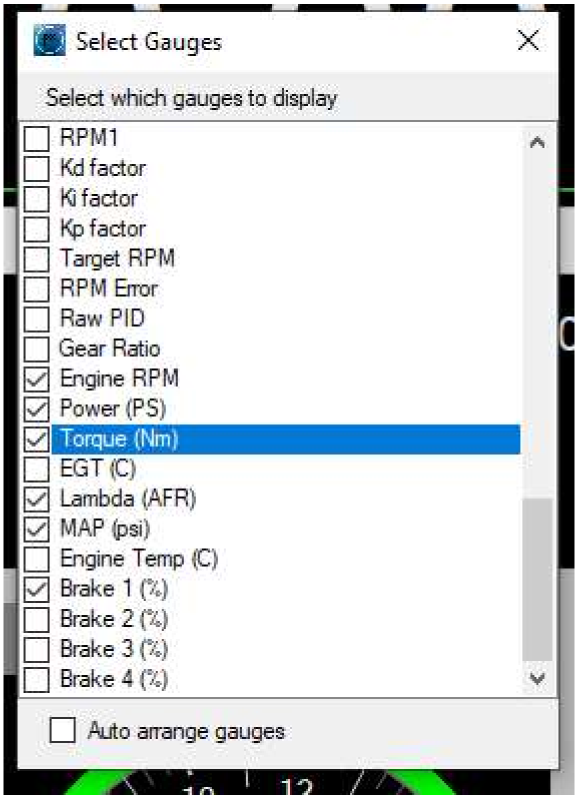
11.2 Configuring Gauges

11.2.1 Adding new gauges

The gauges can be arranged to suit any style of work.
You can add any recorded channel as gauge by pressing the "V" key on Keyboard or "Gauge on/off" button in the Controls area:



A new window will pop-up with list of available channel. Gauges can be auto arranged or manually arranged, defined by using the "Auto arrange gauges" checkbox.



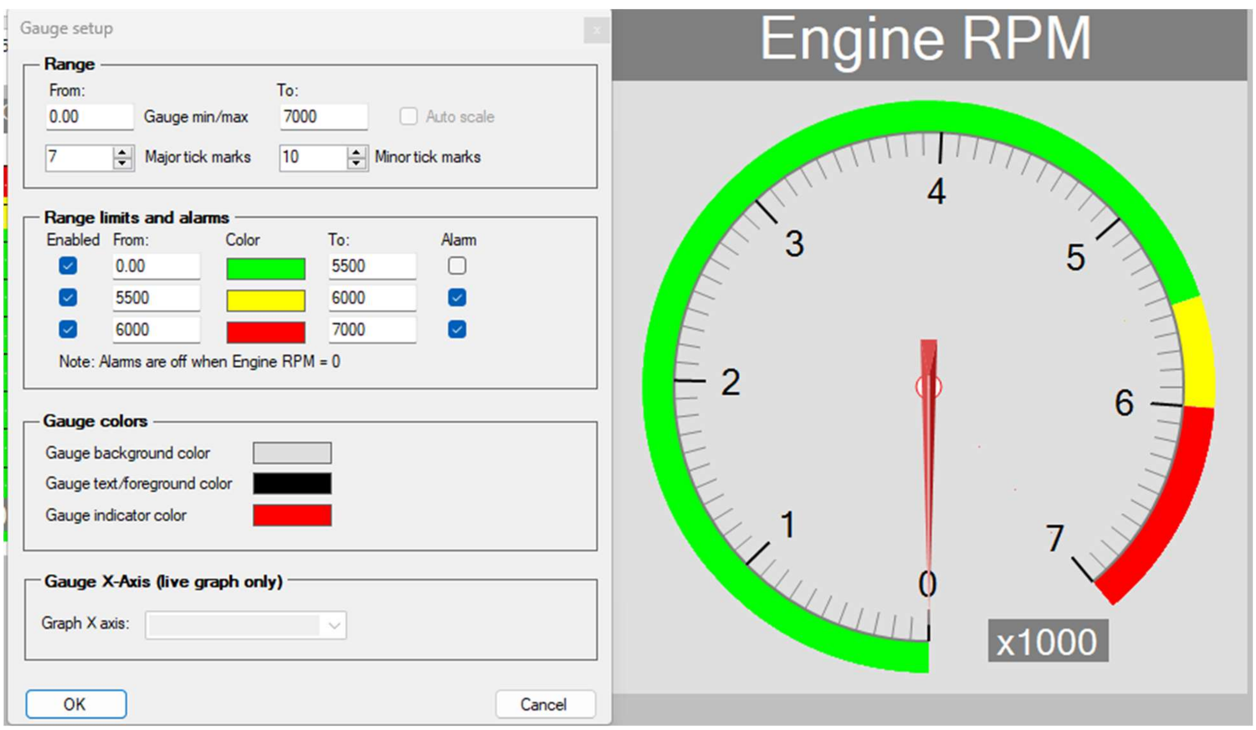
11.2.2 Types of gauges

Analog, Digital, Bar and Graph gauges are supported. Gauges can be configured with different colors, alarms, tick marks and ranges.

11.2.2.1 Analog

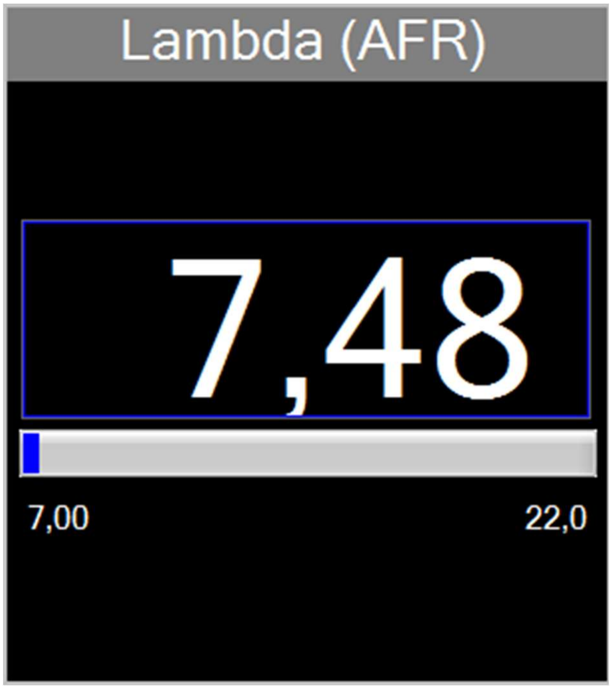
This is a typical "tacho" style gauge with definable Green, Yellow and Red area.

Use the "Gauge setup" function in context menu to setup the gauge:



11.2.2.2 Digital

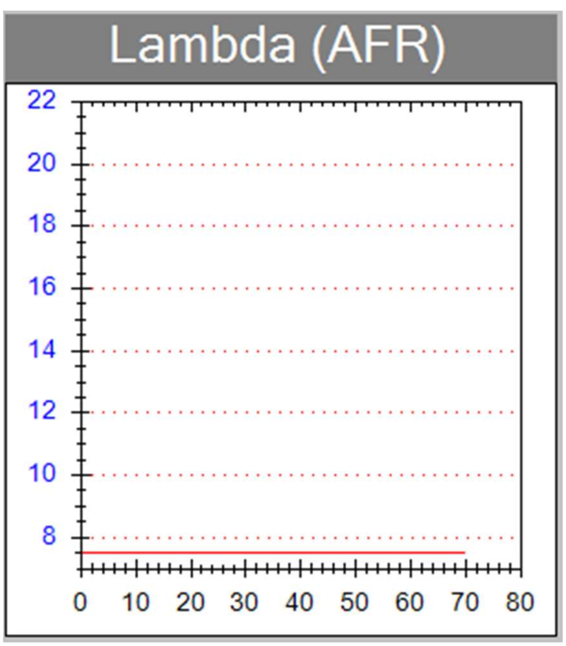
This is a standard "number" style gauge with a horizontal bar below the value showing the range of the gauge.



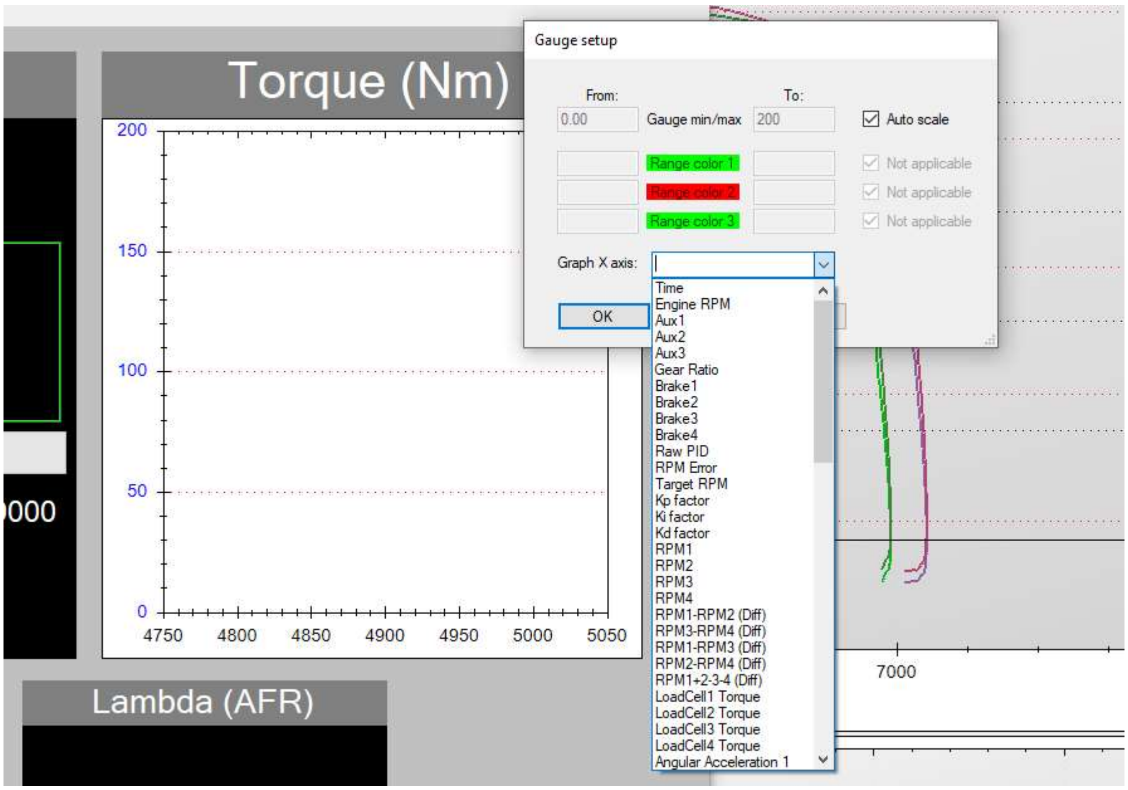
The colors and other parameters for the horizontal bar are defined with the "Gauge setup" function as well.

11.2.2.3 Live graph

This type of gauge is a live-time graph with automatically adjusted X-axis. They are also setup by right click and “Gauge setup”.

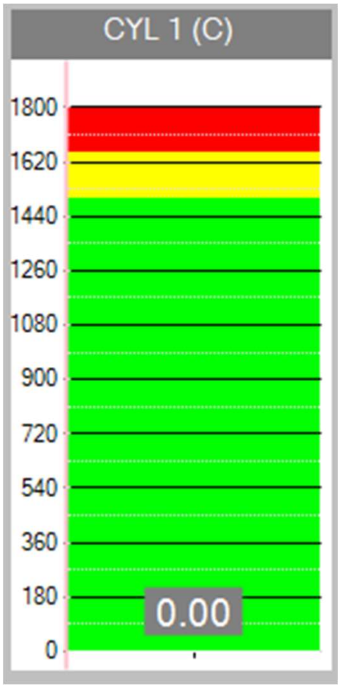


Graph type gauges can use any channel as X-axis. This can be especially useful in steady state tuning, where you can get an instant Torque vs Lambda view or Torque vs Ignition angle view for example (assuming of course you have an Ignition angle channel from for example a CAN bus channel).



11.2.2.4 Bar gauge

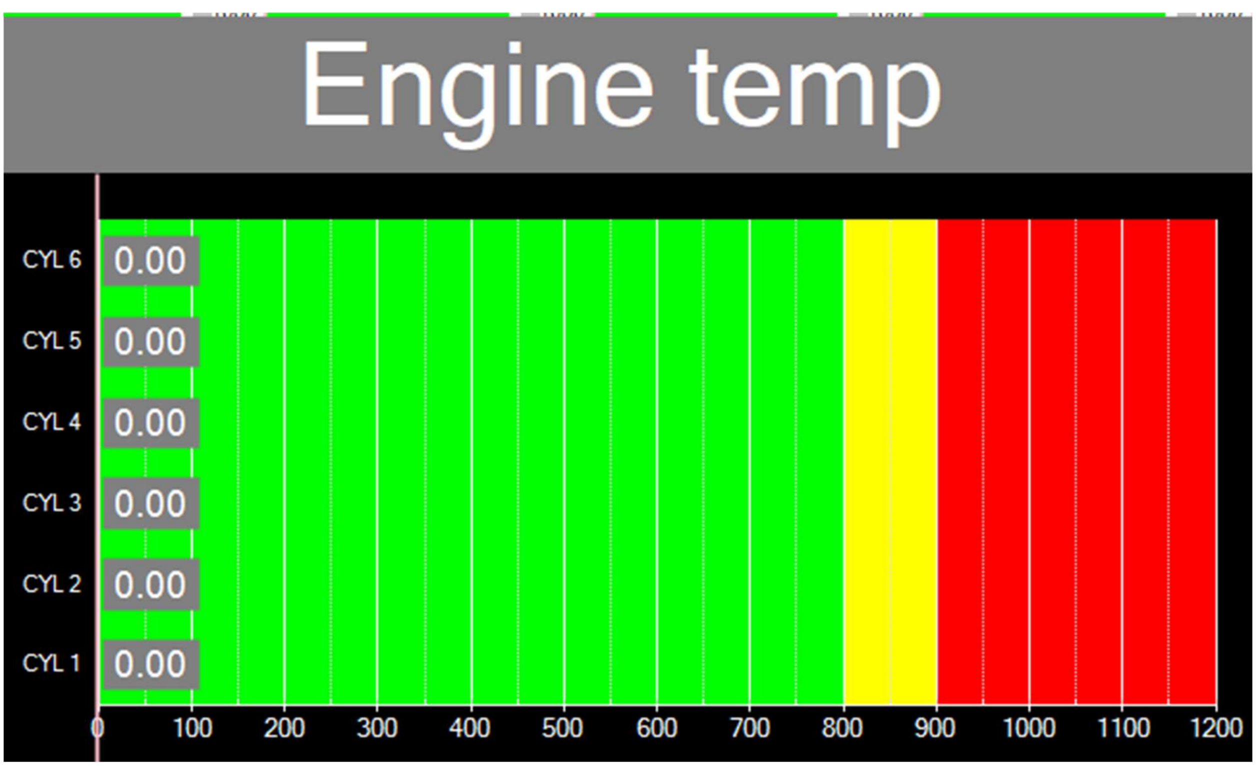
Bar gauges uses a horizontal or vertical bar to indicate the value.



Ranges, colors, indicators, alarms etc are set as for other gauges.

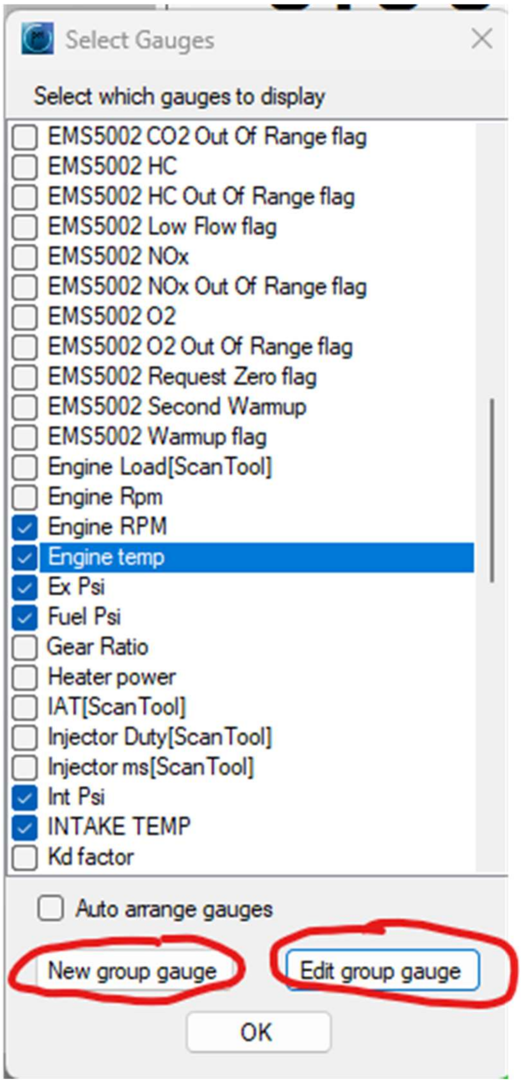
11.2.2.5 Group gauges

Gauges can be grouped. This is useful if you have for example 8 thermocouples or 2 brakes or other channels that shall be compared during the run.



The example shows 6 temperatures sensors in one group gauge.

To create/edit a group gauge click Create group gauge or Edit group gauge in the window where you select channels ('v' button or Gauge on/off button).

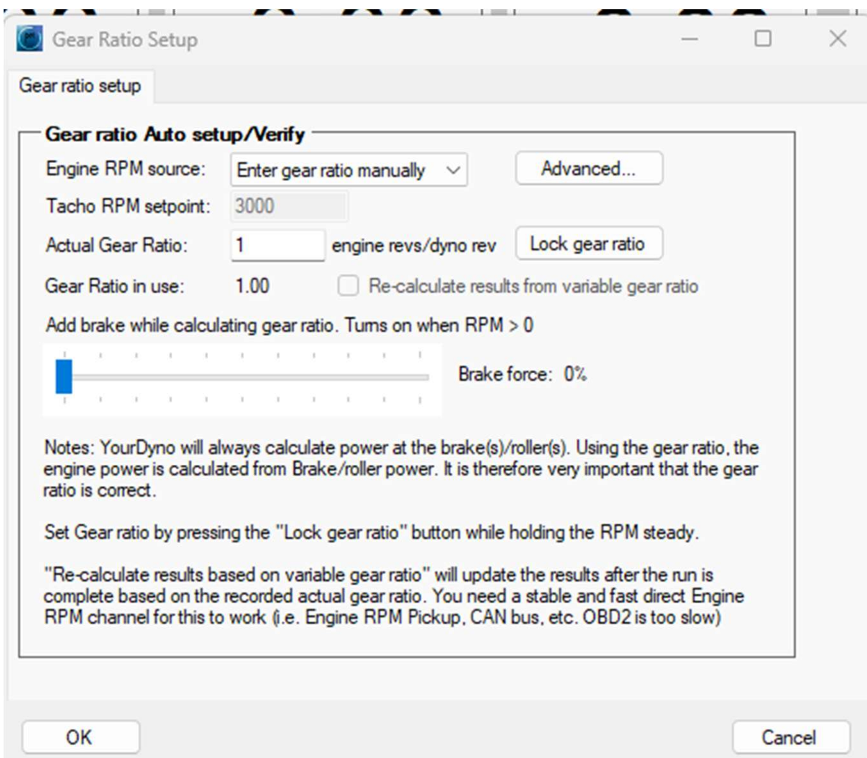


Group gauges are turned on and off and configured as other gauges.

11.2.3 Example on one of possible gauges setup

11.3 Gear ratio setup

When the gear ratio is known, select Set gear ratio manually and enter it in the text box. For engine dyno directly connected to the brake, the gear ratio is 1.

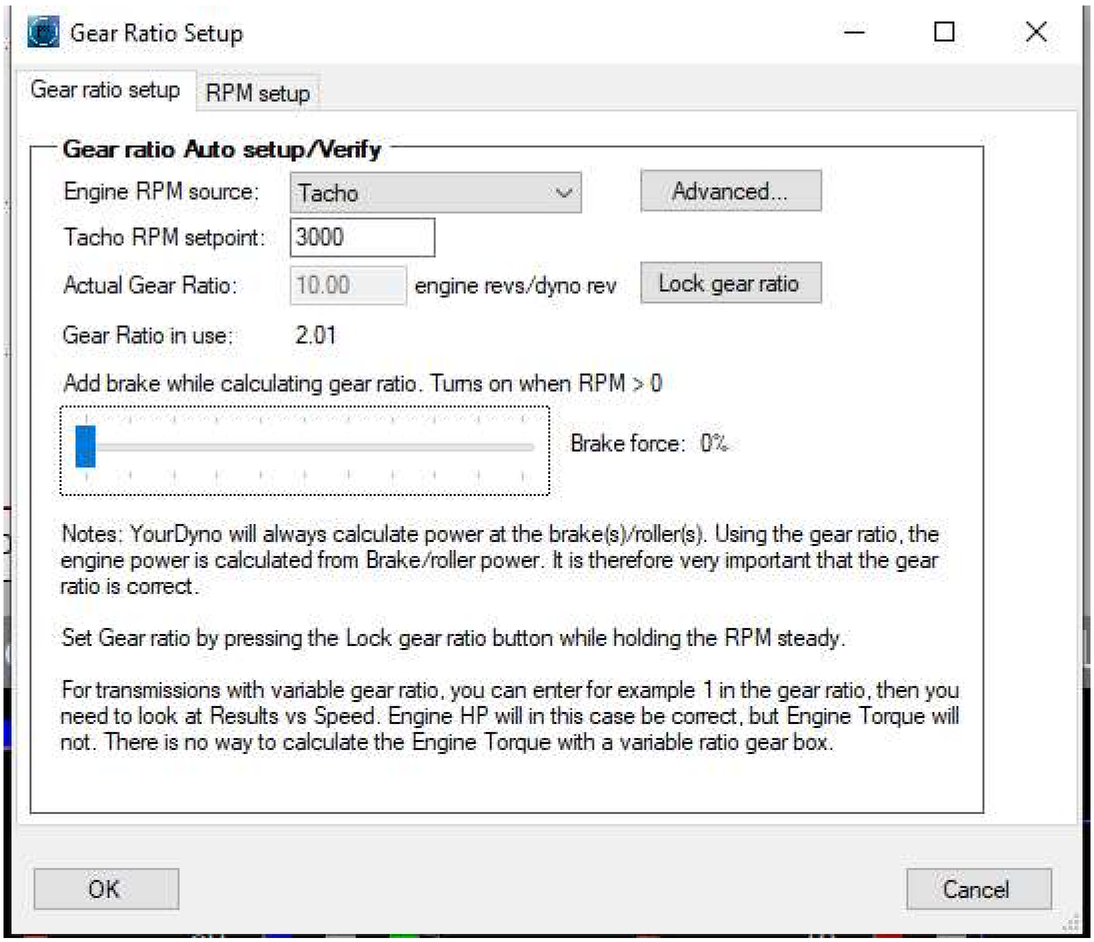


If the gear ratio is not known, it can be measured in a variety of ways.

The Engine RPM calculation in YourDyno system is based on the RPM signal from the brake/roller RPM sensor(s). There are many reasons why the actual Engine RPM (for example from OBD2 interface) cannot be used to correctly control the dynamometer. Mainly they are too slow. Since all roller dynamometers measure torque at wheels, it is important that the Gear ratio is correctly set. Otherwise, the Engine Torque reading will not be correct.

11.3.1.1 Tacho

This is the fastest but also least accurate way of determining the Gear ratio.



1. Select Tacho RPM setpoint. It is recommended to use middle of the Tachometer range somewhere that is easy to keep the engine revving at constant revs.
2. Enter the vehicle and accelerate the car to reach the set RPM
3. Make sure you are on the gear you wish to use later for the test Run. Usually, it's 4th or 5th gear
4. Try to hold the engine RPM at setpoint RPM value as precise as possible

5. When the RPM reading at vehicle tachometer is stabilized at setpoint value press "Lock gear ratio" button.

The YourDyno Software now "knows" what is the total Gear ratio between engine and rollers.

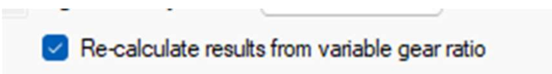
Please note that whenever you'll change gear the Gear ratio will be off and you need to repeat the procedure.

11.3.1.2 Using other channels as the direct Engine RPM source

Other channels, for example the Engine RPM Pickup channel (requires an inductive pickup over a coil wire) can be used as the direct engine RPM source. In this case, choose the correct channel, hold the RPM steady and click Lock gear ratio. Any RPM can be held, as long as it is stable.

11.3.1.3 Variable gear ratio

In case the gear ratio changes during the run, due to an auto gearbox or similar, the Re-calculate results from variable gear ratio option can be used.

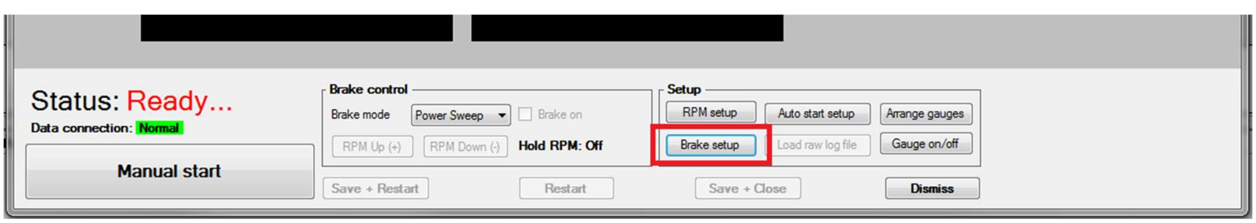


This requires a direct engine RPM measurement. It will recalculate the results after the run is complete, to produce Results vs Engine RPM

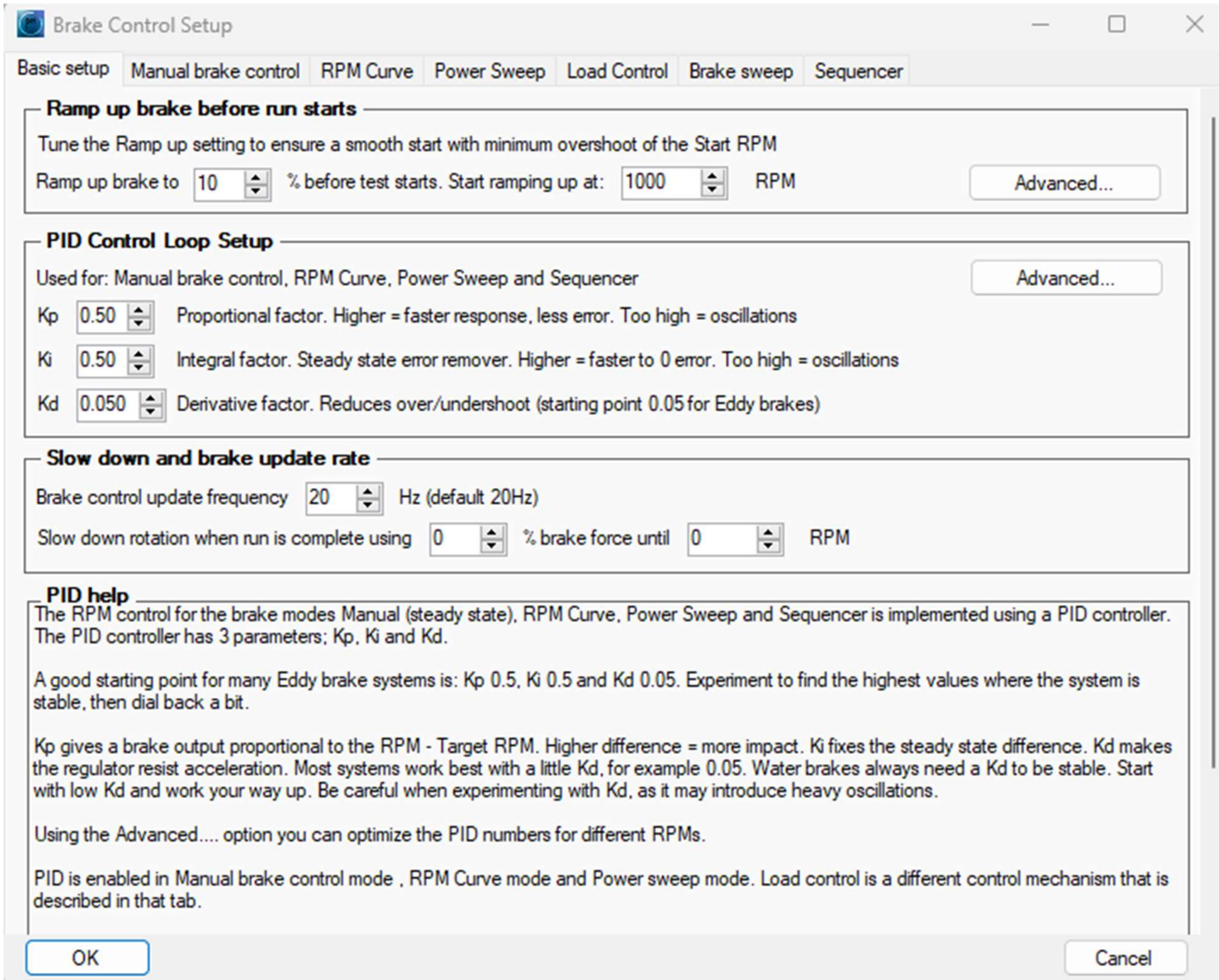
11.4 Brake Control Setup. PID settings

YourDyno supports a number of different brake control modes, suitable for almost any scenario and setup.

In this section you can setup the properties for the different Brake Control / Test Modes. To open the Brake Control Setup please the "Brake setup" button in Run window:



11.4.1 Basic setup



11.4.1.1 Ramp up brake

Use “Ramp up brake” to ensure the engine is nicely loaded by the time it reaches the start RPM. Too low “Ramp up brake” and the RPM will overshoot the start RPM and the regulator will bring it down over some seconds. Too low “Ramp up brake” and the RPM will not reach the start RPM because of too much brake. Experiment a bit to get this roughly right for a smooth start.

Typically we want the brake to start ramping up much earlier than the start RPM so the brake has time to build up brake force. 1000 RPM is used in the example above.

Move advanced ramp up curves can be defined using the Advanced button.

11.4.1.2 Slow down after run

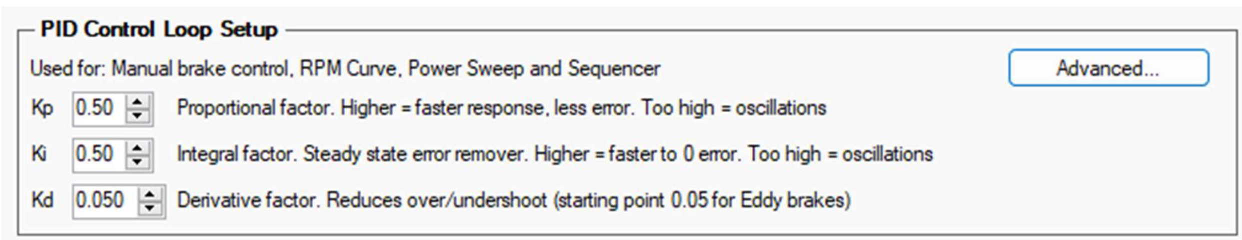
Use this option to turn on the brake after the run is complete to quickly stop the rotation.

11.5 PID Control loop setup

Several brake modes use a PID controller to regulate the brake force:

- Manual RPM control
- RPM Curve
- Power sweep
- Sequencer

A PID controller is a common regulator which uses 3 parameters; Kp, Ki and Kd. It is recommended to read up on them on google/youtube to get some familiarity with the parameters.



Kp = 0.5, Ki = 0.5, Kd = 0.05 is a good starting point for many setups.

11.6 Brake Modes

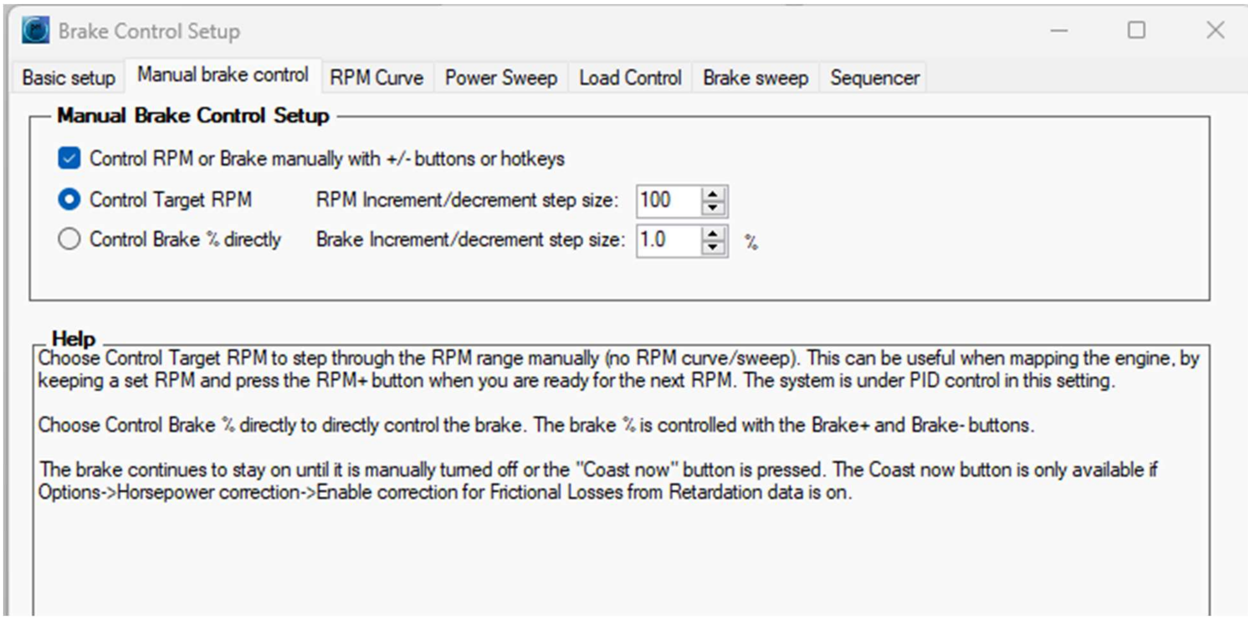
11.6.1 Manual brake control

Two types of Manual brake control exist; Control Target RPM and Control brake directly.

In the "Control Target RPM" mode the YourDyno Software will hold the set target engine RPM regardless of engine load (throttle opening). Adjust the RPM increment / decrements step using the corresponding field.

How well the YourDyno controller will hold the target RPM depends on the PID settings used. Adjust the PID parameters if needed.

In the Control Brake % directly mode, the brake is fully manually controlled with the mouse or hotkeys.



11.6.2 RPM Curve

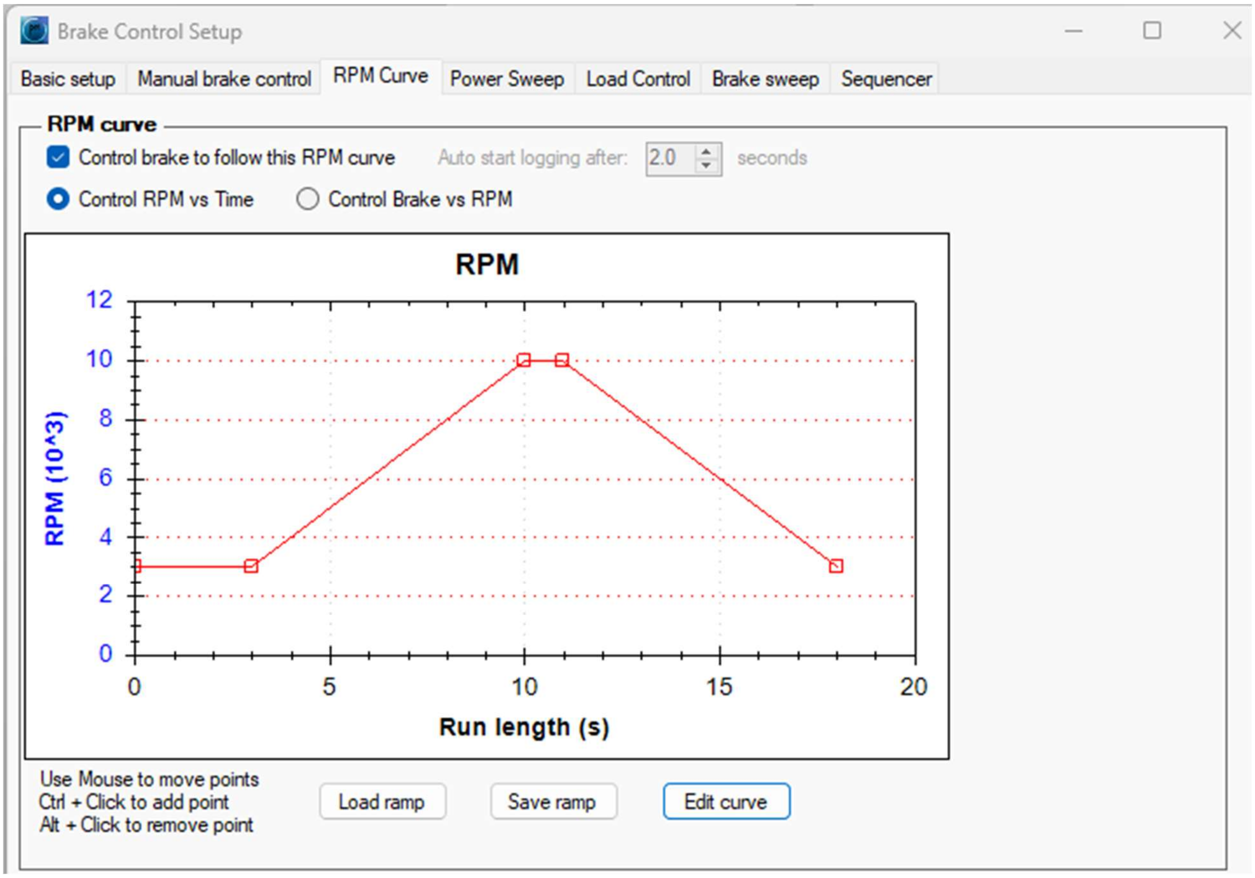
Two types of RPM curves exist: Control RPM vs Time and Control Brake vs RPM.

11.6.2.1 Control RPM vs Time

In the Control RPM vs Time mode the YourDyno Software follows predefined Engine RPM target curve.

You may add multiple RPM targets to create a test profile.

Use mouse cursor to drag the RPM target points on the diagram.



Press "Edit ramp" button to open an RPM setpoint table and edit it manually.

Use "Load ramp" and "Save ramp" buttons to save and load RPM setpoint profiles from your hard drive.

11.6.2.2 Control Brake vs RPM

In this mode the brake is directly controlled by the RPM. This mode works best for dynos with high inertia, and can be particular useful when testing cars with an abrupt torque curve. The Brake force is simply defined by the RPM of the car, so the torque rise can be anticipated.

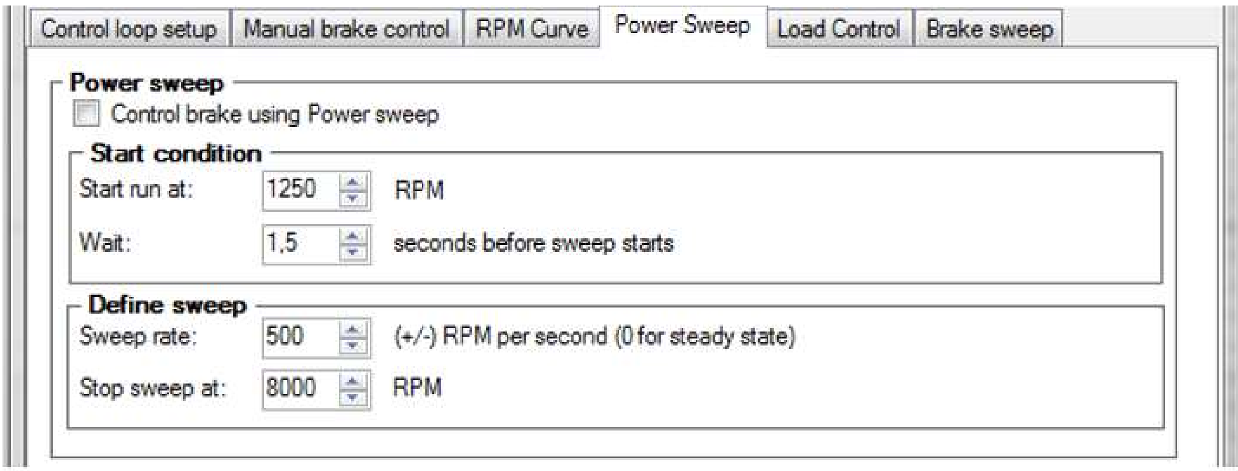
11.6.3 Power Sweep

The Power Sweep Test Mode is the typical acceleration test performed to measure the Engine Power and Torque and draw the known "normal" dyno graph. In this Test Mode the acceleration rate (Sweep rate) defines how fast the Engine RPM will increase.

In the "Start condition" section you can define the starting Engine RPM and wait time (preload time). The preload time is used to allow build-up of induction pressure in engines equipped with forced induction (super-charged / turbo-charged engines)

In the "Define sweep" section select the desired Sweep rate in RPM per second and Stop RPM.

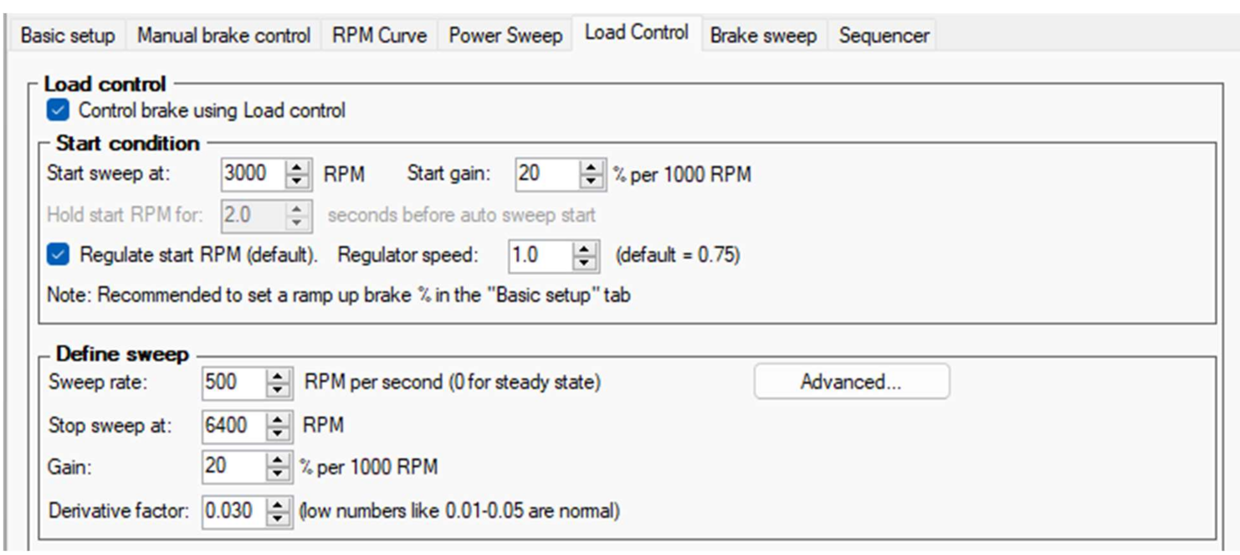
Set the "Stop sweep at" RPM approximately 250-500 RPM below the vehicles RPM-limiter.



11.6.4 Load Control

This advanced Test Mode is especially useful with Water Brakes or when the tested engine has a very fast torque increase which can cause oscillations when using standard PID regulator.

The regulator basically lets the engine accelerate in a more natural way. This means the regulator lets it accelerate faster where it is strong and slower where it is weak. A PID regulator on the other hand always tries to make the RPM follow the set target RPM exactly, which more easily causes oscillations.



The main parameters here are Gain and Derivative factor.

The Gain is basically how aggressive the regulator is. Higher number means a more straight line acceleration (but also higher chance of oscillations). Derivative factor can be thought of as a Acceleration factor. It will give more brake if the RPM suddenly accelerates.

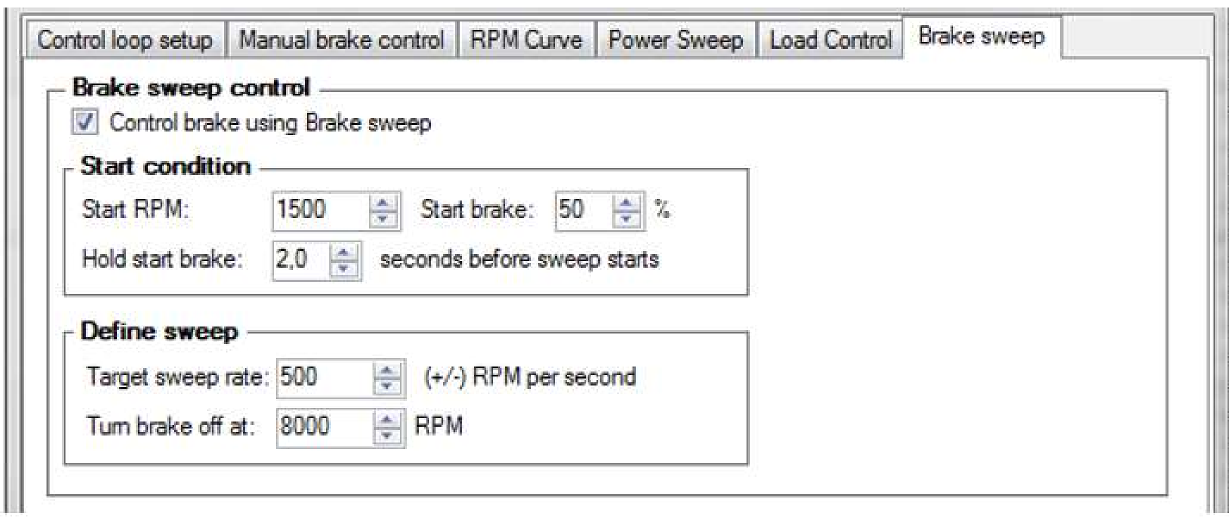
A good starting point is Gain 15 and Derivative factor 0.03.

Under "Advanced" button you can change the "Gain factor" and "Sweep rate factor" over the RPM range if needed.

11.6.5 Brake sweep

This test mode was designed especially for hydraulic brakes. In this Test Mode the brake output is gradually increased or decreased without the use of PID control. This means that the target sweep rate and actual engine RPM may vary as the Brake Sweep mode will not try to stabilize the engine RPM - instead it will only gradually increase brake output from the "Start brake" value.

The benefit of this Test Mode is that because no PID control is in use the system will not generate any oscillations.



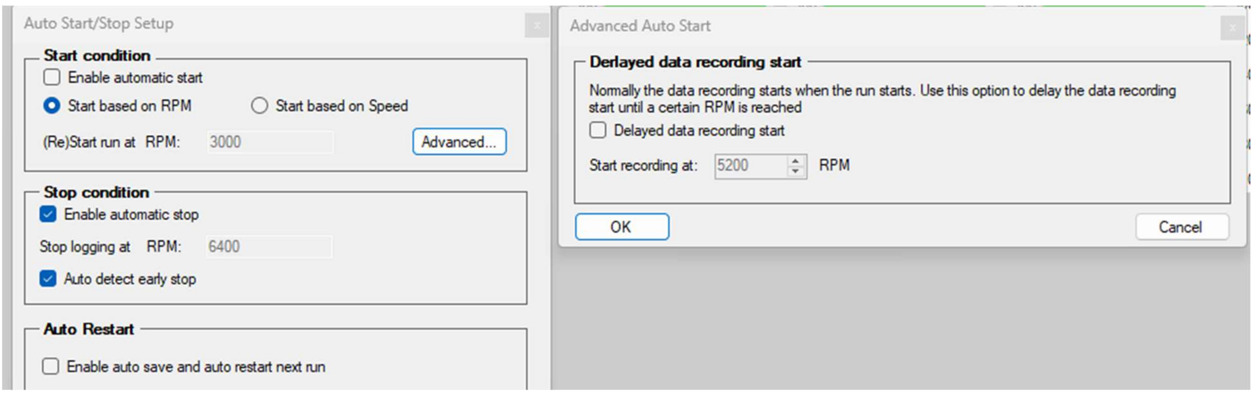
Note that most hydraulic dynos work best from high to low RPM. To enable this, set the Target sweep rate to a negative number, for example -500 RPM per second.

11.7 Auto start stop

11.7.1 Automatic recording of test Run

This function allows automatic recording of test Run. Use the corresponding tab in "Brake setup" window to adjust the "(Re)Start run at RPM:" value.

When Retardation data (Friction losses) measurement is ON the recording of the test Run will stop only after the engine RPM has dropped back to Starting RPM value.



Auto detect early stop will stop data recording even if the end RPM was not reached by looking at the torque, which drops when the throttle is closed.

11.8 Brake control update frequency

The brake can be controlled (adjusted). Normally 20 times per second is recommended.

11.9 MOI wizard

The automatic MOI (moment of inertia) wizard can be used to determine the complete system inertia (dynamometer + vehicle).

The MOI setting is base for all result evaluation thus it is recommended for all users to perform the automatic MOI test for all vehicles prior to actual power test. This test is performed using two coast-down phases: first un-braked and second braked. From the difference in de-acceleration of the vehicle between these two tests the software will calculate the system MOI.

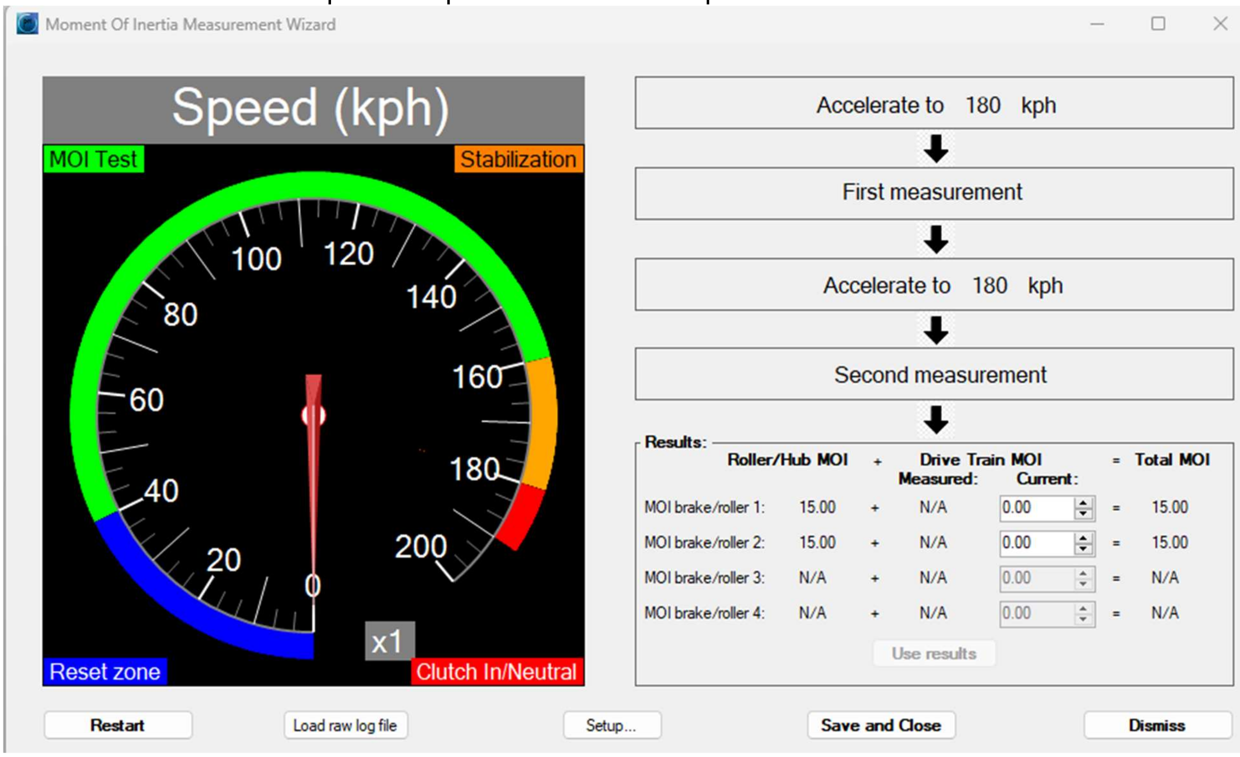
Please note that this calculated MOI takes following losses into account:

- Friction losses in drive-train
- Friction losses between roller and tire
- Friction losses in dynamometer

As with any other roller-dynamometer there are still some losses which cannot be measured during such procedure (for example hysteresis of elastic components and power losses in drivetrain).

11.9.1 Automatic MOI test procedure

1. In the Run window please open the "MOI setup" wizard.

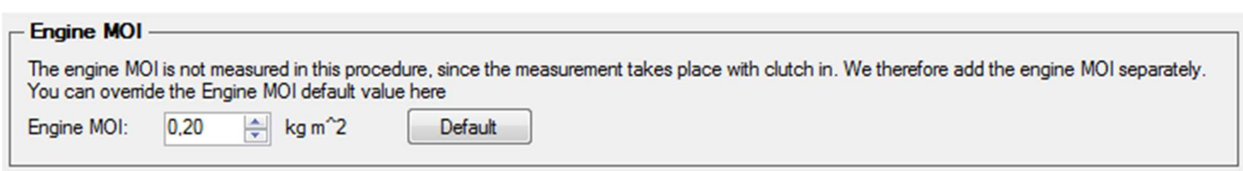


2. Click Setup and ensure the max speed can be safely reached
3. Accelerate to perform two test runs. It is not necessary to perform these tests under WOT conditions
4. At the end of second test the wizard will show you determined MOI value. You can now decide if you want to use this value for actual power measurements.

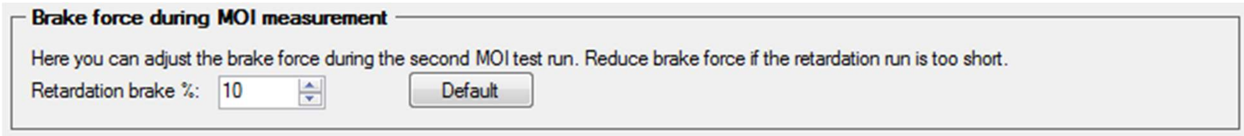
11.9.1.1 MOI wizard settings

Since the automatic MOI test takes place during coast down phase (clutch pressed or automatic gearbox in N) you can use the Advanced Settings to include Engine Inertia in the calculation.

If you are not sure what value to use, please leave the default setting.



Set the Retardation brake % such that the second run is significantly slower than the first, but not so slow that there is very little date. At least ~5 seconds of retardation data is needed. Some experimentation is needed here.

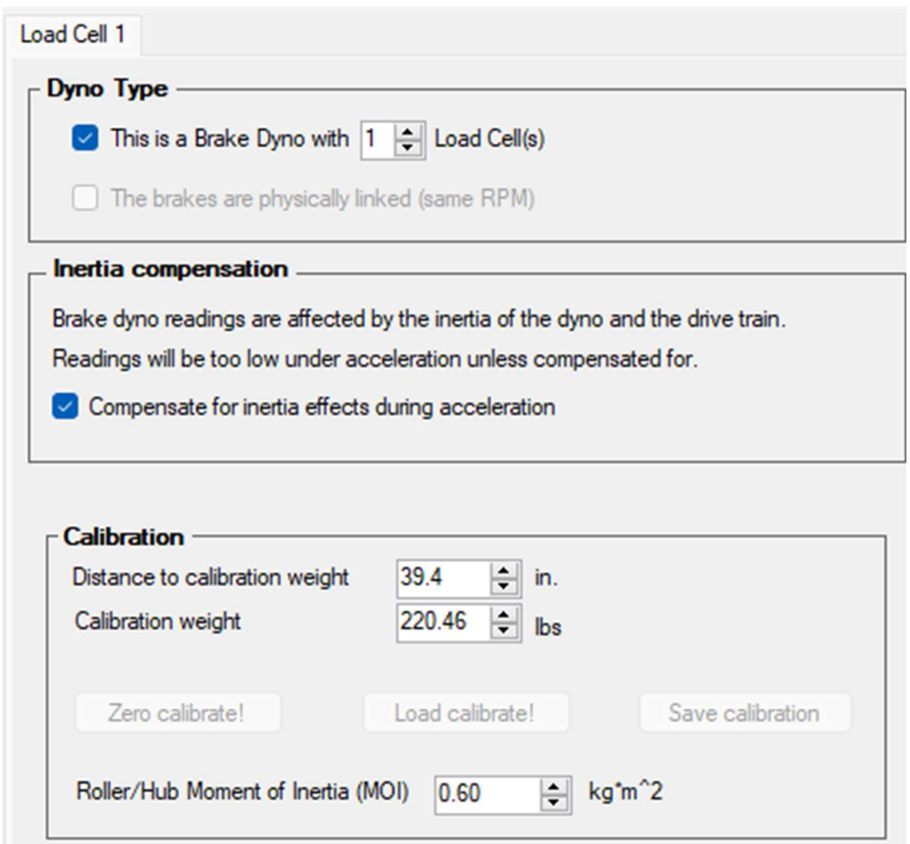


12 Setup examples

12.1 Water brake example

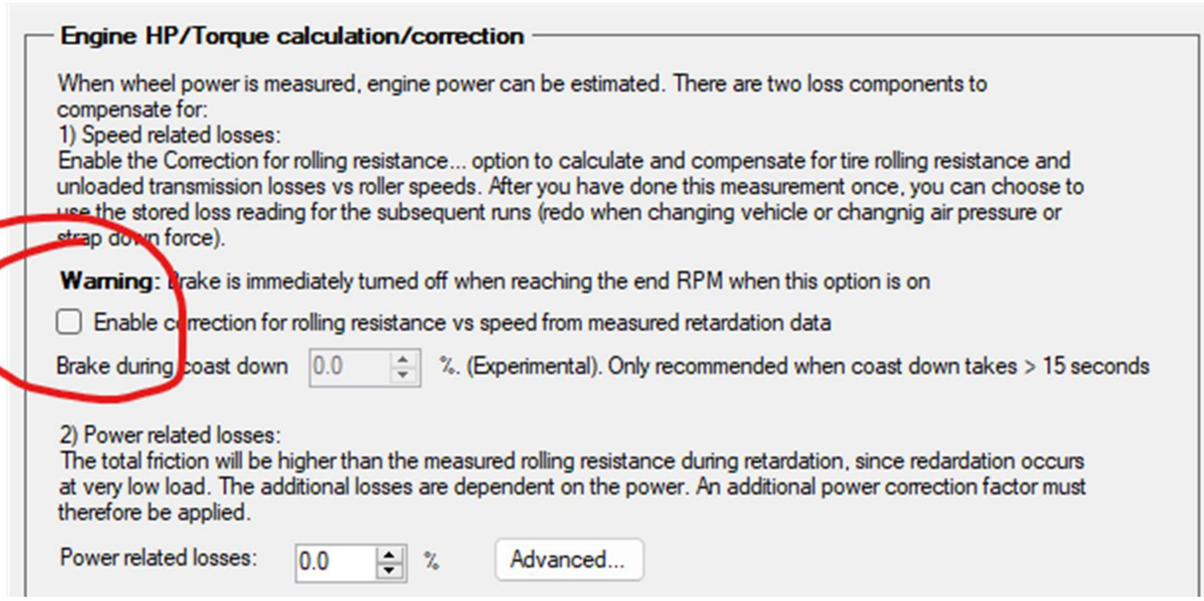
12.1.1 Load cell

Configure 1 load cell, turn on inertia effects and set MOI depending on the engine + water brake (around 0.6 for a V8 for example).



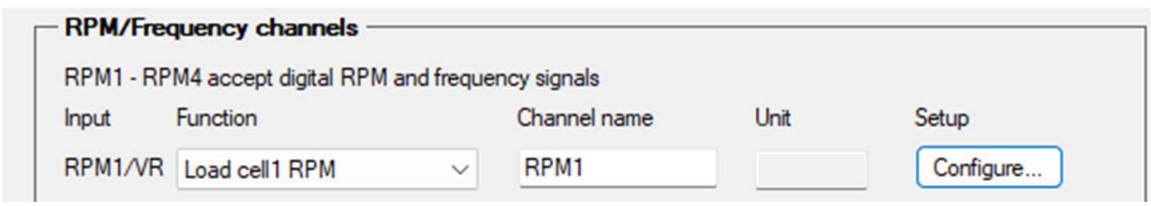
12.1.2 Do NOT turn on retardation data measurement

Retardation data measurement turns off the brake when hitting the end RPM, which is NOT wanted for engine dynos. So make sure this option is off.



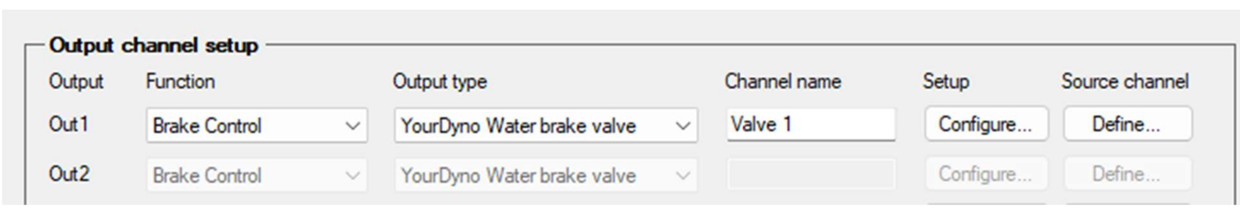
12.1.3 RPM

Use RPM1 and configure it like this:



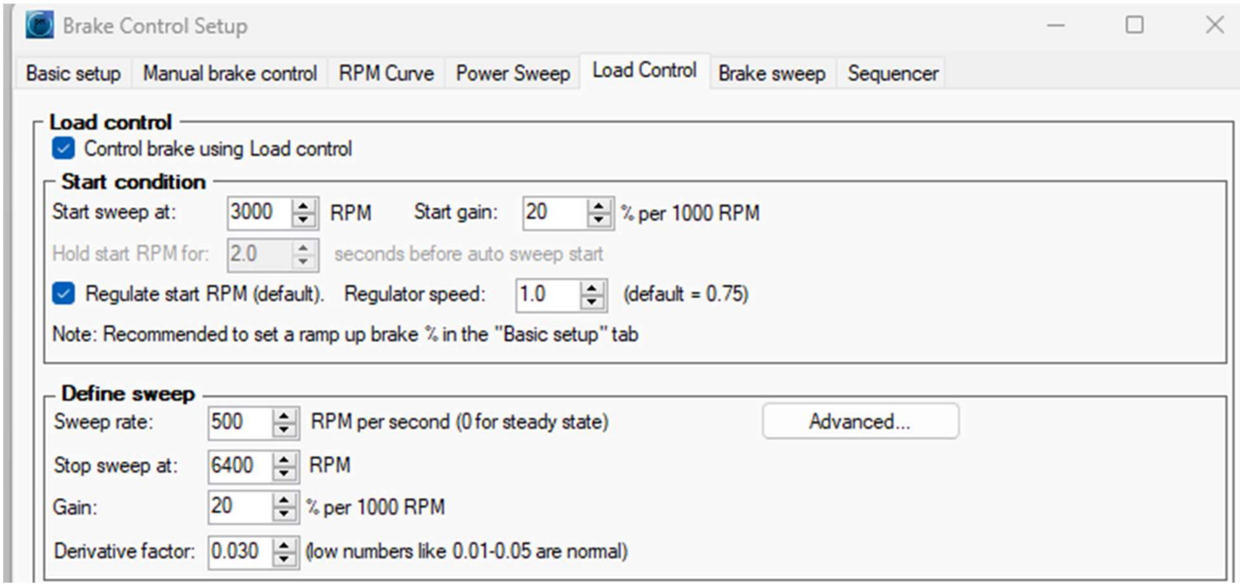
12.1.4 Brake output

Use Out1/Out2 and configure it like this (or other valve type):



12.1.5 Brake control mode

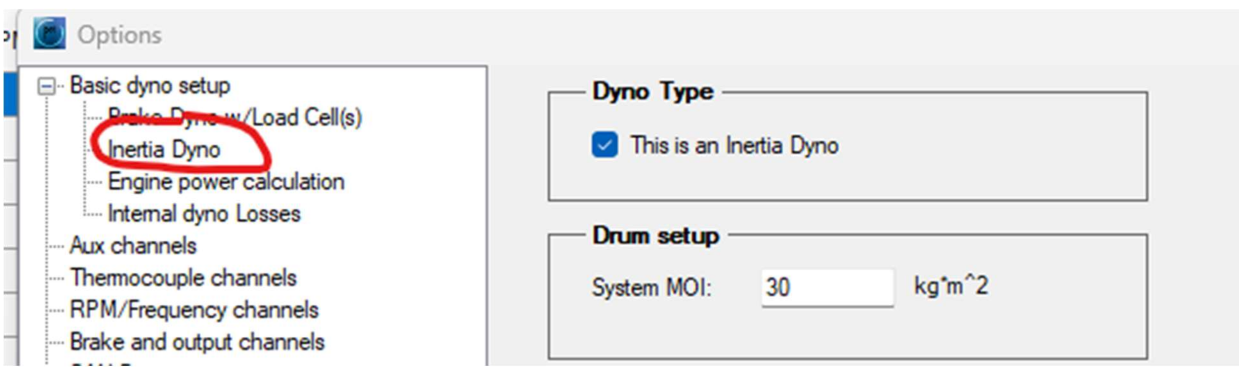
Load Control is recommended. Good starting point:



12.2 Inertia dyno example

12.2.1 Basic

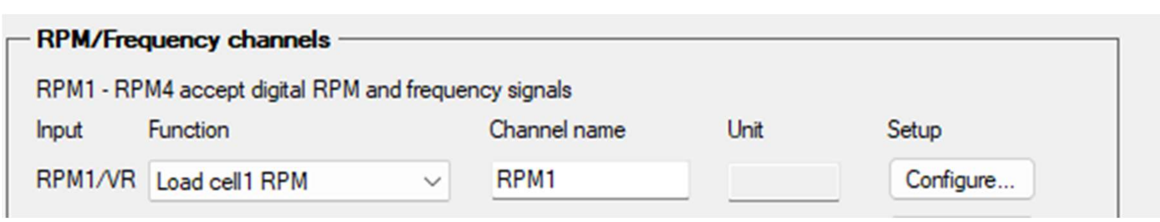
Turn on Inertia mode



Brake dyno mode can also be used if the load cell reads 0. This is useful for setups that have a non-measured brake that is only used to slow down rotation after the run.

12.2.2 RPM sensor

Set RPM1 function to be Load cell 1 RPM. The selection here is a bit illogical since there is no load cell, but this is the correct selection.



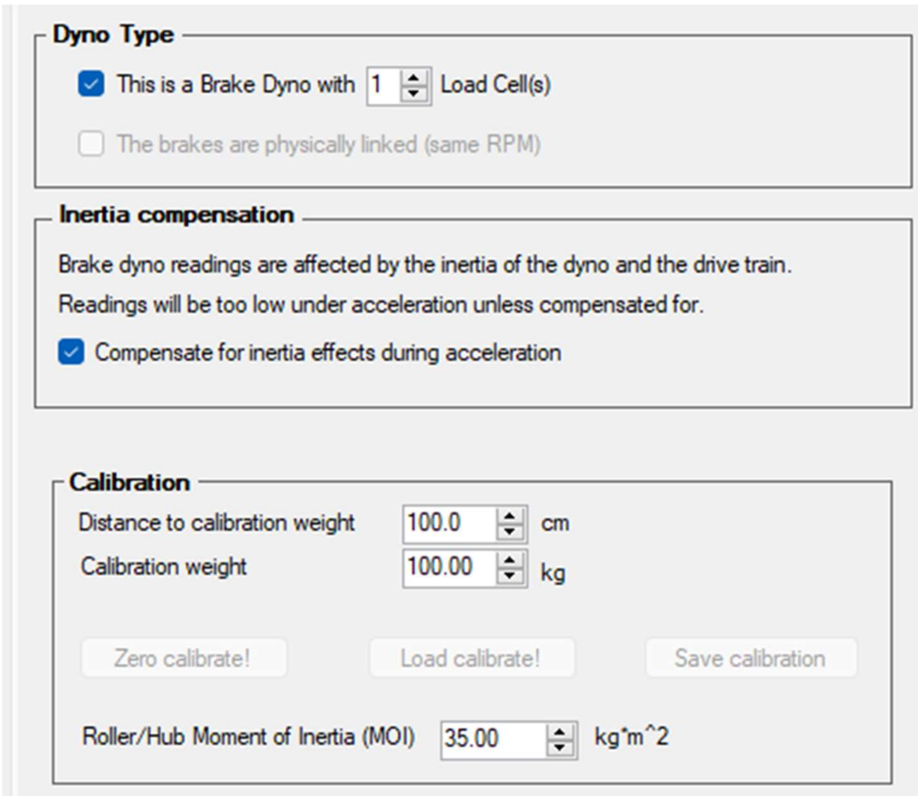
12.2.3 Run window

No brake mode is available for inertia dynos, but auto start/stop can be set like for other dynos.

12.3 2WD chassis dyno example

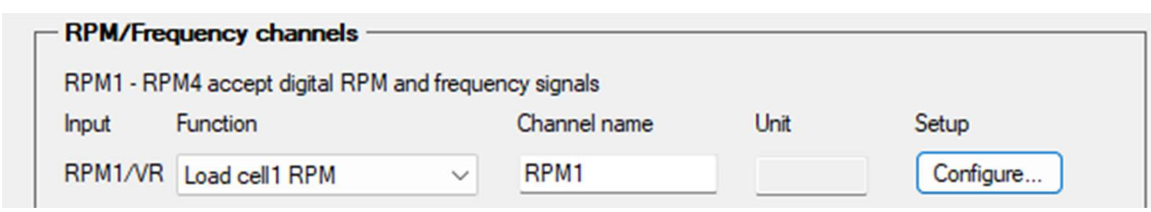
12.3.1 Load cell

Configure 1 load cell, turn on inertia effects. You need to measure the MOI either manually or by using the MOI wizard or you can try to calculate it.



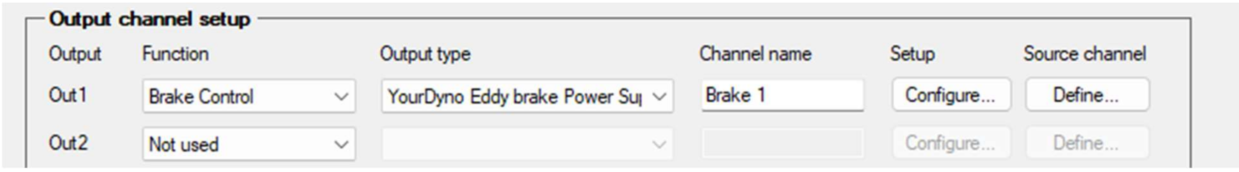
12.3.2 RPM

Use RPM1 and configure it like this:



12.3.3 Brake output

Use Out1 and configure it like this (or other output type):



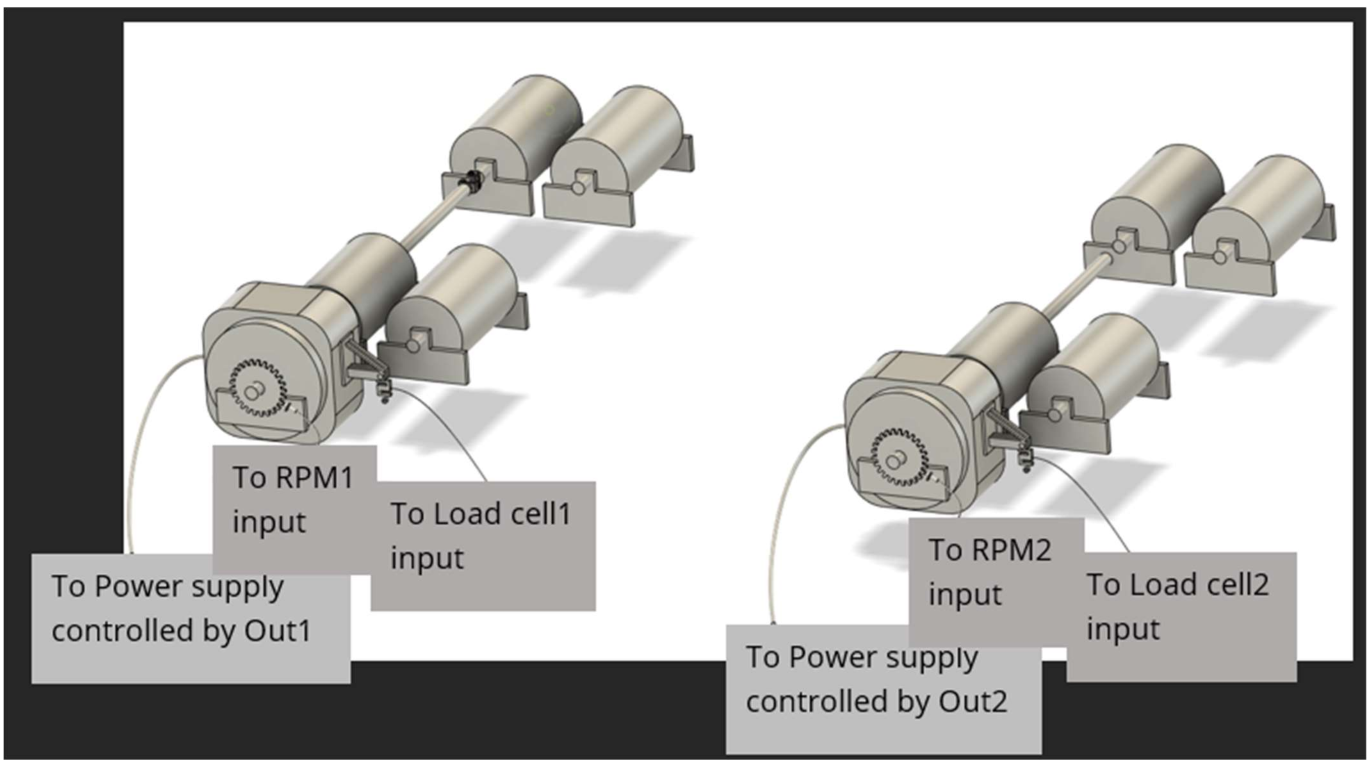
12.3.4 Brake control mode

Power sweep is recommended for normal sweeps.

12.4 4WD chassis and 2WD hub example

12.4.1 Using the right inputs and outputs

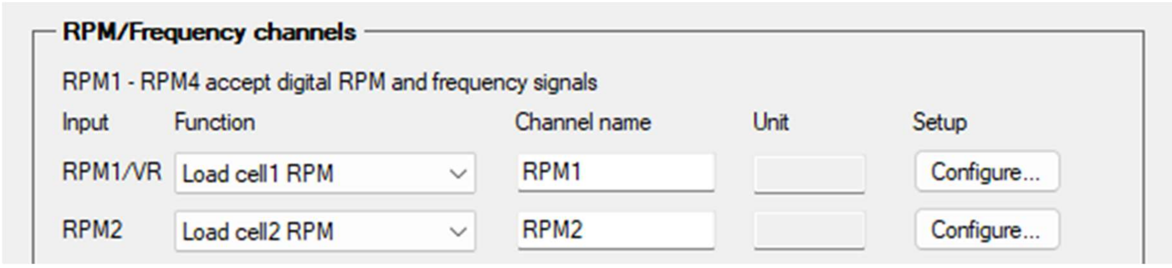
The RPM, Load cell and Out channels work together. RPM1, Load Cell 1 and Out1 are used for the same brake. You cannot mix and match the channels. Correct setup below:



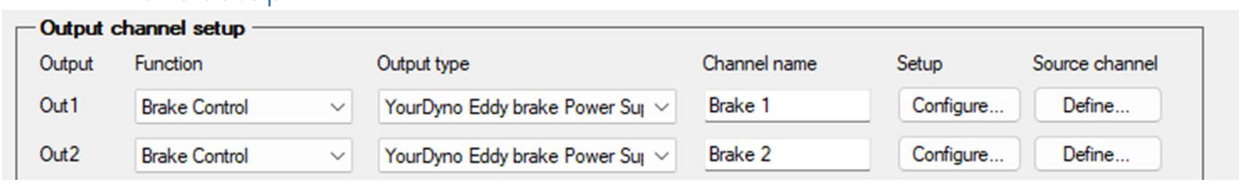
12.4.2 Load cells

Configure 2 load cells and configure the MOI

12.4.3 RPM



12.4.4 Brake setup



12.4.5 Brake control mode

Power sweep is recommended for normal sweeps.

12.5 4WD hub example

The setup requires a YourDyno Ultimate or 2 YourDyno Standards. The setup is basically the same a 2WD hub dyno, only it uses 4 load cells, 4 RPM sensors and 4 brake outputs.

13 Tips and tricks

13.1 Finding the right Moment of Inertia (MOI)

The MOI impacts the power and torque readings like this:

Torque = (Load cell torque + Acceleration * MOI) / Gear ratio

Obviously for an inertia dyno, the Load Cell component is 0.

When the MOI is high, a significant portion of the power/torque comes from accelerating the heavy roller/brake, so it is important to get the MOI number right.

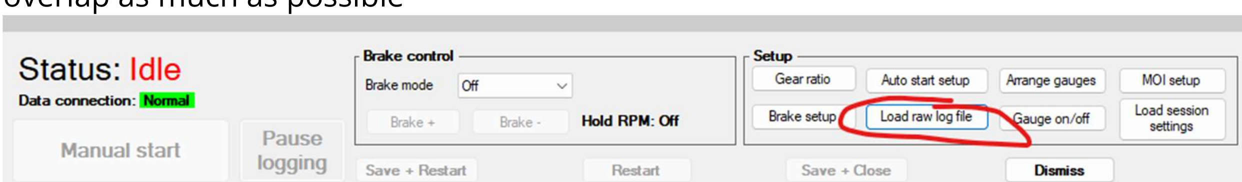
In addition to the MOI Wizard described in chapter MOI wizard11.9 there are a number of ways to find the MOI manually, but each one with its own pitfalls.

13.1.1 Double ramp

This is a classic way of measuring the MOI. The procedure is:

- Define an RPM curve like this:

- Hold full power both going up and down
- When done, compare the results in the Results vs RPM. If results are higher going up then MOI is too high and vice versa
- Adjust the MOI and read back the raw log file to re-run the same run until results overlap as much as possible



Pitfalls:

The procedure only works if the engine performs the same going up and going down. There can be heat soak (=lower power going down), air cleanliness difference, turbo pressure difference, etc.

13.1.2 Steady state + Ramp

The procedure is to do a steady state test at a certain RPM and do a sweep. The sweep and the steady state run shall have the same power/torque at the steady state RPM, if not adjust the MOI and re-run the sweep. The steady state does not need to be rerun, since MOI does not impact steady state power.

Pitfalls: Same as for double ramp

13.1.3 Test in different gears

This is potentially a good way to measure the MOI, and the only semi-simple way for an inertia dyno. You define a Power sweep with a set RPM/s, which will be the same for both runs. This way, if the engine behaves somewhat differently in fast and slow sweeps, ramping up and ramping down, etc, then that does not come into play (since the engine will ramp the same).

Procedure:

- Define a power sweep from low to high RPM
- Set gear ratio in the highest gear allowable
- Do Run1 with this gear
- Write down the gear ratio and set gear ratio for the a lower gear
- Do Run2 with this gear
- Compare the runs and redo with different MOI until they match. Note that you need to manually set the gear ratios for each run

Pitfall:

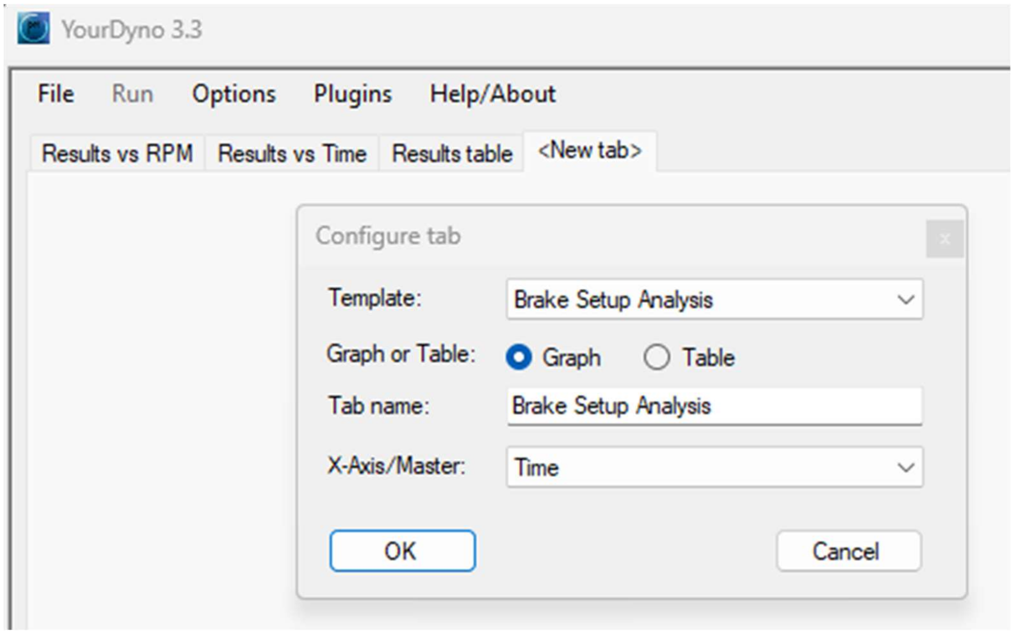
The engine also has some MOI and its impact is slightly different between the runs because the gear ratio is different. This can be ignored if the MOI is sufficiently large.

13.2 Finding the best brake control settings

Finding the best PID numbers for the brake regulator takes some practice. Same for Gain/Derivative factors for Load Control.

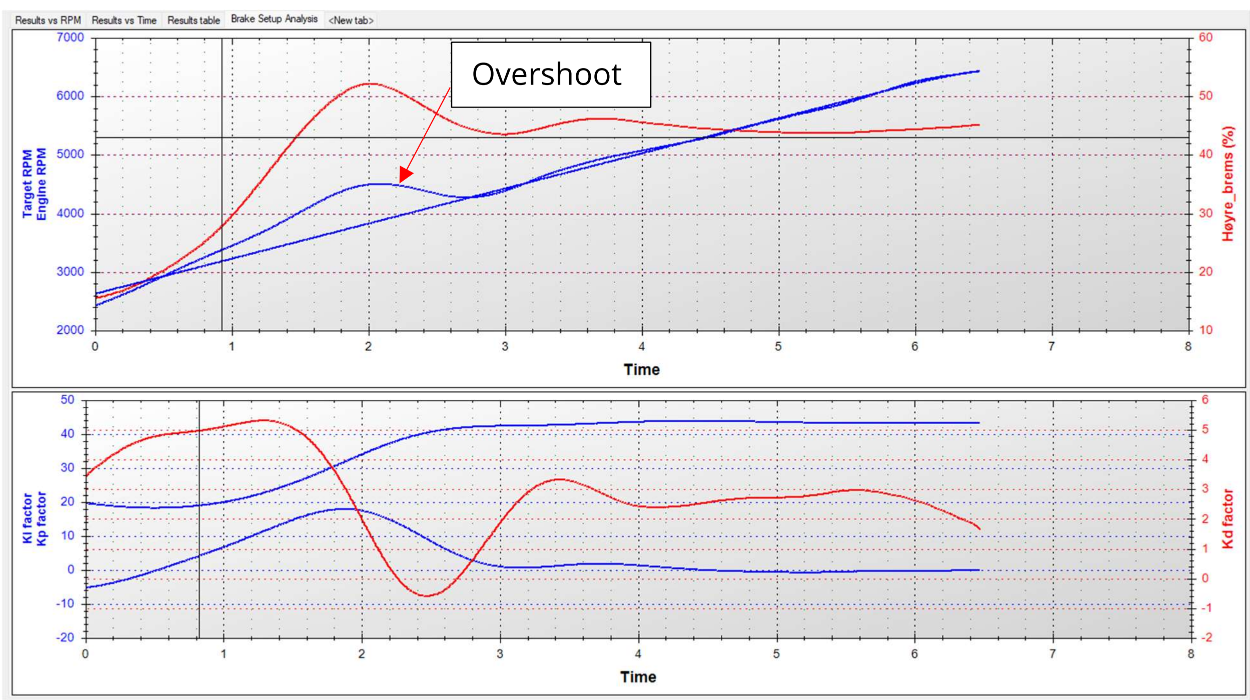
13.2.1 Looking under the hood of the regulator

First step is to create a Brake setup analysis tab:



Now a new tab is created where the Engine RPM, Brake % and components of the PID/Load control algorithm are plotted. You can add channels to the graphs of course.

Example: This is a Toyota Supra drift car with very abrupt torque band:



On the top graph we see the Engine RPM vs Target RPM in blue. The Brake is in red. As we can see, the Engine RPM overshoots its target before it is pulled down to the target. This happens as the engine hits the torque band.

On the bottom graph we see the components of the PID regulator. The Brake% = Kp + Ki + Kd.

The problem is that the regulator is too “loose”. It lets the engine overrun too much. That means we need to increase some parameters to make the brake control harder.

None of the parameters Kp, Ki or Kd oscillate, so each one is a potential candidate to increase.

- Kd reacts to acceleration and is the fastest to respond to deviations from the target. So, trying a Kd increase first is a good approach. Kd is very responsive so be careful with the increases (too much = oscillations)
- Kp is next to respond, it responds to the difference between the target and the actual RPM. So increasing Kp will also help.
- Ki responds to the accumulated difference between target and actual RPM over time, so it is slower to respond. It will likely not help in this case. We also see the steady state error is small once we come over the torque band, which is another sign that the Ki is ok.

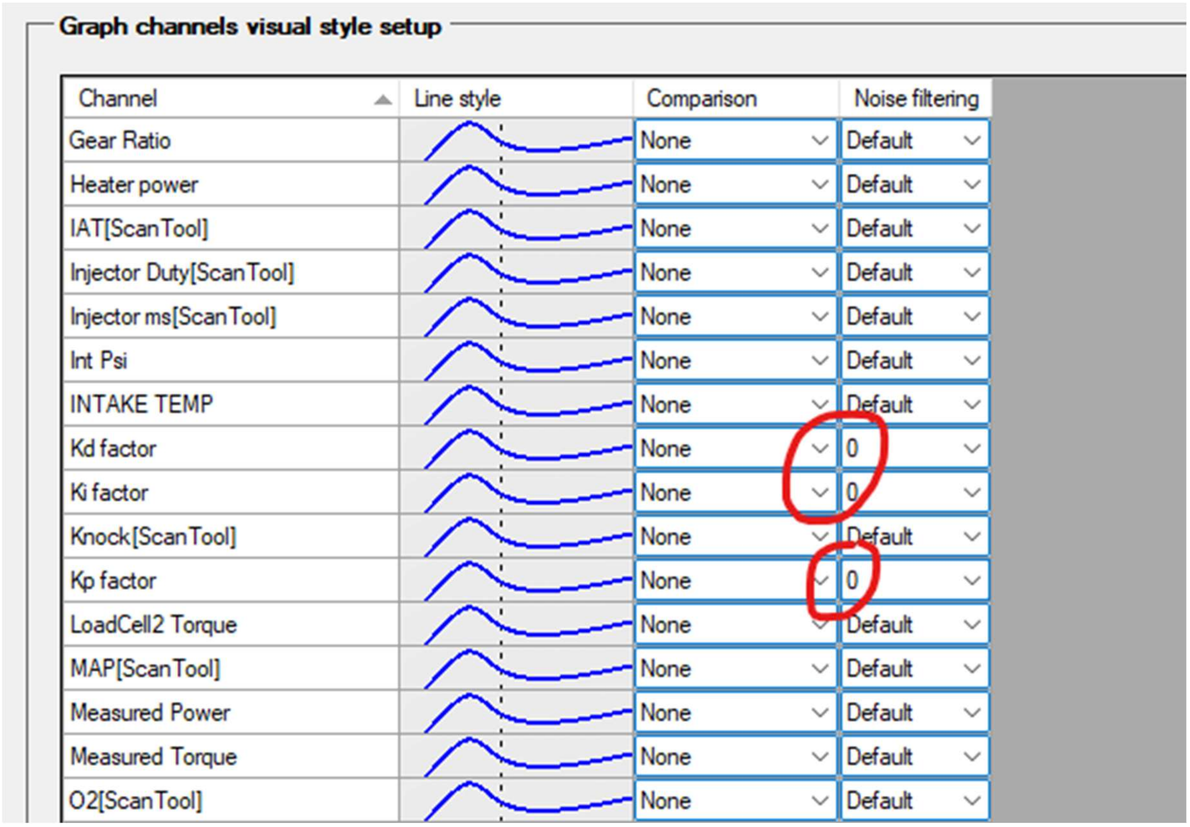
In general, the parameters should not oscillate (much). An oscillation is normally caused by the parameter being too high.

13.2.2 Analyzing load control

When analyzing the Load Control brake mode, Kp Factor = Gain and Kd factor = Derivative Facor. There is no Ki. Otherwise the procedure is the same as for PID tuning.

13.2.3 Turning off noise filtering on brake channels

It is often easier to see what is going on with the brake performance with the noise filtering set to 0 for those channels. Do it for the Brake1, and for Kp, Ki and Kd.

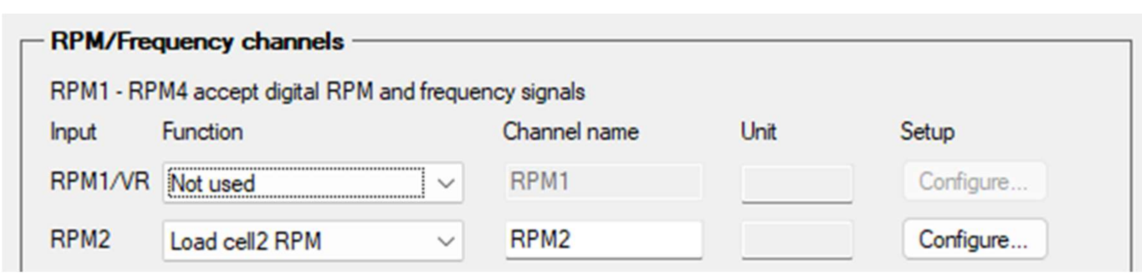


13.3 Drive modes when testing a 2WD car on a 4WD dyno

13.3.1 Non-linked dyno

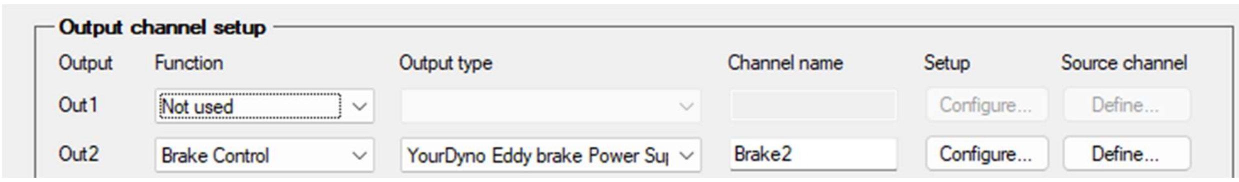
For a non-linked dyno, the non-driven wheels will not spin, but they may move a little, causing the RPM sensor to sense some movement. It is recommended to put the RPM sensor on the non-driven wheels to Not used while testing a 2WD car on a 4WD non-linked dyno.

In the example below, the driven wheels are on RPM2.



13.3.2 Linked dyno

For linked 4WD dynos, the brake on the non-driven wheels will also be applied during a run, unless that brake output is set to Not used. Therefore, set the brake output to Not used. In the example below, the wheels on RPM1/Out1 are not driven (but still spinning).

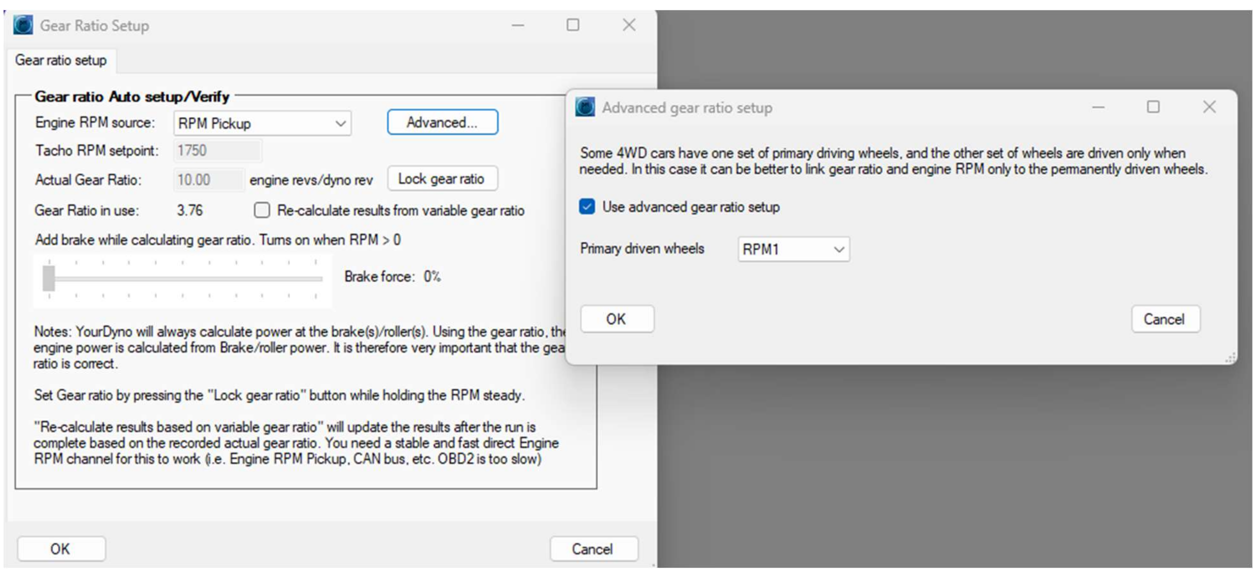


Note that setting the RPM sensor to Not used would also turn off the brake to those wheels, but power/torque would be wrong, because the acceleration and inertia (MOI) of that RPM sensor will be ignored.

13.4 Non-linked 4WD dyno concerns

Many vehicles have a complicated 4WD system, where one wheel pair (usually the front) are the primary driven wheels. Only when the vehicle senses what it believes is spin will power also be transferred to the other wheel pair.

In this case, turn on the “Use advanced gear ratio setup” in Gear ratio->Advanced.

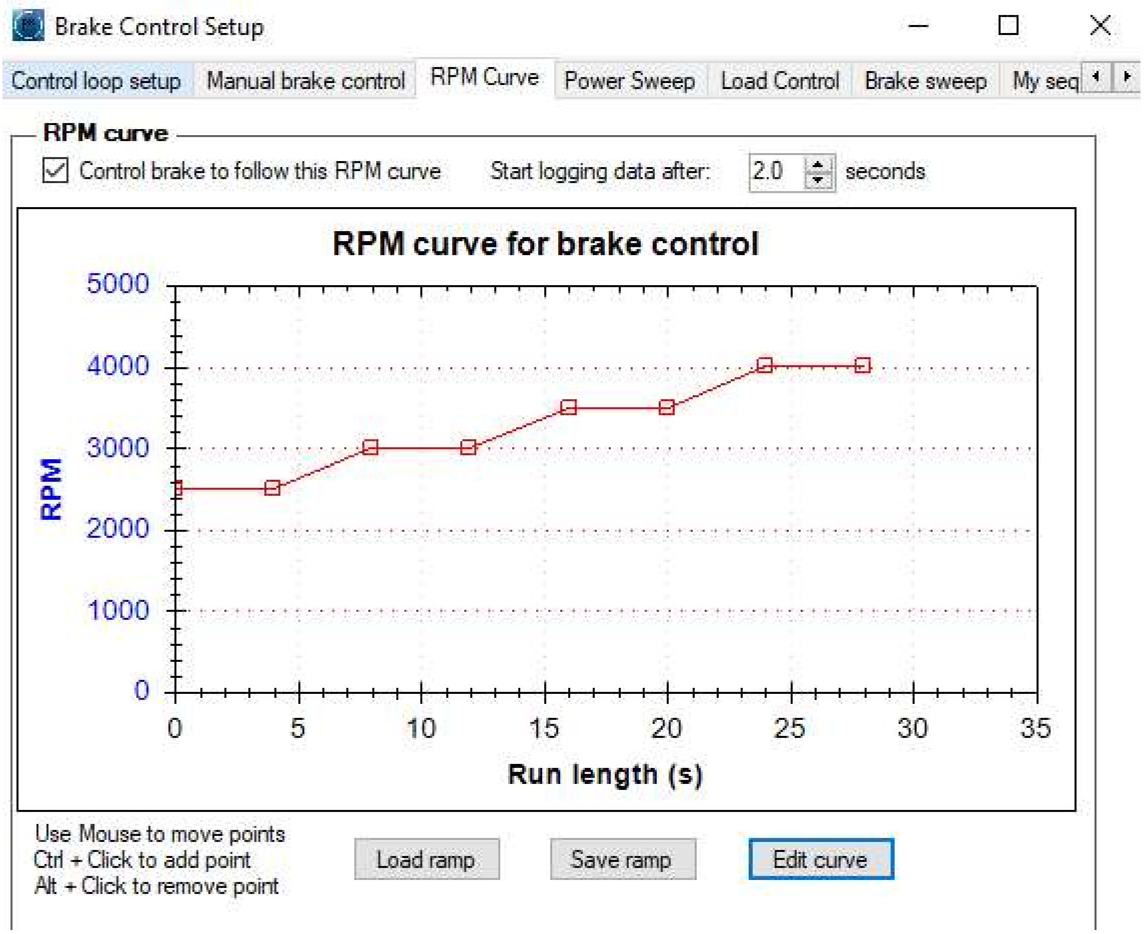


With this option on, the gear ratio will be calculated from the primary driven wheels.

With a linked 4WD dyno, this option does not need to be used.

13.5 Automatic RPM Step test

You can use the RPM Curve mode to perform semi-automatic RPM Step tests where the YourDyno Software will increase the Engine RPM target after specified time.



14 Support

For support contact YourDyno.com at https://yourdyno.com/about-us/

To review runs for potential issues we need:

- The csv file of the run(s) (File->Save as csv)
- The raw log file of the same run(s)
- The saved options file (Options->Backup options to file)

Please don't send many runs! Only send enough to quickly can see the problem or question you might have. 1 or 2 runs is enough in 99% of the cases.