UnaVision Software manual

Version Oct 10 2025

YourDyno.com

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.

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For more information, visit https://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 UnaVision software please download the latest installation package from www.yourdyno.com website.

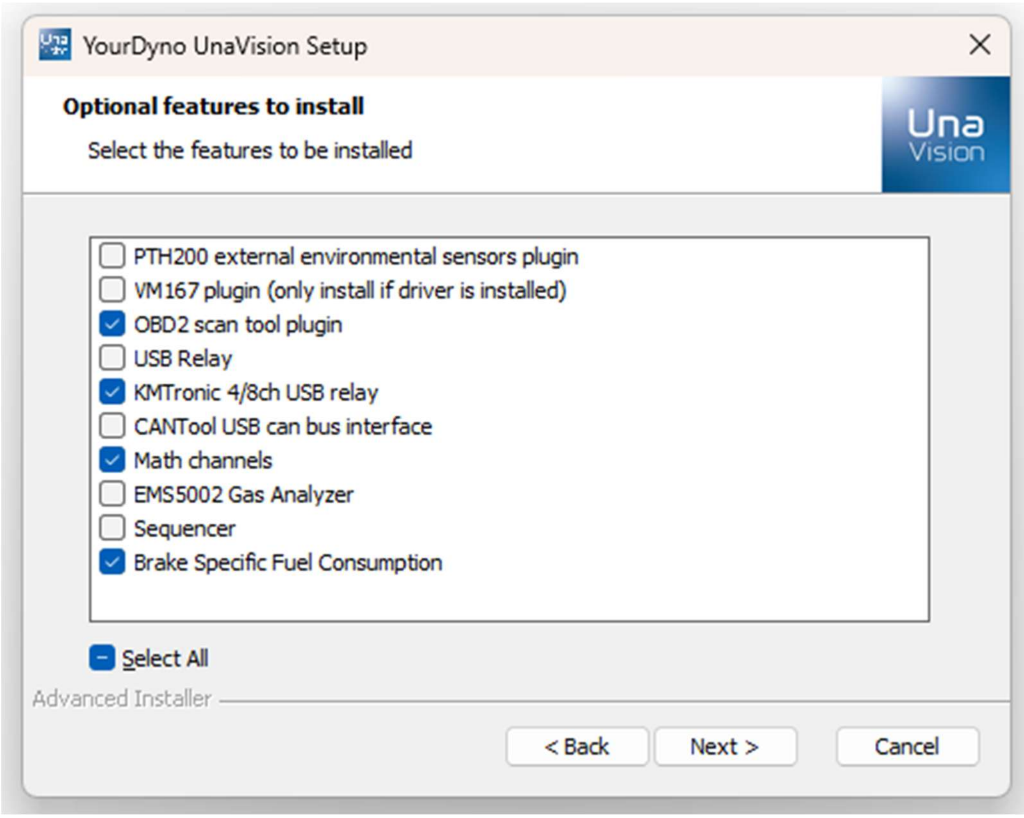
1. After downloading the installation package please execute the file "UnaVisionInstaller_x.x.xx.exe".

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

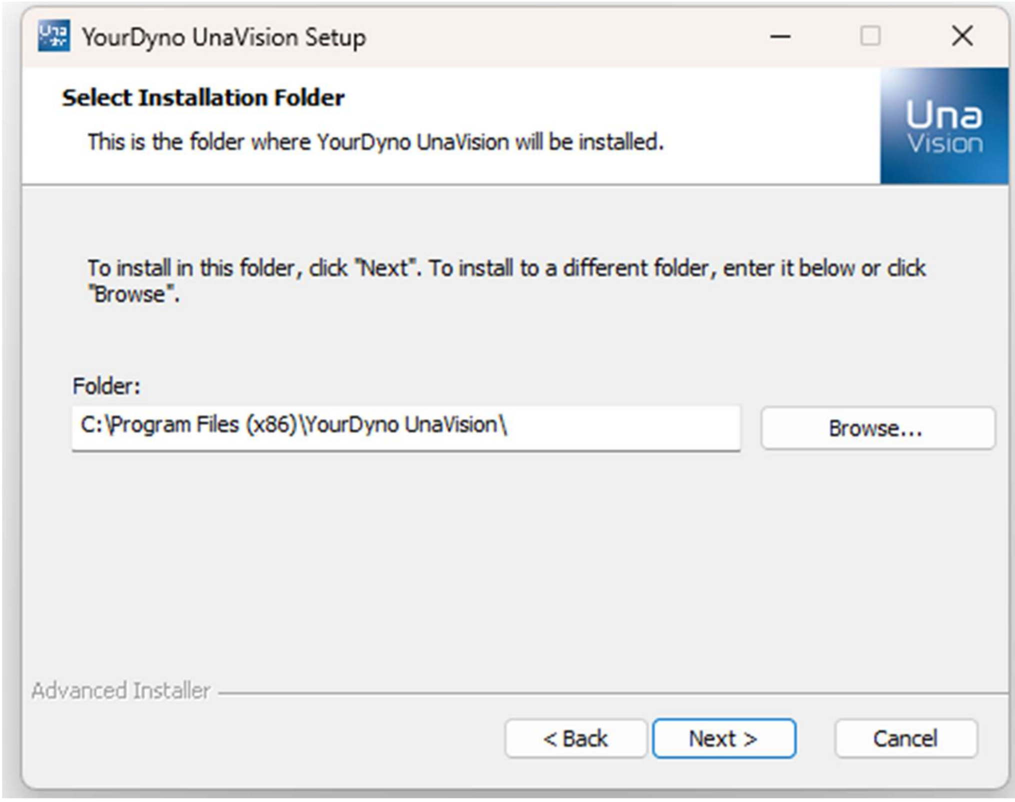
Press the button "Next" to start the installation wizard.

2. Please select the preferred plugins from the list. Do not install plugins you will not use, as they consume CPU and memory resources, in addition to cluttering the setup with unused data channels.

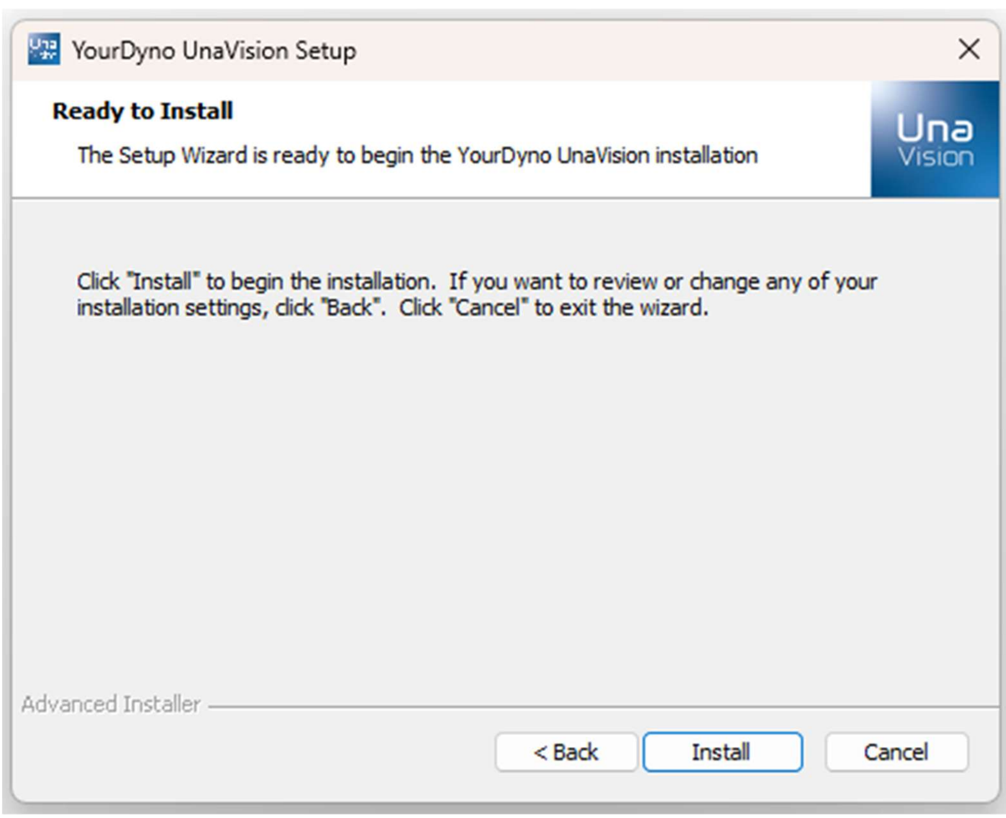
Press button "Next" to continue.



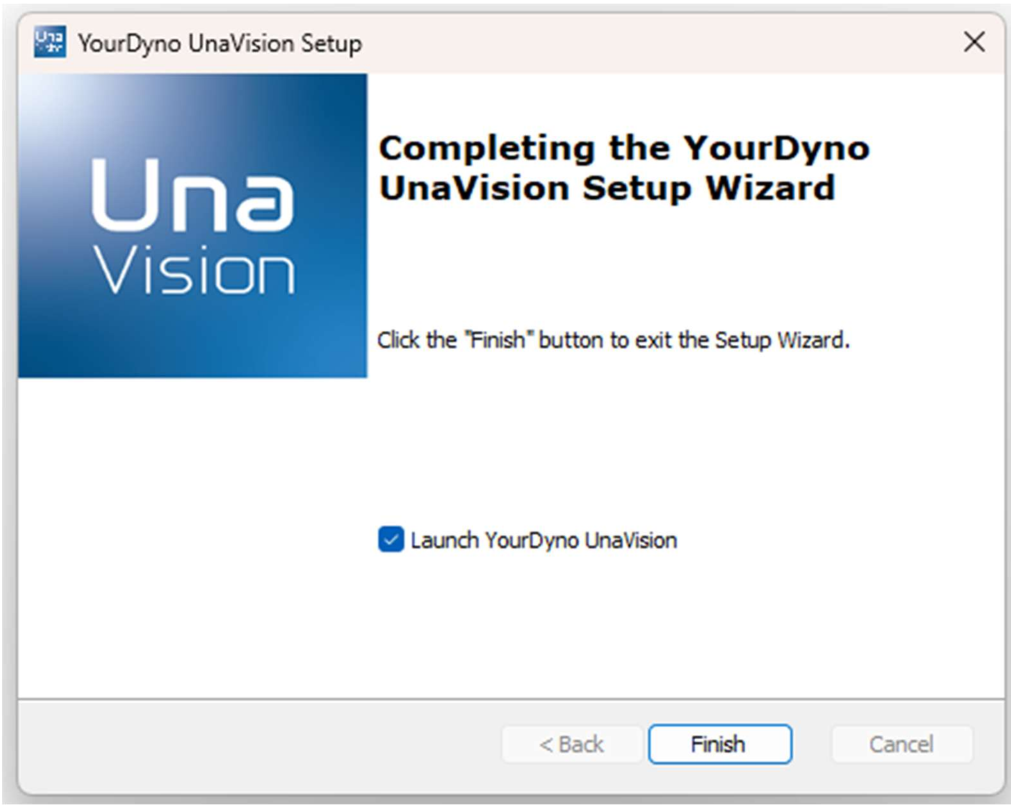
3. Select installation directory or keep default location.
Press button "Next" to continue.



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 Ethernet setup (Ultimate v3 only)

The Ultimate v3 can communicate with the PC over USB or Fiber optic Ethernet. Ethernet is recommended. See chapter 17 for Ethernet setup.

5 What is the YourDyno UnaVision software

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

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

6 Dyno settings

UnaVision contains many hundred settings that define the operation of the software, including configuration of the data channels, the visual setup, the run settings, etc. They are set to match the hardware and the user's preferences. The settings are defined in two places:

- The main menu -> Options window
- The Run window

The current settings are stored in the **config.json** file in the Documents\YourDynoDatabase folder.

6.1 Setting up a new dyno system

To configure a fresh UnaVision installation, select the correct dyno type in Options->Dyno types and profiles and click "Load default configuration for this dyno".

The main settings are now set to a good starting point for this dyno type, but details need to be checked and changed where necessary.

6.2 Converting old YourDyno software settings to UnaVision

To upgrade to UnaVision from the previous YourDyno software, manually read a backup of the old options:

- Open the old YourDyno software
- Select Options->Backup options to file
- Close the old YourDyno software and open UnaVision
- Options->Dyno types and profiles. Select Restore options from file

Check over the options to verify successful settings migration.

7 Menu: Options

Most settings are in the Options menu.

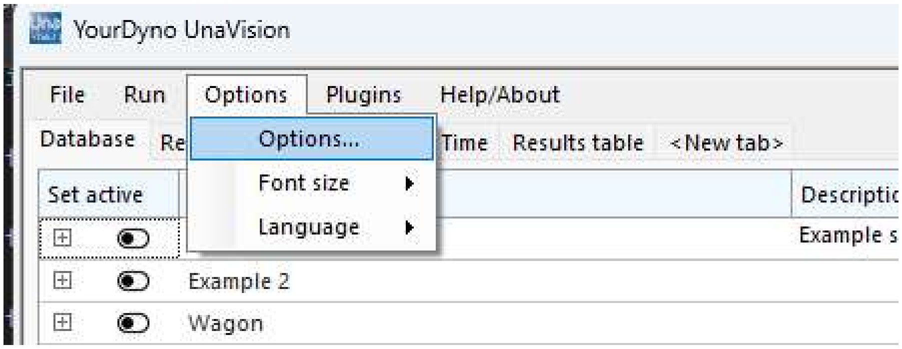


FIGURE 1 OPTIONS MENU

The following sections go through each of the main options.

7.1 Options -> Dyno type and profiles

In this window the type of dyno is selected, profiles are handled, and the database folder location can be set.

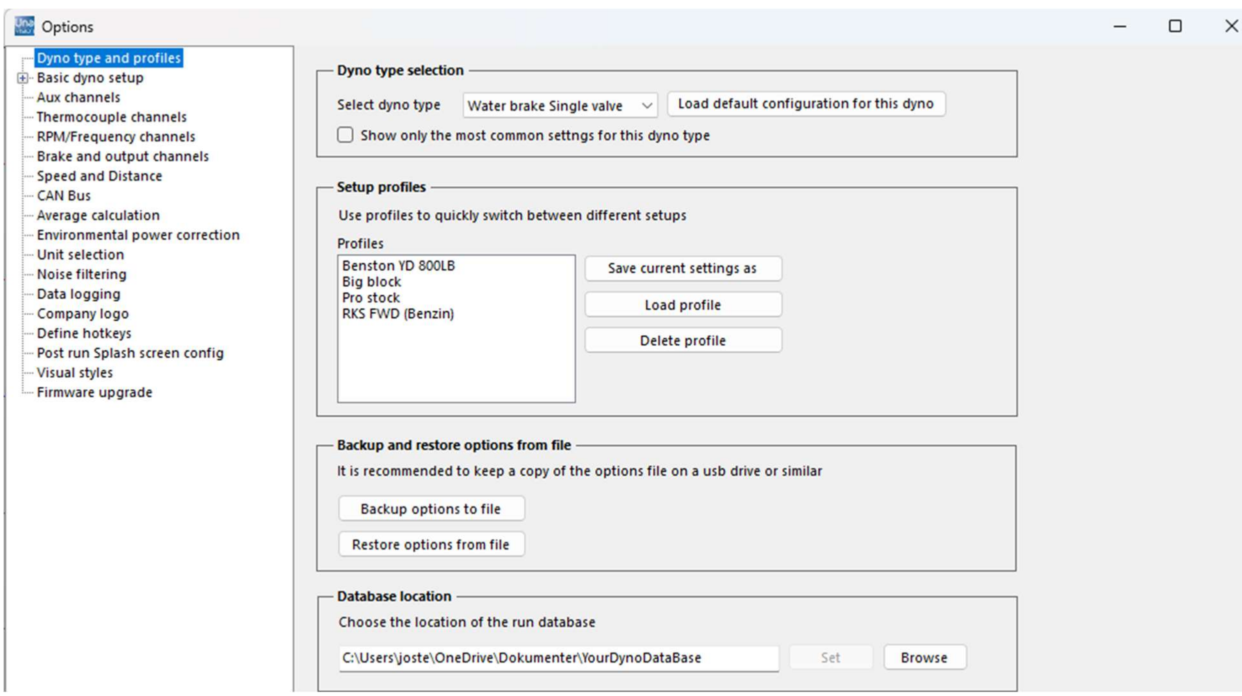


FIGURE 2 DYNO TYPES AND PROFILES

7.1.1 Dyno type selection

Select the dyno type in the list. This has two effects:

- The “Load default configuration for this dyno”-button is enabled. This can be used to quickly set the most common settings for this dyno. Use this only for new installations, as it will overwrite all current settings.
- The “Show only the most common settings for this dyno type” is enabled. Selecting this will hide certain settings that are not commonly used for the selected dyno.

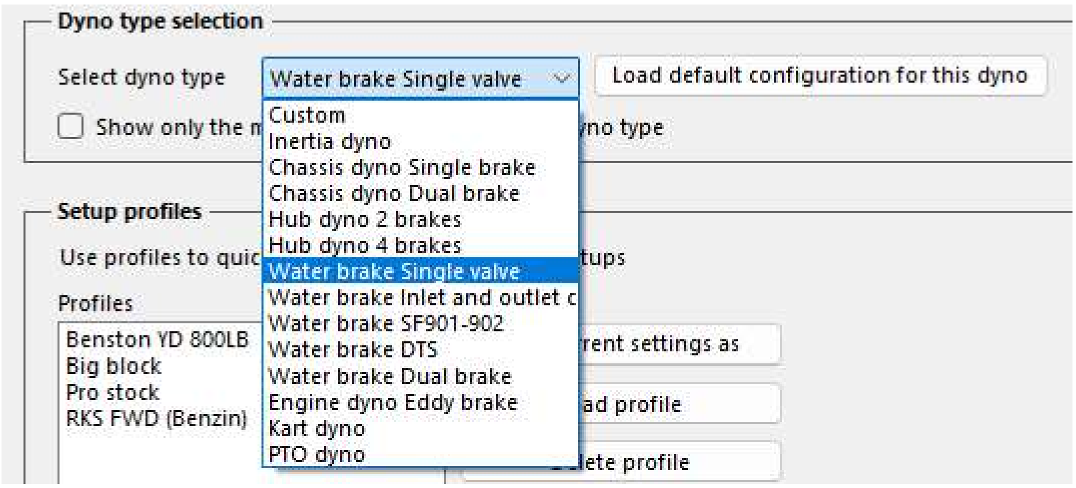


FIGURE 3 SELECT THE DYNO TYPE

7.1.2 Setup profiles

Profiles are used to quickly change between different setups. For example, on a 4WD dyno, one profile can be 2WD and one can be 4WD. Or different engines or vehicles can have different profiles, with different Moment of Inertia, run start RPM and end RPM, etc.

7.1.3 Restore options from file

To upgrade to UnaVision from the previous YourDyno software, click “Restore options from file”. Check over the options to verify successful settings migration.

This button can also be used to read back a backed up UnaVision settings file.

7.2 Basic dyno setup

7.2.1 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).

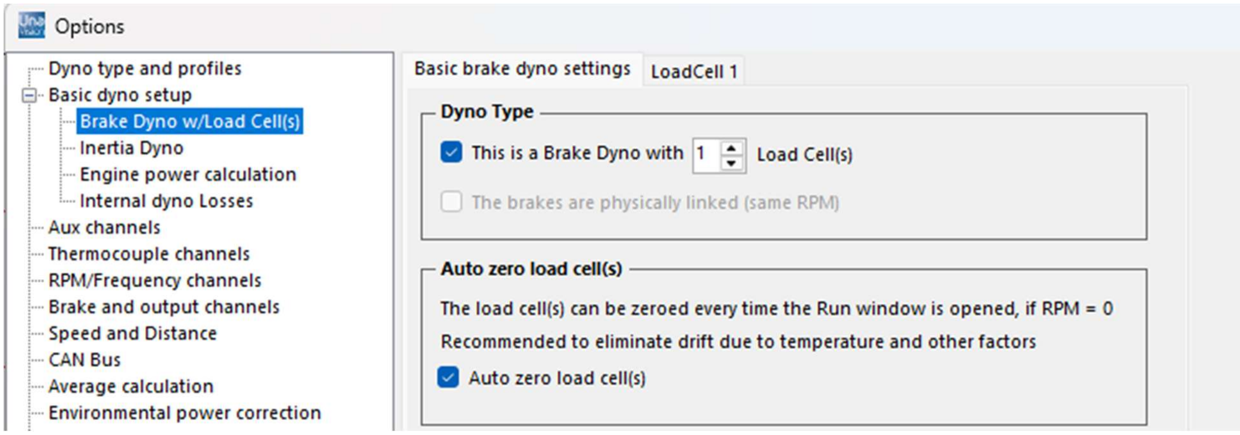


FIGURE 4 BRAKE DYNO BASIC SETUP

In this menu:

If Auto zero load cell(s) is on, then load cells are zero'ed when a new Run is started and the RPM is 0. Load cells will drift over time and temperature, so it is recommended to keep the Auto zero on.

Note that the Auto zero load cell will change the calibration ever so slightly every time the Run window is opened. This means if you re-run a run even after having done no settings changes, it will show slightly different results if the Run window was opened since the run was originally done. Close the Run window and load the options from the run if needed. This will load the calibration factors that were in use when the run was performed.

7.2.2 Inertia compensation

Then enter correct value in the "Moment of Inertia..." filed in correct unit (kgm^2).

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.

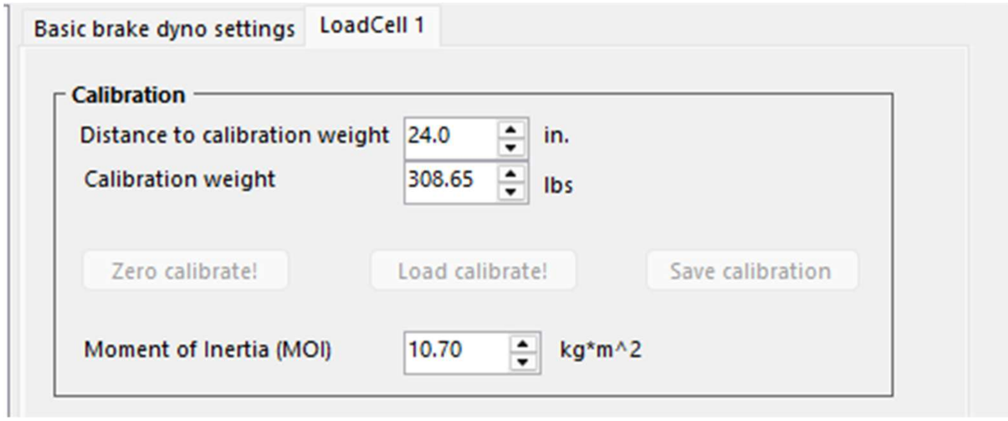


FIGURE 5 SET MOMENT OF INERTIA FOR EACH BRAKE

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

7.2.3 Load Cell calibration

Go to the Load cell tab(s) to calibrate the load cell.

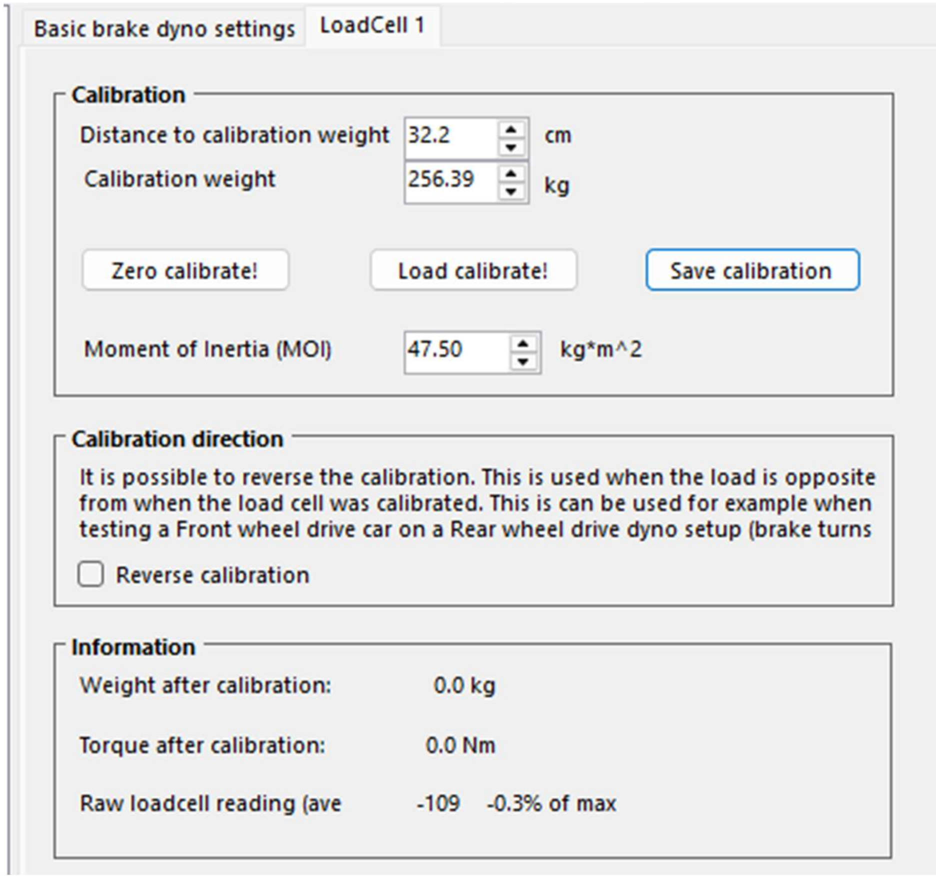
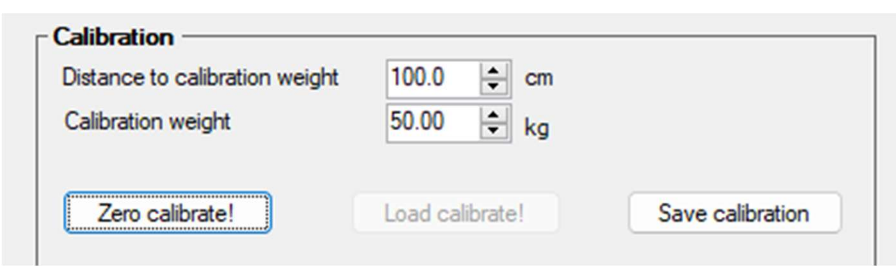


FIGURE 6 LOAD CELL CALIBRATION

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

7.2.3.1 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.



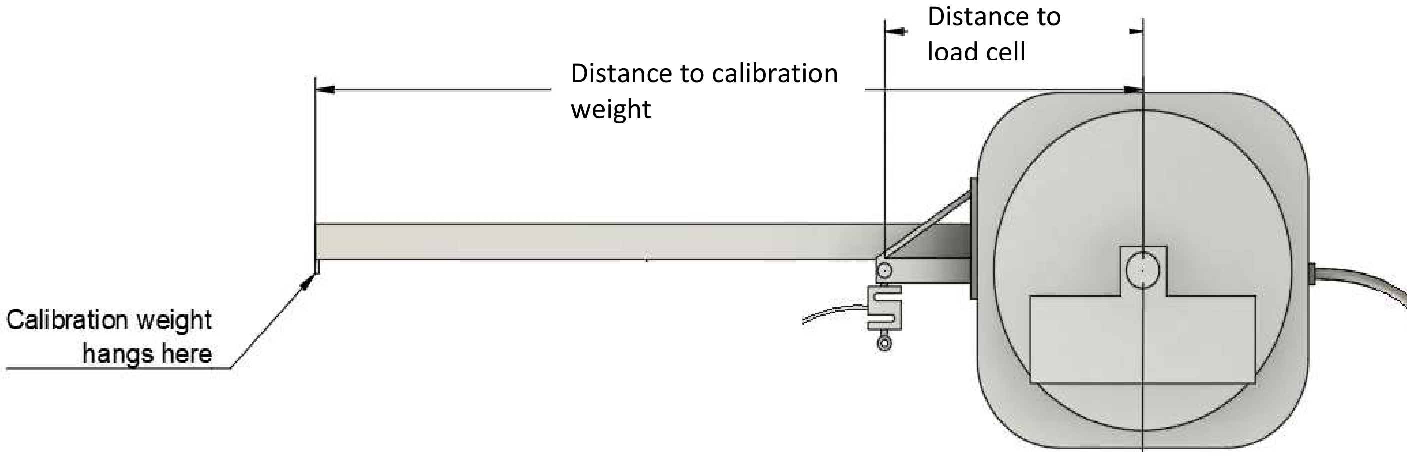
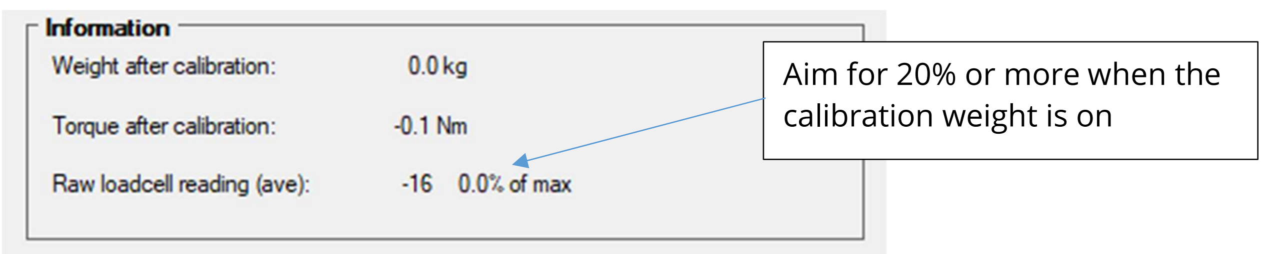


FIGURE 7 USING A CALIBRATION ARM

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



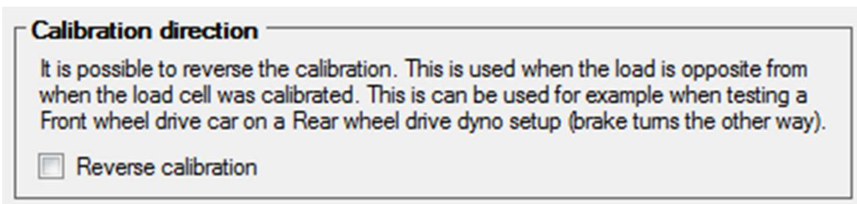
7.2.3.2 Calibration procedure

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 (see figure above)
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"

7.2.3.3 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.



⚠

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).

7.3 Inertia Dyno

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

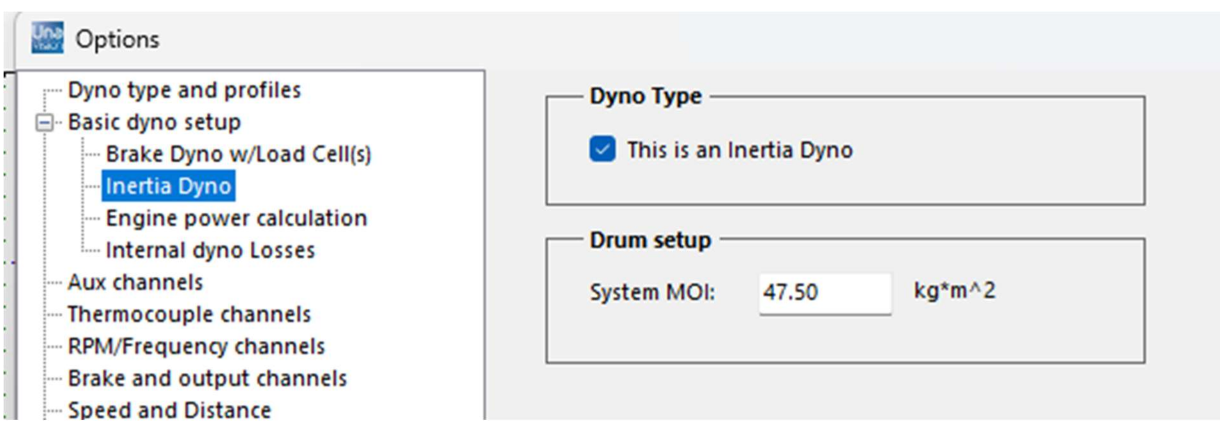
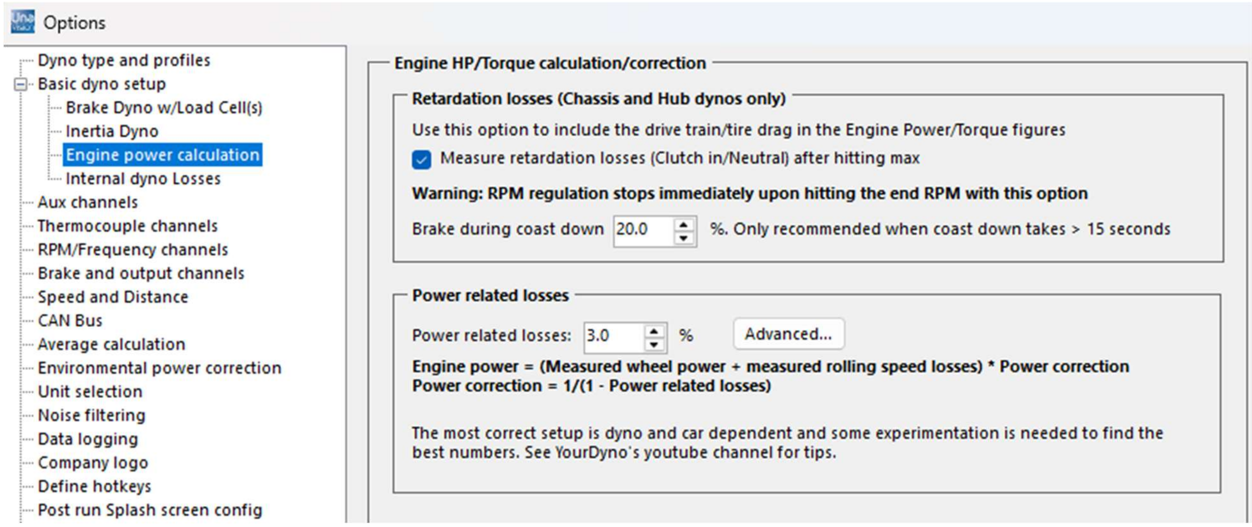


FIGURE 8 INERTIA DYNO SETUP

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

7.4 Engine power calculation



7.4.1 Retardation loss measurement

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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 can be measured during so called coast-down phase. To enable friction losses measurement please activate the “Measure retardation losses” checkbox.

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WARNING: 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.

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.

7.4.2 Power related losses

To enable power related loss correction, modify the "Power related losses" value.

Power related losses can be used for any dyno type (also Engine, PTO, etc).

7.5 Internal dyno losses

The internal losses of the dyno can be specified.

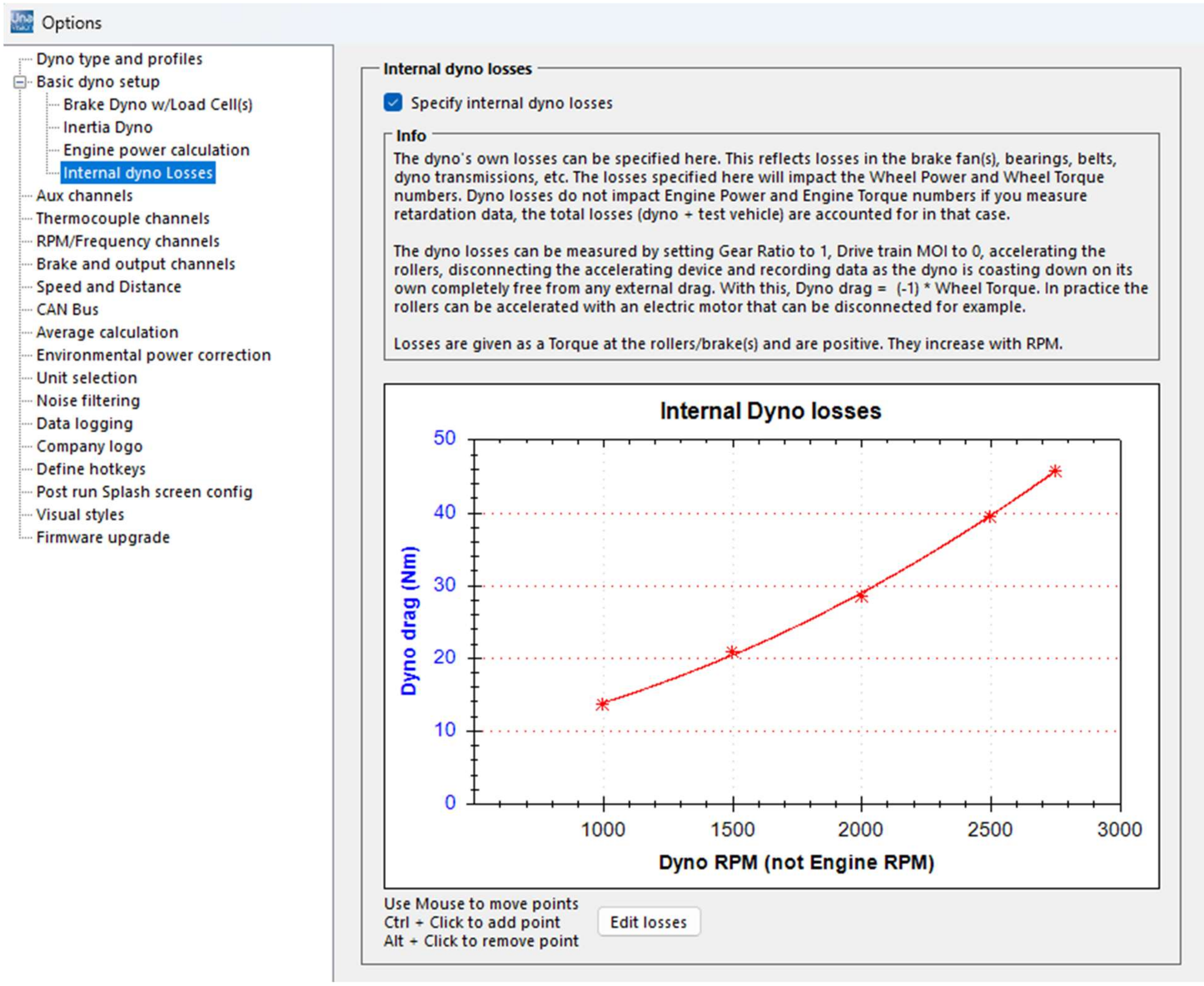


FIGURE 9 INERNAL DYNO LOSSSES

7.5.1 When should internal dyno losses be specified?

Some dynos have unmeasured internal losses, and these will cause the Wheel Power/Torque to read too low unless they are specified.

Engine Power/Torque may or may not be impacted the same way. **If retardation measurement is done** (see section 7.4.1 Retardation loss measurement) then Engine Power/Torque is **not impacted**, because the retardation loss measurement includes all losses, also the internal dyno losses, and adds this to the measured data to get engine data.

If retardation measurement is **not done**, then Engine Power/Torque will also be too low if the internal dyno losses are not specified.

The internal dyno losses can be significant and should be determined in the following cases:

- Dynos with air cooled eddy brakes. The eddy brake contains a fan for cooling and the effect of this fan is not measured by the dyno
- Dynos with belts or other mechanical devices that introduce drag

7.5.2 How to determine the internal dyno losses

7.5.2.1 Using brake specification

Eddy brake dynos without any synchronization will have their loss determined almost entirely by the brake drag, other drags like bearings etc can be ignored. In this case, contact the brake manufacturer, they typically have the Drag vs RPM curve. This can be entered directly into the graph/table. Note that the specified drag is the total drag, so if the dyno has two brakes, then multiply by 2.

7.5.2.2 Measuring the drag

Alternatively the drag can be measured. To measure the drag, accelerate the rollers/hubs and let them coast down without anything connected. This is sometimes easier said than done. One way is to use a motorcycle and lift the motorcycle off the roller when at high speed (can be dangerous). A safer, but somewhat less accurate, is to accelerate the rollers and let them coast down in neutral/clutch in. In this case, the drag in the drive train is also included in the total drag, so the drag will be overestimated.

Do the run with Manual start and stop. Configure a tab with Dyno RPM as the x-axis and look at the data channel called Measured Dyno Torque.

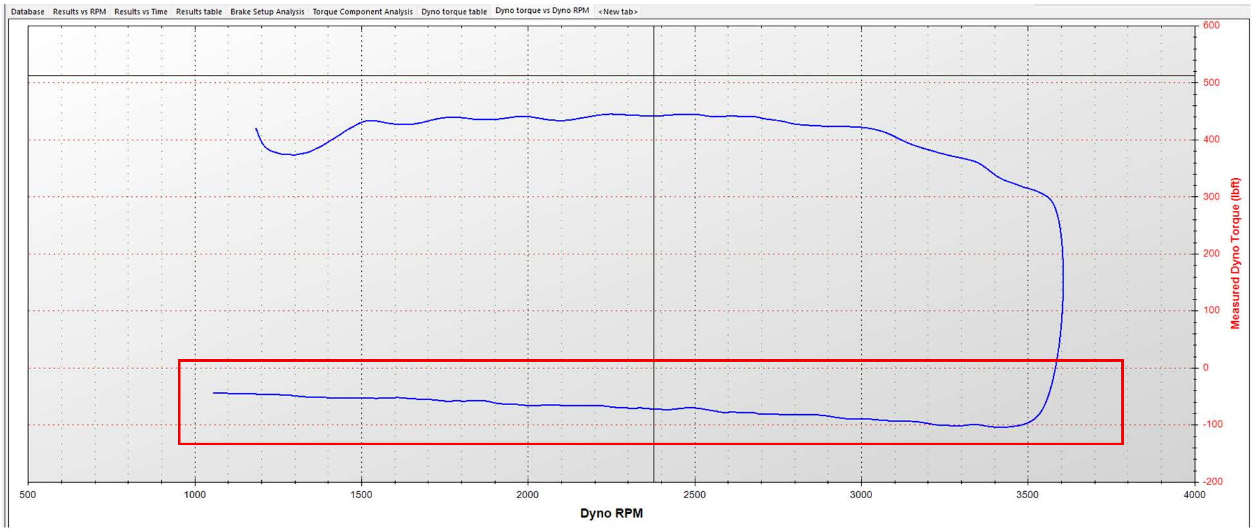


FIGURE 10 AN DYNO GRAPH OF AN ACTUAL DYNO DRAG MEASUREMENT (6 BRAKES)

The red area is the drag. A table can also be used:

Master	Corvette_1
Dyno RPM	Measured Dyno Torque (lbft)
1250	376.7
1500	431.1
1750	439.2
2000	441.1
2250	445.4
2500	444.9
2750	434.1
3000	422.1
3250	375.0
3500	314.7
3250	-96.18
3000	-100.5
2750	-89.18
2500	-80.91
2250	-69.85
2000	-68.04
1750	-65.66
1500	-57.80
1250	-52.35
1000.0	-46.73
Average*	

FIGURE 11 THE LOSSES CAN BE COPIED DIRECTLY FROM THE TABLE

7.6 Aux channels

The YourDyno Ultimate controller offers 16 analog input channels (Aux 1 … Aux 16) and the YourDyno Standard has 3 (Aux1 … Aux3).

⚠

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.

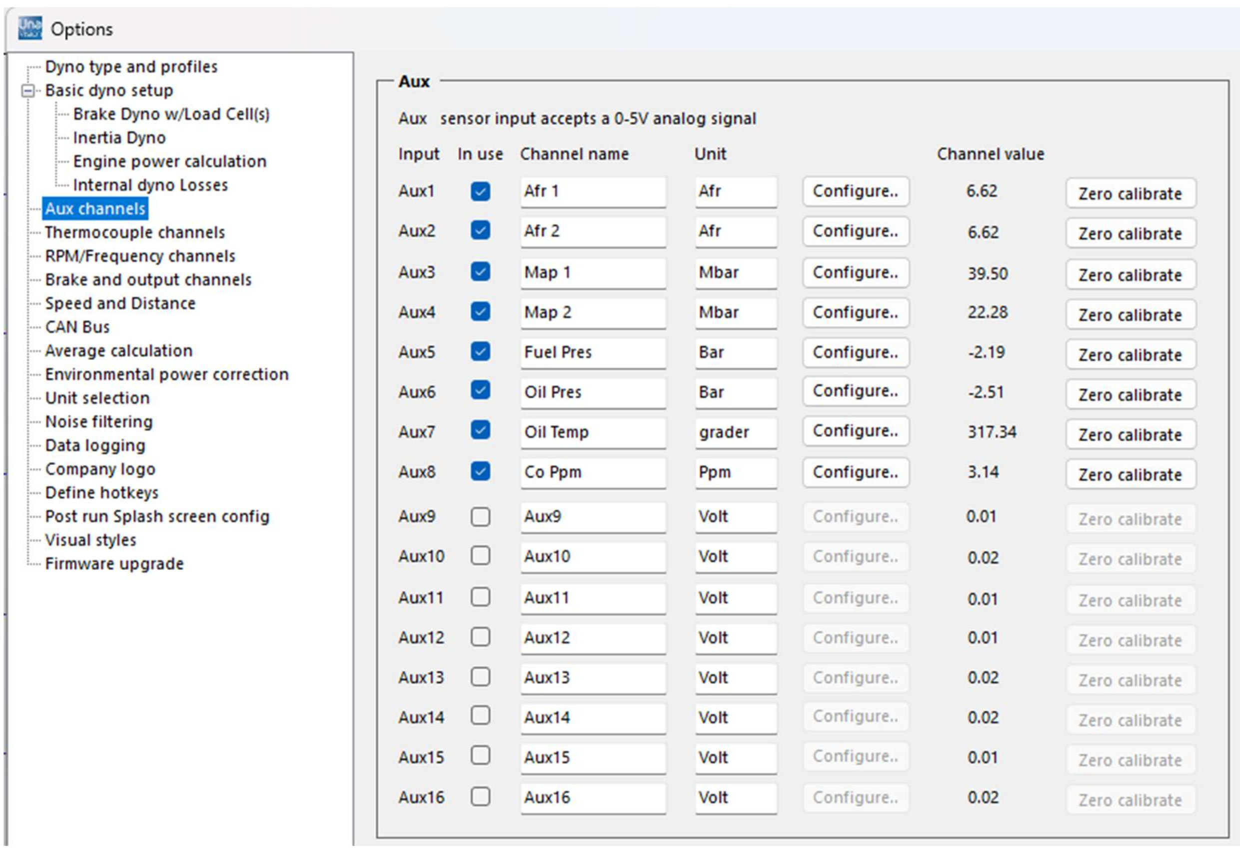


FIGURE 12 AUX CHANNEL SETUP

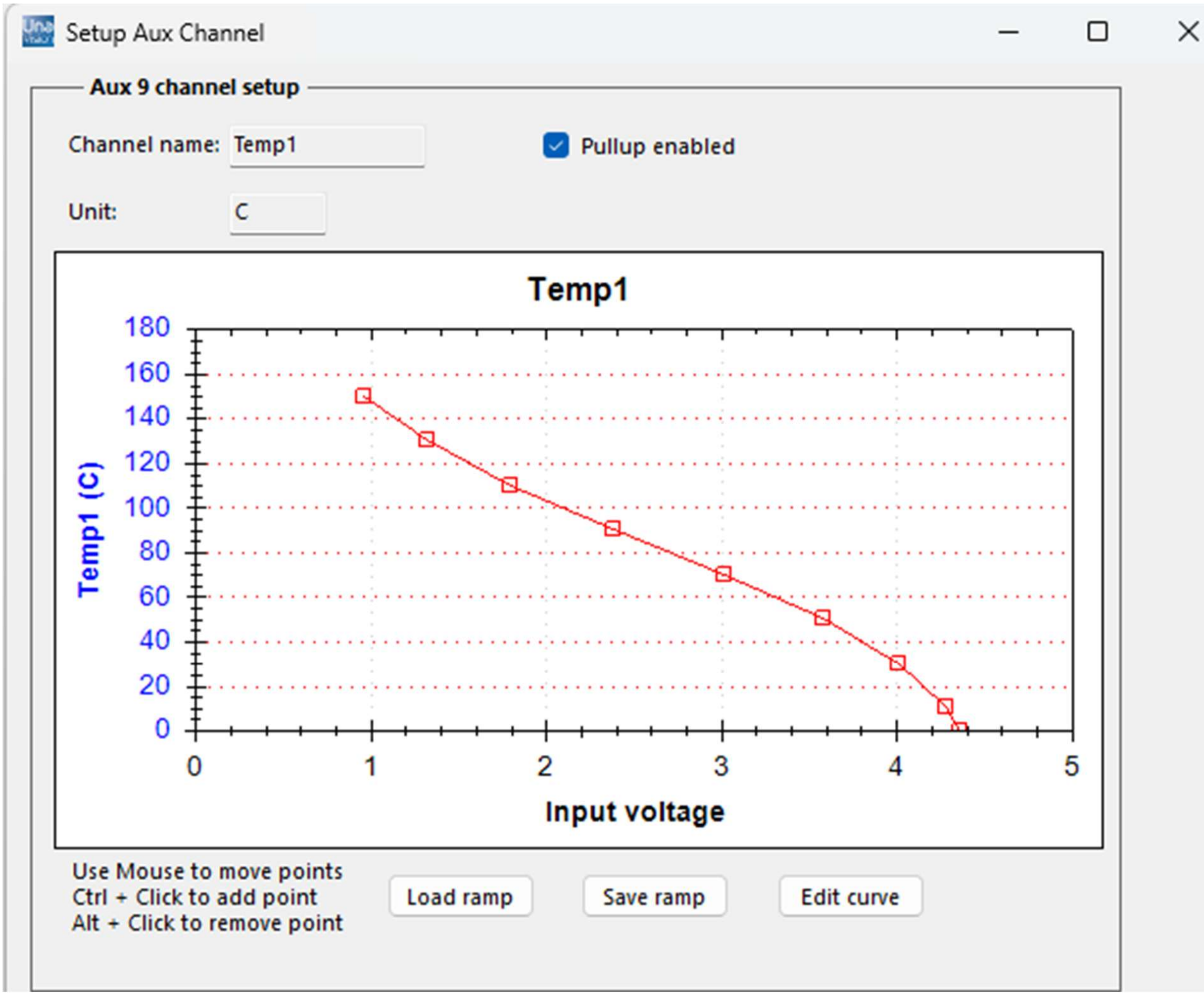


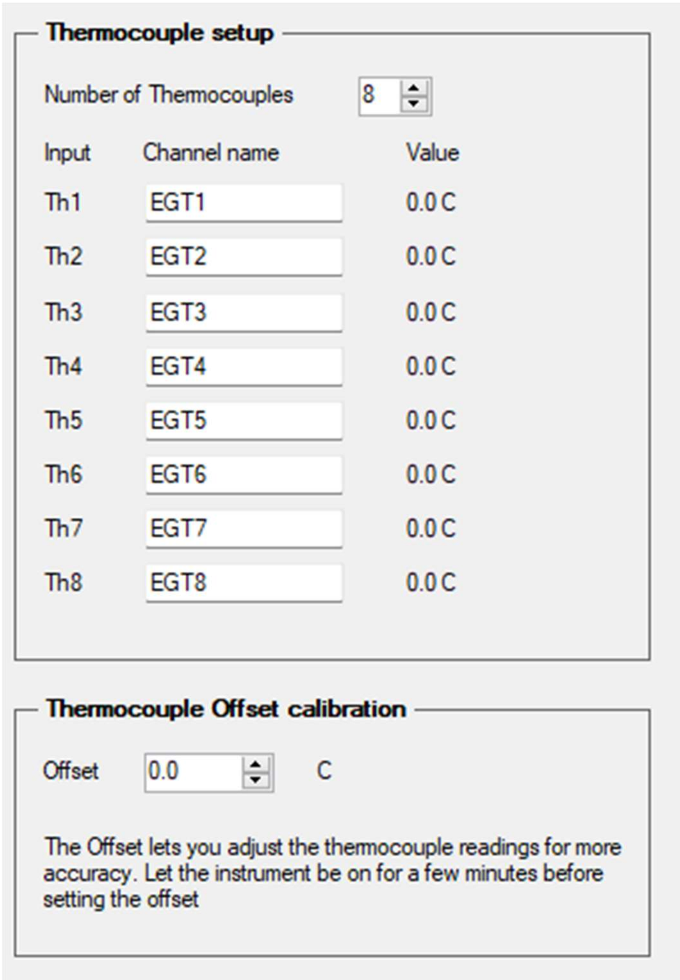
FIGURE 13 EXAMPLE AUX SETUP

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.

The Ultimate v2 has built-in pullup resistors for Aux9-Aux16 that can be enabled in the software.

7.7 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.



7.8 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.

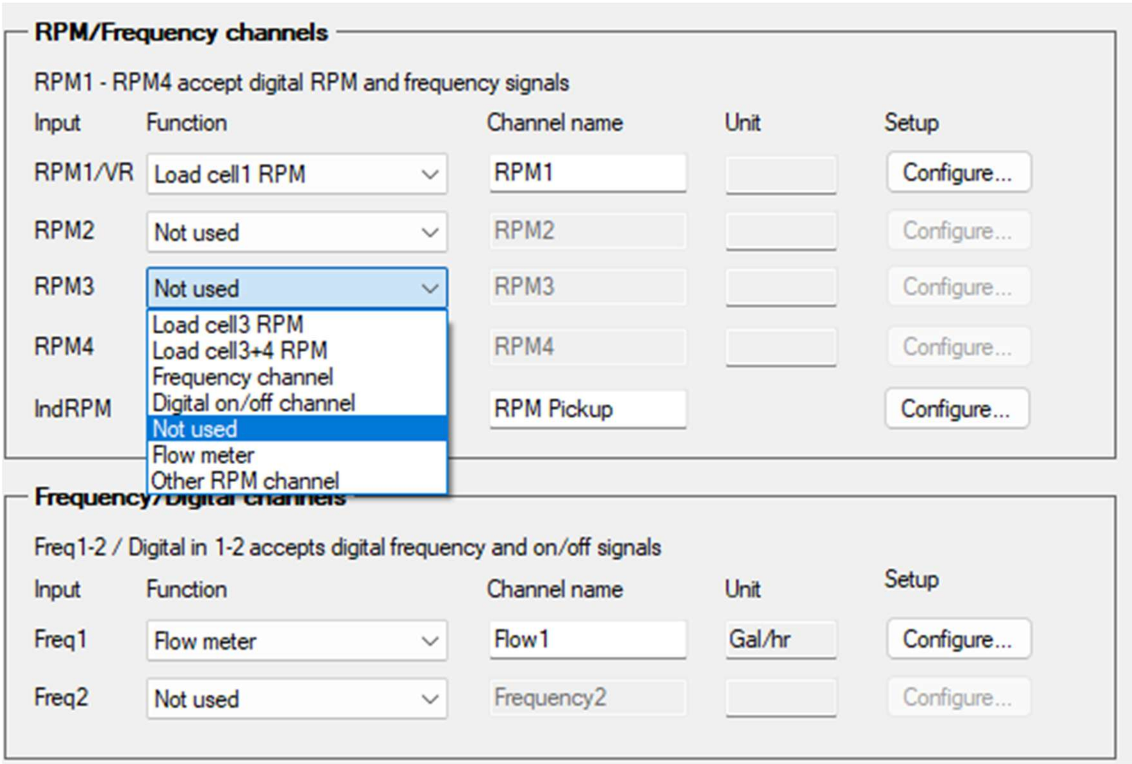


FIGURE 14 RPM/FREQUENCY CHANNEL SETUP

7.8.1 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

FIGURE 15 CORRECT CHANNEL ASSIGNMENTS

7.8.2 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.

7.8.2.1 Drive ratio

Use the Drive ratio option in case the Load cell RPM channel is not measuring the brake RPM directly. It is defined as the number of brake revolutions per rpm sensor revolution (e.g. 2 if the brake spins twice as fast as the RPM trigger wheel).

7.8.3 Frequency channels

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

7.8.4 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.

7.8.5 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.

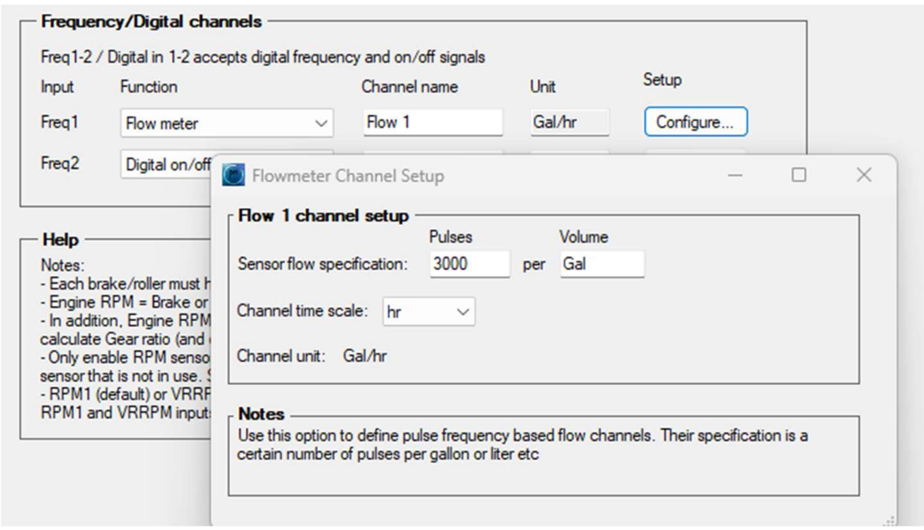


FIGURE 16 CONFIGURE THE FLOW METER CHANNELS

7.9 Brake and output channels

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

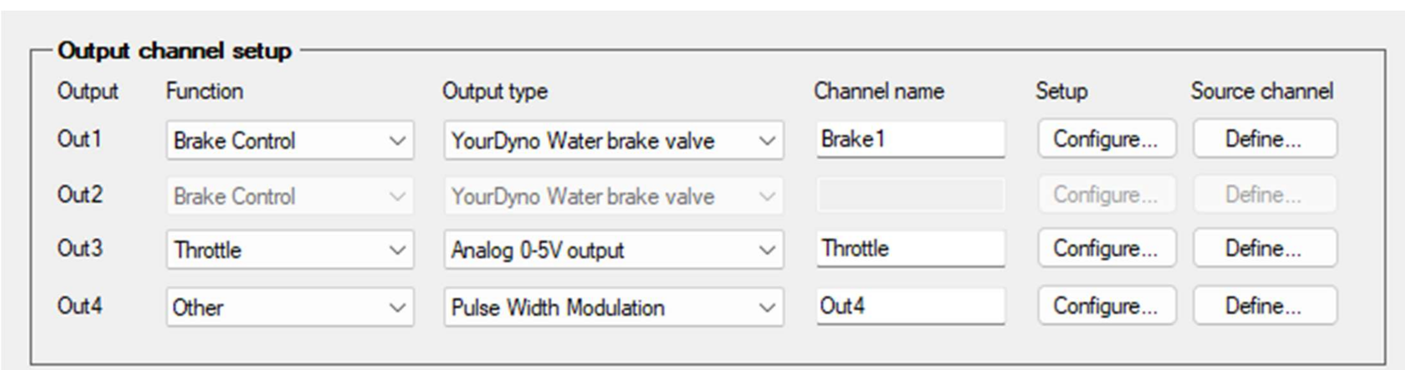


FIGURE 17 CONFIGURE OUTPUT CHANNELS

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

7.9.1 Brake controller setup

The physical connection(s) to the brake(s) are set up 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.

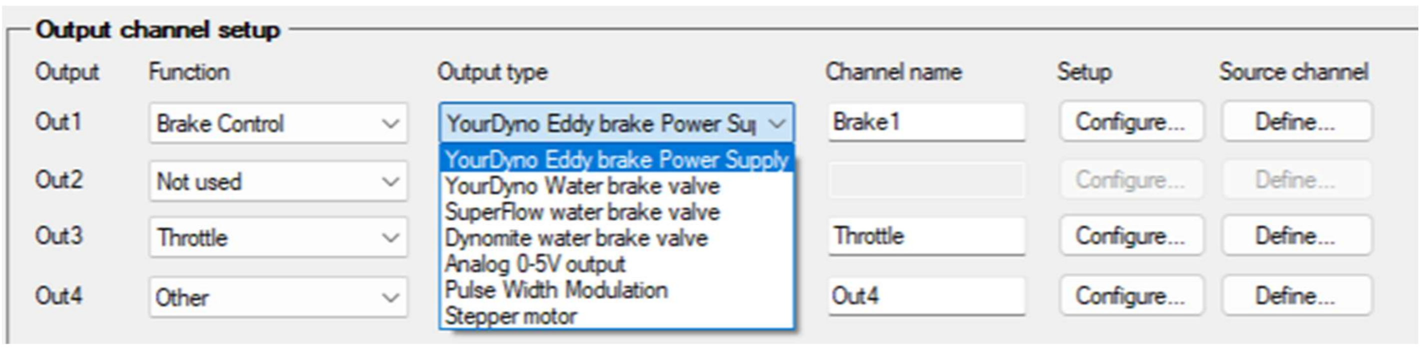


FIGURE 18 BRAKE TYPE SELECTION

7.9.1.1 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.

⚠

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).

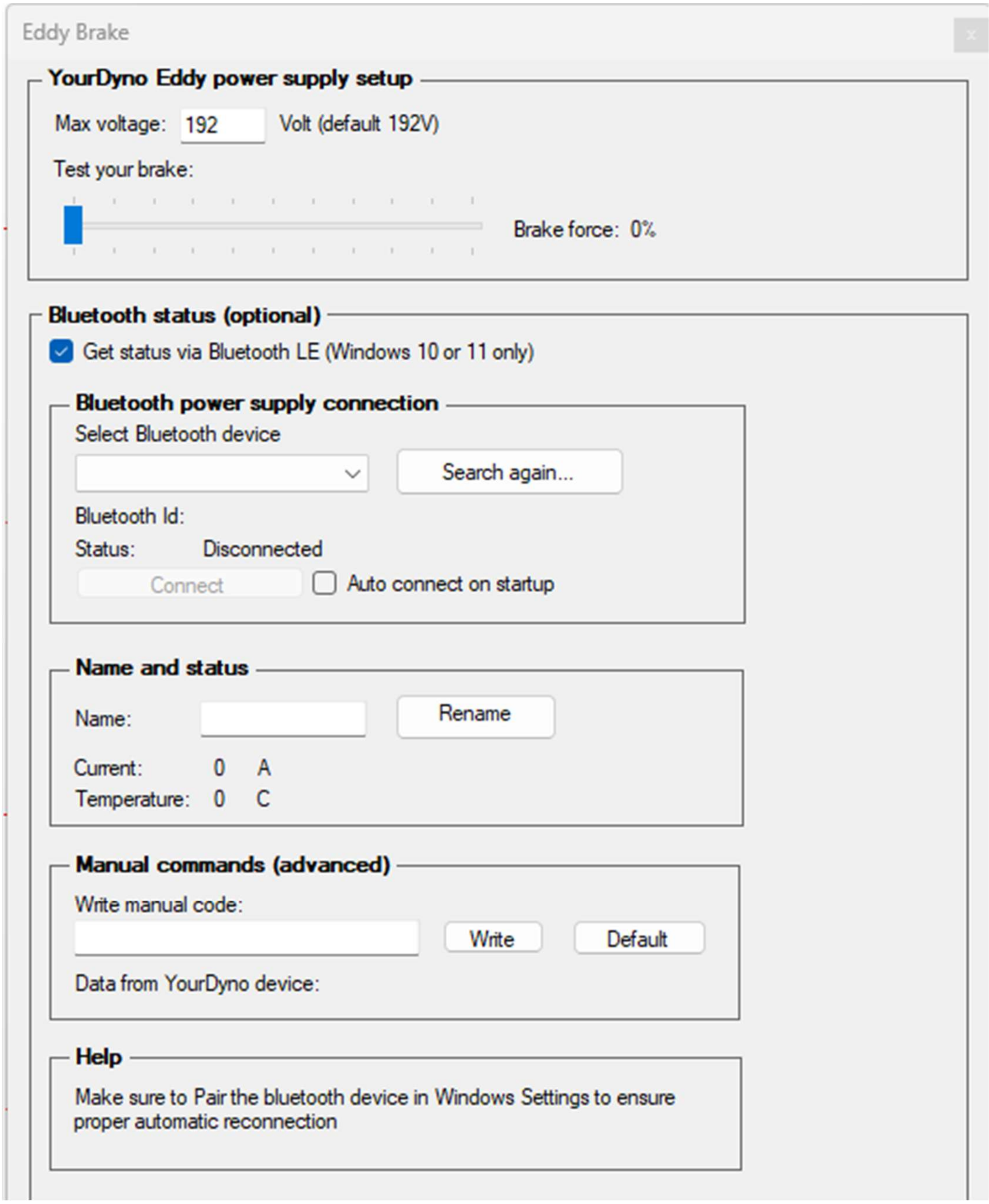


FIGURE 19 EDDY BRAKE CONFIGURATION

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.

⚠

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!

7.9.1.2 Water brake valves

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

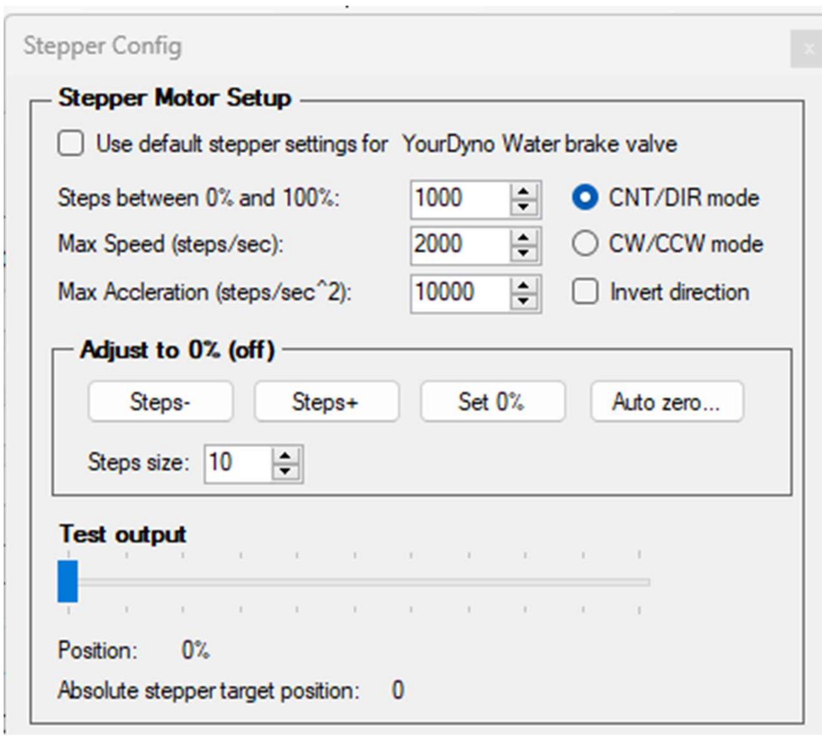


FIGURE 20 STEPPER MOTOR CONFIGURATION

See individual manuals for the valves for the detailed setup.

7.9.1.3 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

7.9.2 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.

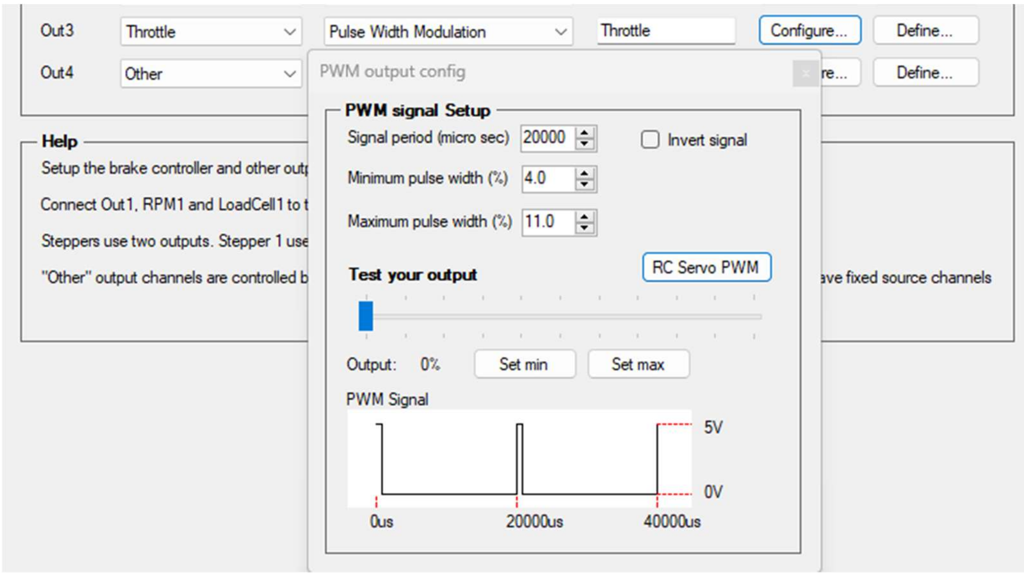


FIGURE 21 PULSE WIDTH MODULATION CONFIGURATION

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

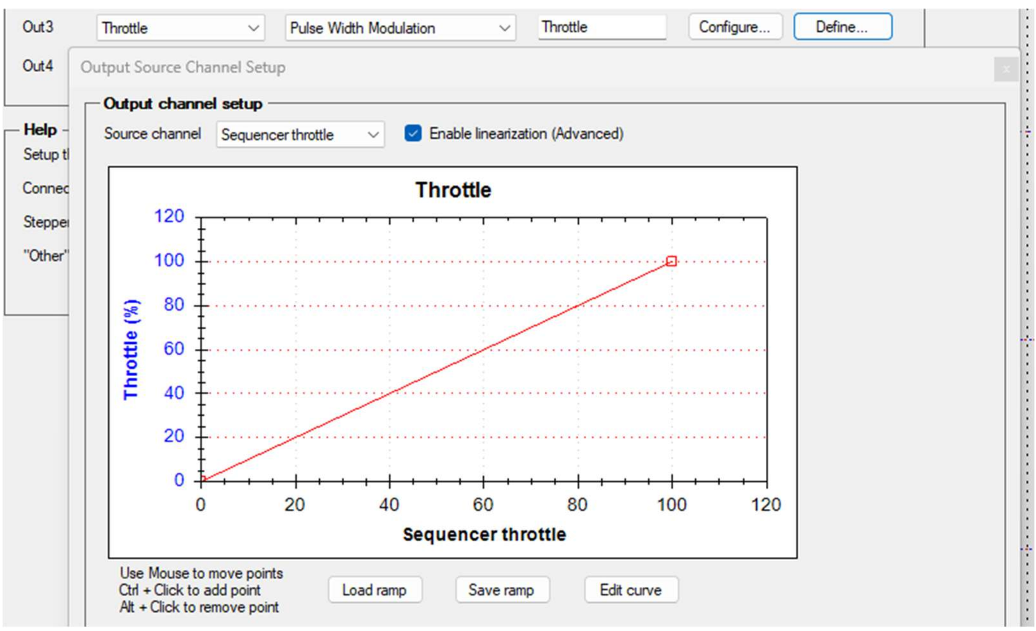


FIGURE 22 THROTTLE EXAMPLE

7.9.3 Generic outputs

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

7.10Speed and distance

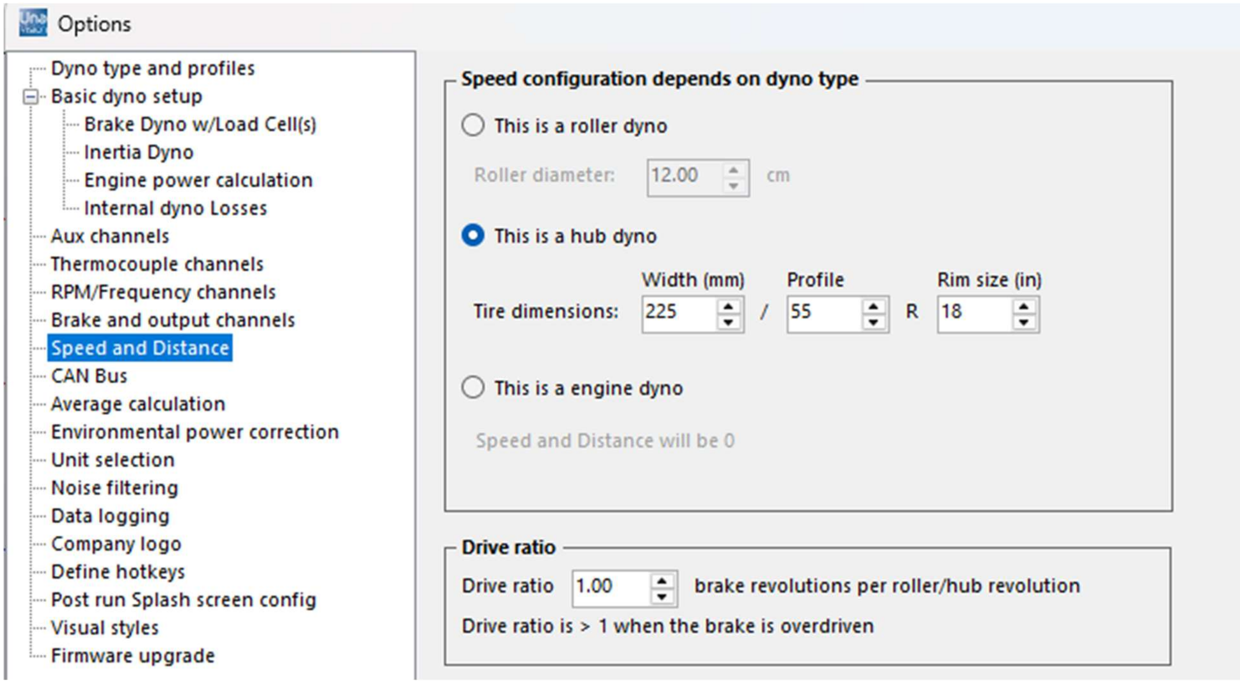


FIGURE 23 SPEED AND DISTANCE CONFIGURATION

For roller dynos set the roller diameter and for hub dynos set the wheel size here. This configures the Speed data channel and the Distance data channel.

Drive ratio is used in case the brake is overdriven. The Drive ratio is Brake RPM/roller or hub RPM.

7.11CAN 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.

7.11.1CAN bus basics

A CAN bus is a very common communication protocol between different parts of the engine/vehicle 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 a CAN ID (address) and the data. The data is formatted a certain way, and you need to know that format to decode the data.

7.11.2 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), or add a ground wire between the CAN device and YourDyno 0V.

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

7.11.3 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

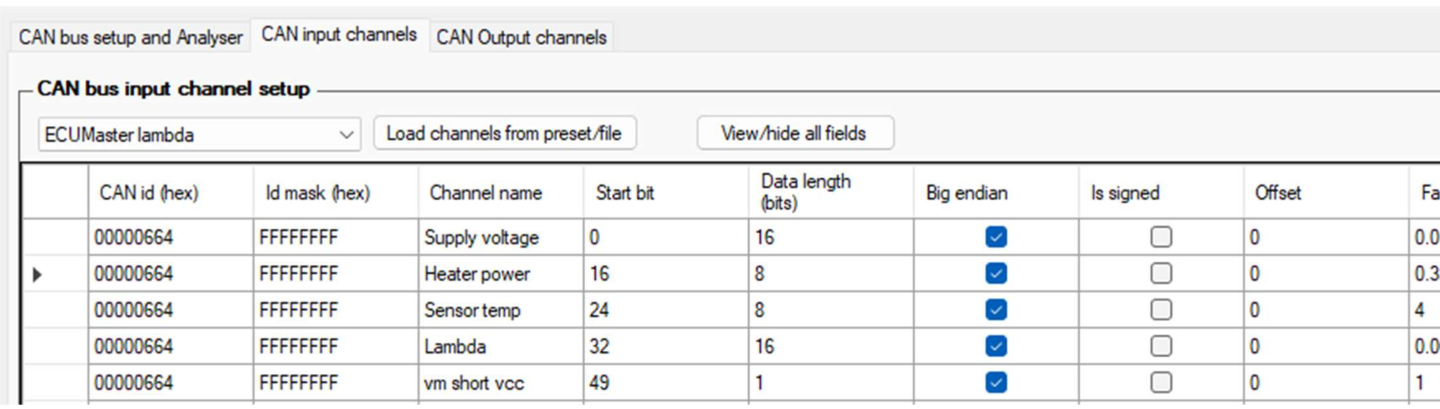


FIGURE 24 CAN BUS INPUT CHANNEL CONFIGURATION

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

Channel type: Typically "Data". For compound CAN messages, select "Multiplexor" or "Multiplexed data".

Multiplexor: Used for Compound CAN messages. The Multiplexor channel is defined here. It is defined as any other CAN channel, but is used by Multiplexed Data channels.

Multiplexed data: These channels are Compound data CAN channels. They are updated by CAN messages that contain a match in the Multiplexor 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)

7.11.4 CAN Outputs

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

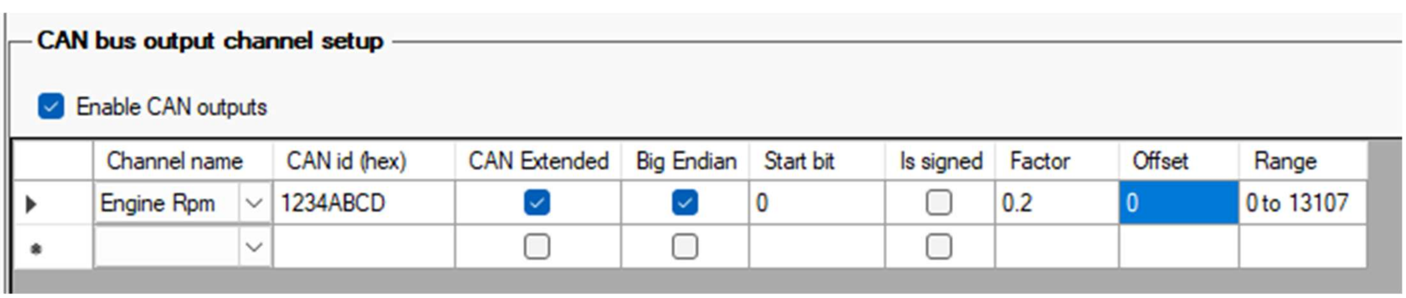


FIGURE 25 CAN BUS OUTPUT CHANNEL CONFIGURATION

The columns are similar in function as for CAN inputs.

7.12 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.

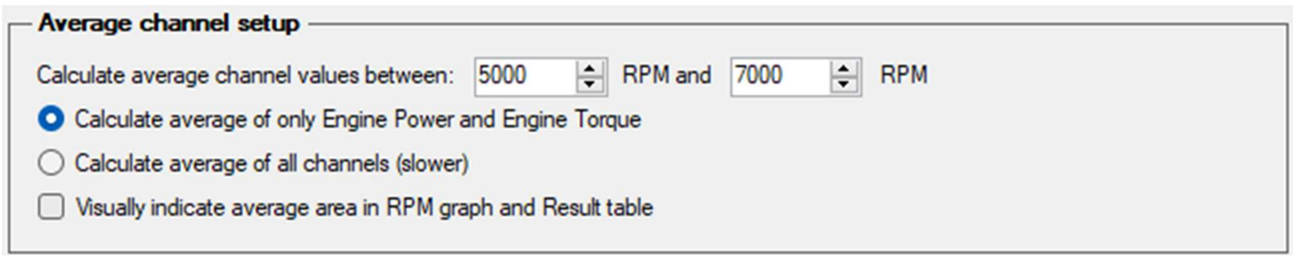


FIGURE 26 DEFINE THE RPM AREA AND TYPE OF AVERAGE CALCULATION

7.13 Environmental (weather) correction

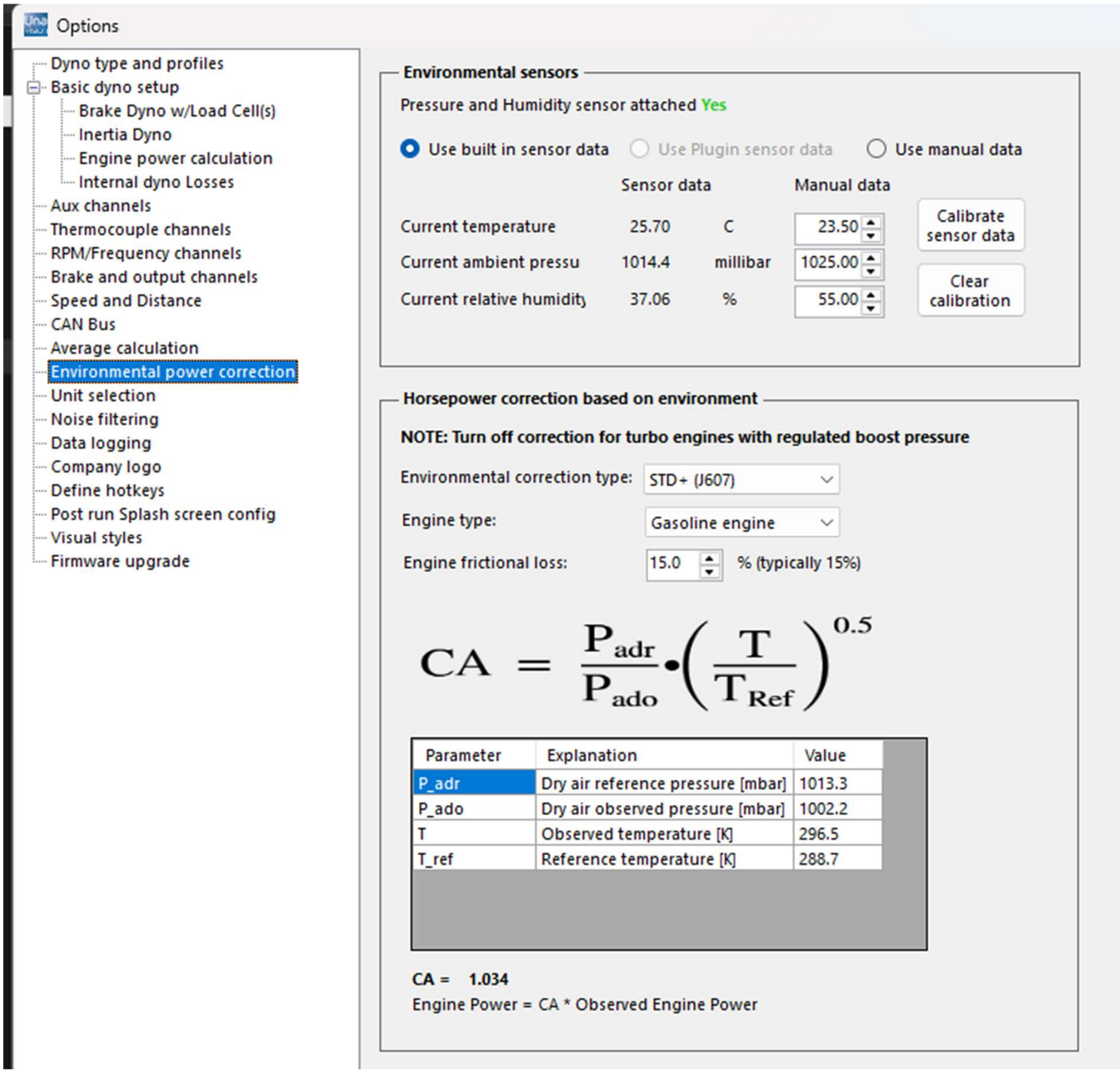


FIGURE 27 ENVIRONMENTAL POWER CORRECTION

7.13.1 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

7.13.2 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.

7.13.3 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.

7.13.4 Calibration

The YourDyno sensor can be calibrated by entering manual data and clicking “Calibrate sensor data”. The calibration is cleared by clicking “Clear calibration”.

7.14 Unit selection

You can choose between different units in this section:

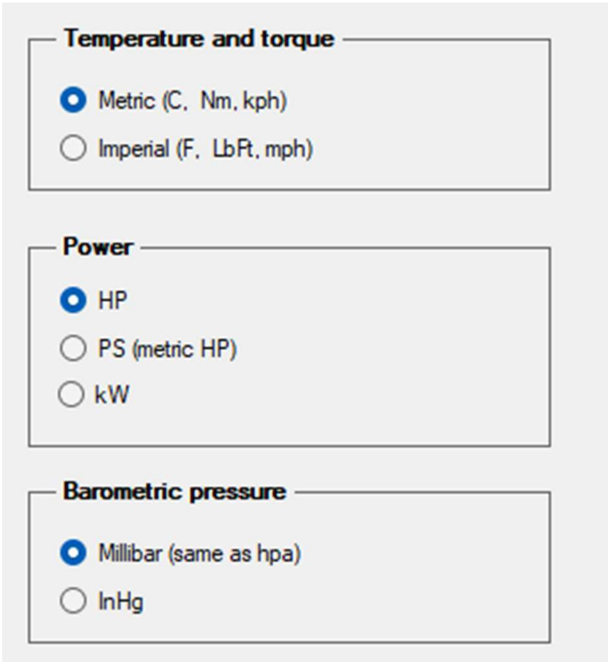


FIGURE 28 UNIT SELECTION

7.15 Noise filtering

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

We advise to use lowest possible settings that allow good results and graph smoothing. The Graph noise filtering setting filters the results. 3 to 5 are normal.

⚠

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

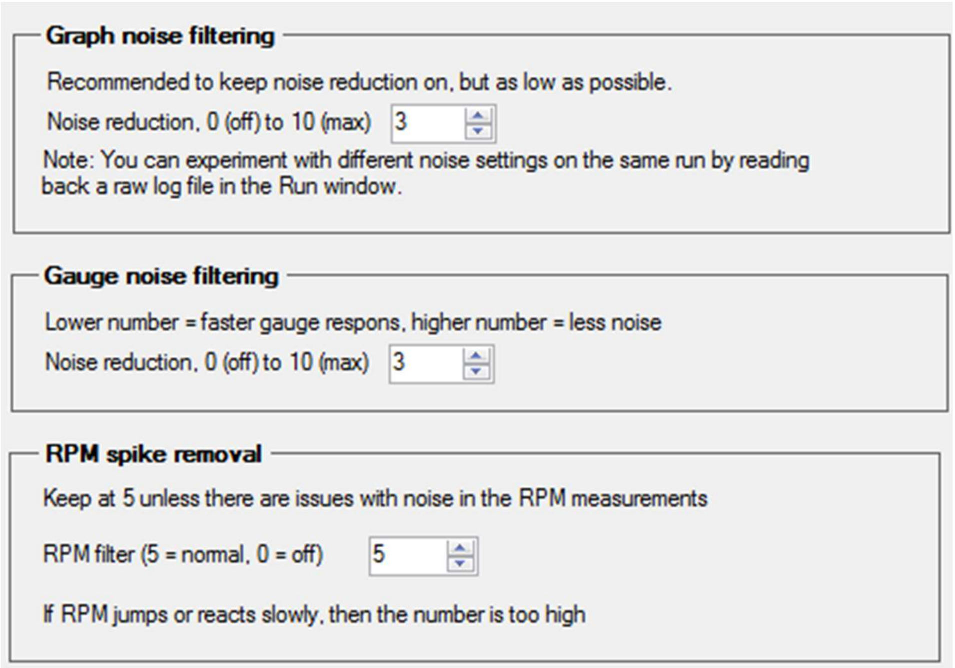


FIGURE 29 NOISE FILTERING OPTIONS

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

7.15.1 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.

7.16 Data logging

All data is logged at about 115Hz. Data compression can be enabled for very long runs. What a “very long run” means depends on the speed of the computer and the number of data channels but can be from about 3 to 15 minutes. If the operation is sluggish and updates are slow, compression can be turned on.

Otherwise leave the down sampling factor at 1 (no compression).

It is possible to change the compression and click the Re-run button to run with different compression, as all data is stored in the database.

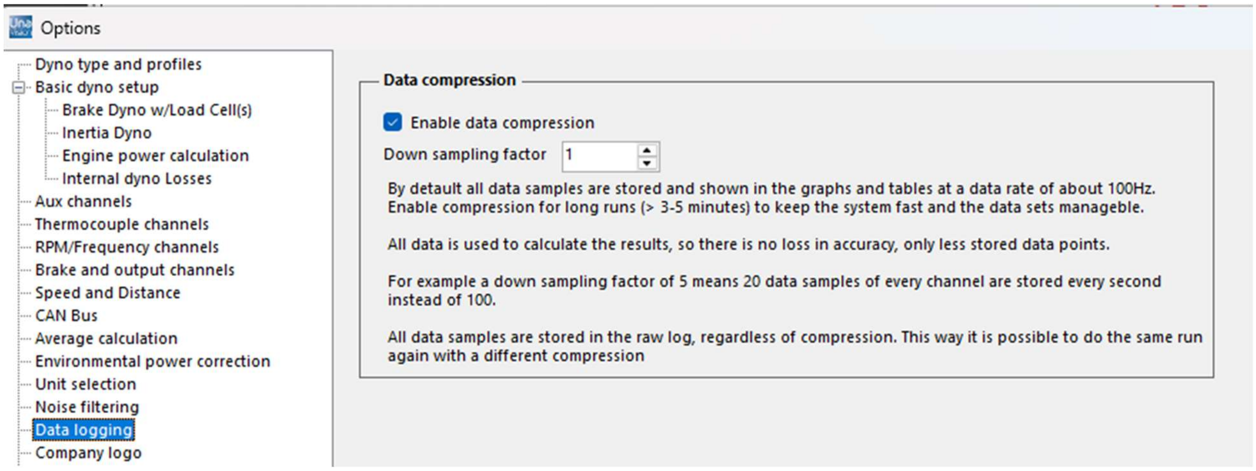
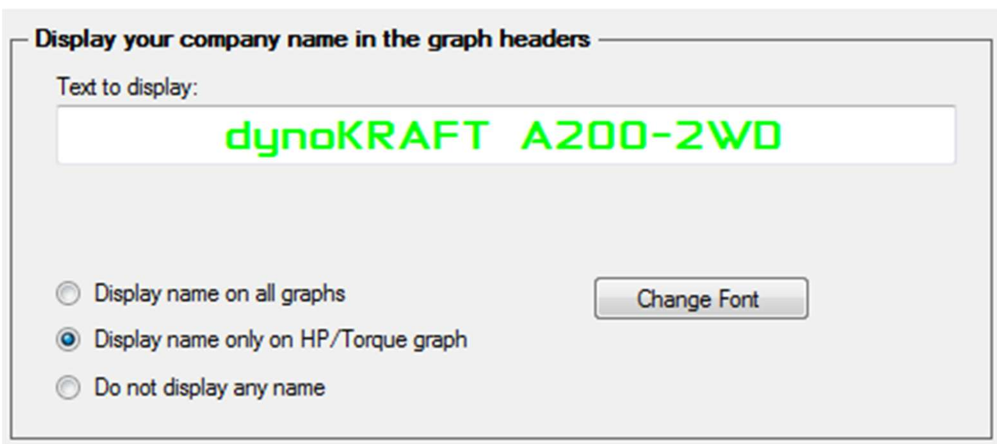


FIGURE 30 DISABLE DATA COMPRESSION OR LEAVE IT AT 1 EXCEPT FOR VERY LONG RUNS

7.17 Company logo

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

This text will also be visible on print-out.



7.18 Define hotkeys

Use this section to define hotkeys on a keyboard.

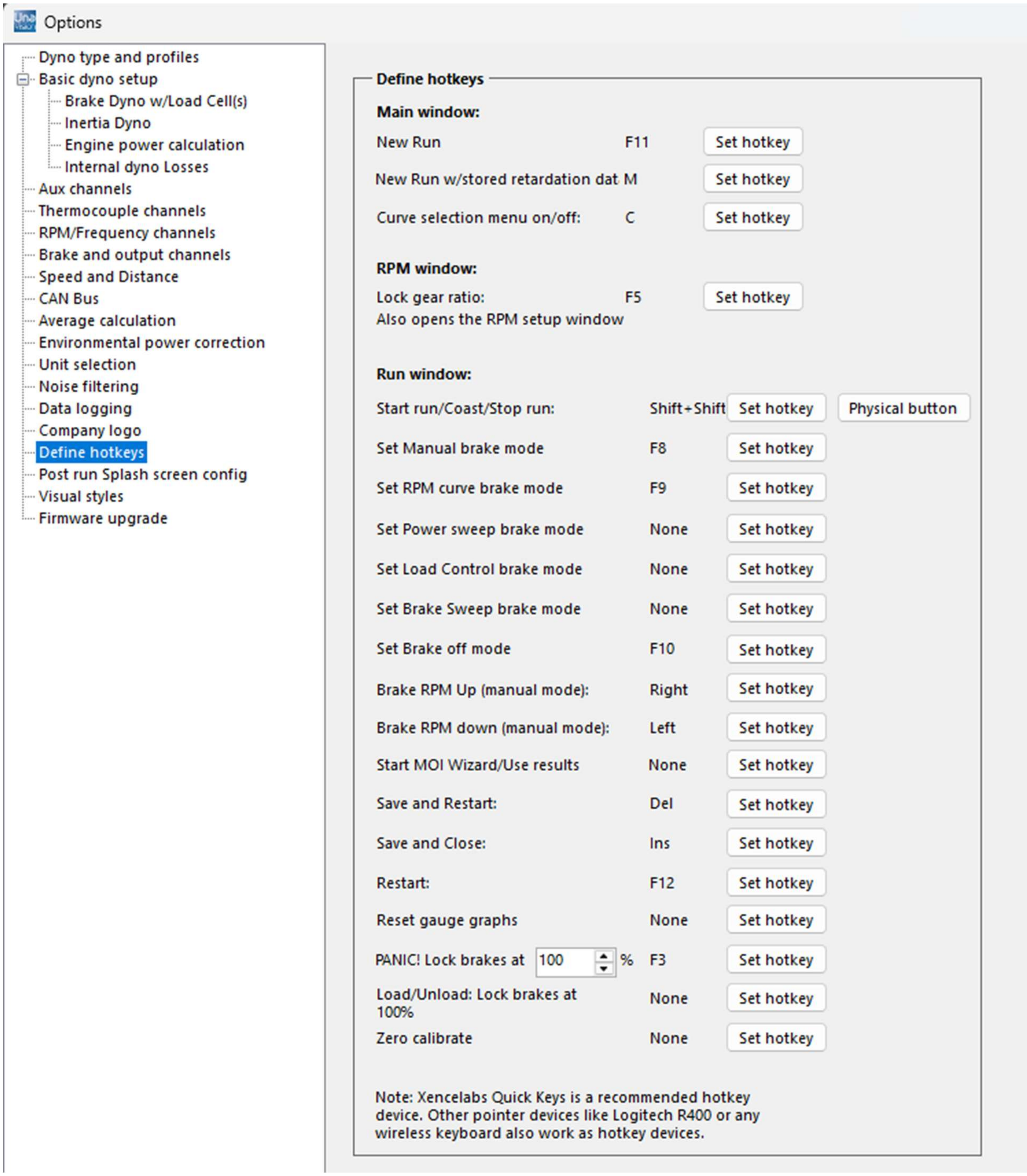


FIGURE 31 HOTKEYS ARE VERY USEFUL FOR QUICK OPERATION

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.

7.18.1 Physical button for Start/Stop

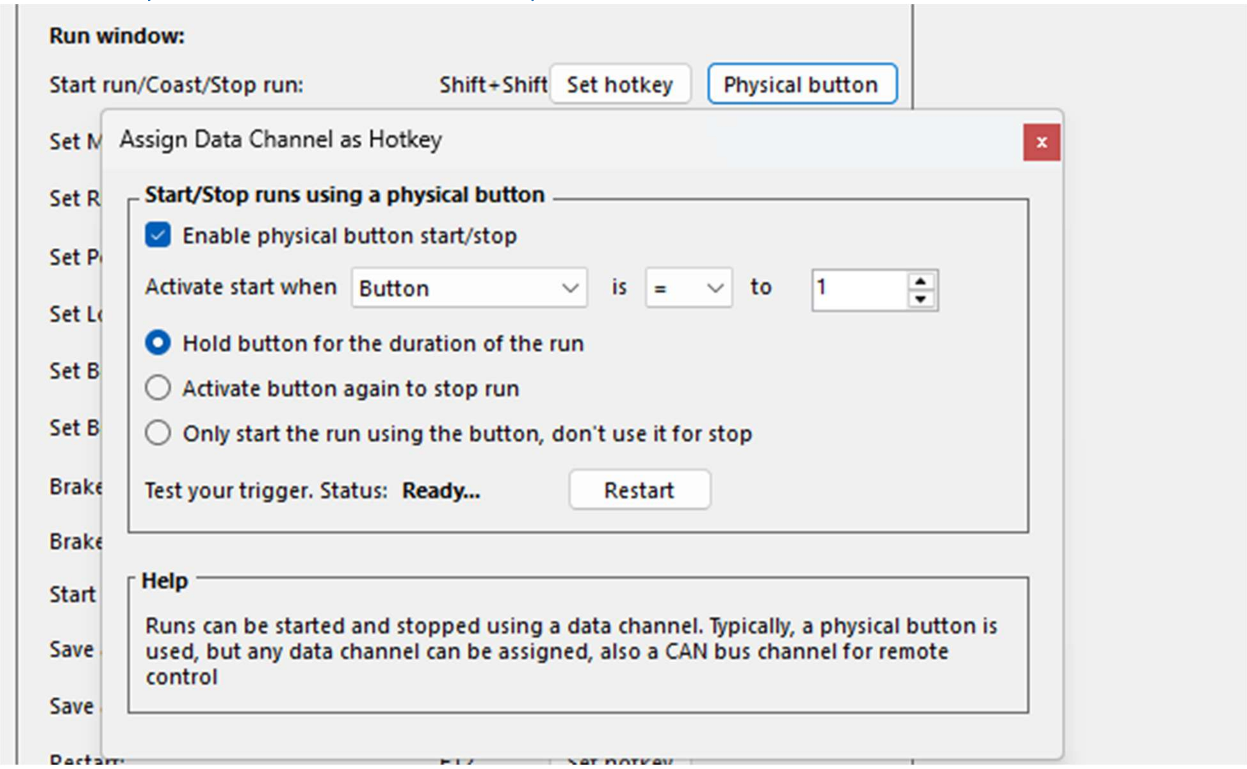


Figure 32 Configuring a physical button to start/stop the run

Any data channel can be used to start and stop a run. Here are some examples of typical usage:

- A physical button wired into a digital input (RPM3/4 or Freq1/2) or an Aux channel:
    - Some dyno operators prefer a button on the throttle lever which is held down for the duration of the run
    - When simulating a drag race start, the Trans brake button can be wired in to a digital channel and be used to start the sweep
- A CAN bus channel from a different system is used to start/stop

7.19 Post run Splash screen config

This option is used to configure the splash screen that pops up after each run.

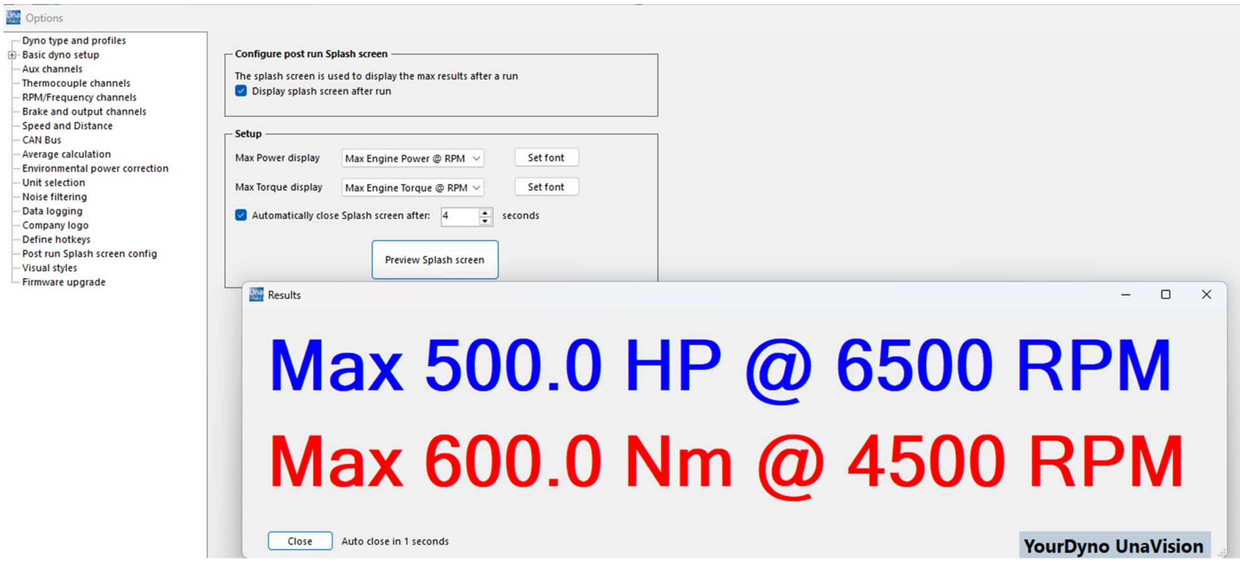


FIGURE 33 POST SCREEN POPUP CONFIGURATION

7.20 Visual styles

The styles of individual channels can be set here.

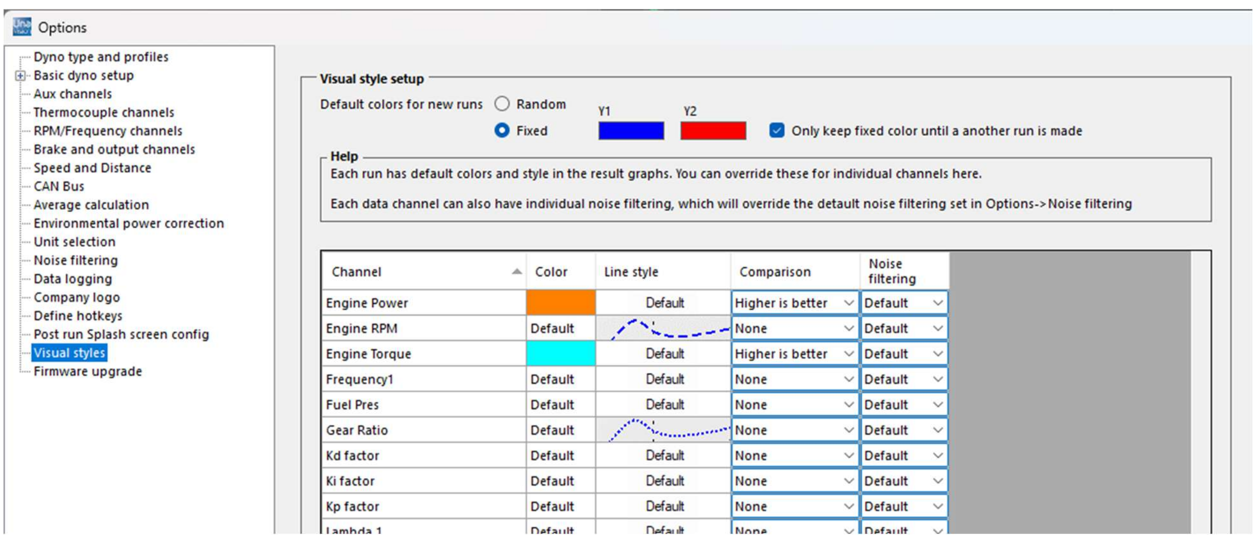


FIGURE 34 VISUAL STYLES

The following can be set per channel:

7.20.1 Color

The default color of graphs is set in the table below the graphs for the Y1 (left) and Y2 (right) axis. The colors for individual channels can be overridden by clicking on the color box. Right click to set it back to Default.

7.20.2 Line style

The default line style for a run is set in the table below the graphs. The line style for individual channels can be overridden here by clicking the Line style box.

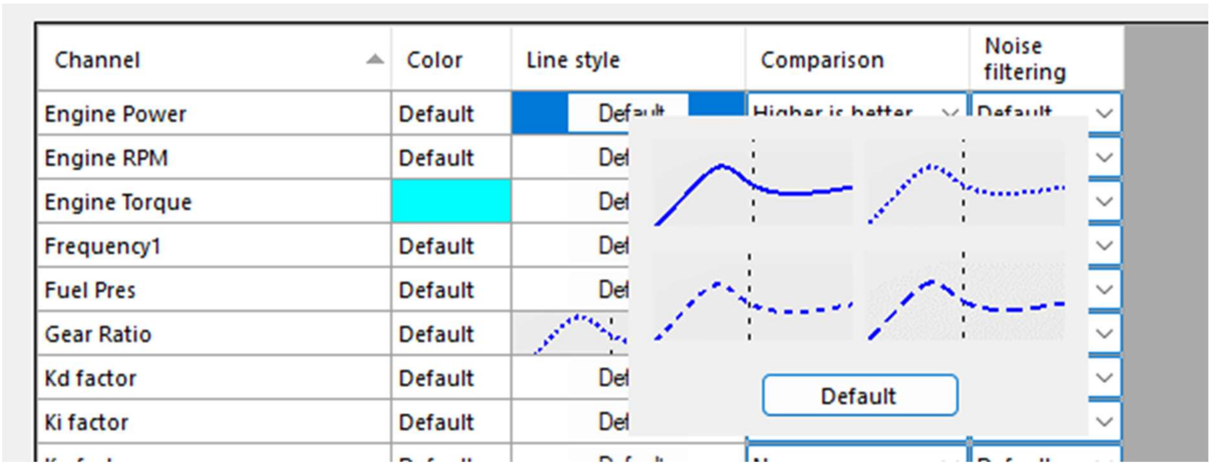


FIGURE 35 LINE STYLE CAN BE SET PER CHANNEL

7.20.3 Comparison

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.

The comparison settings also affect highlighting in Result tables. The highest number will be highlighted green for channels that are set to Higher is better and vice versa for Lower is better.

7.20.4 Noise filtering

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

7.21 Firmware upgrade

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

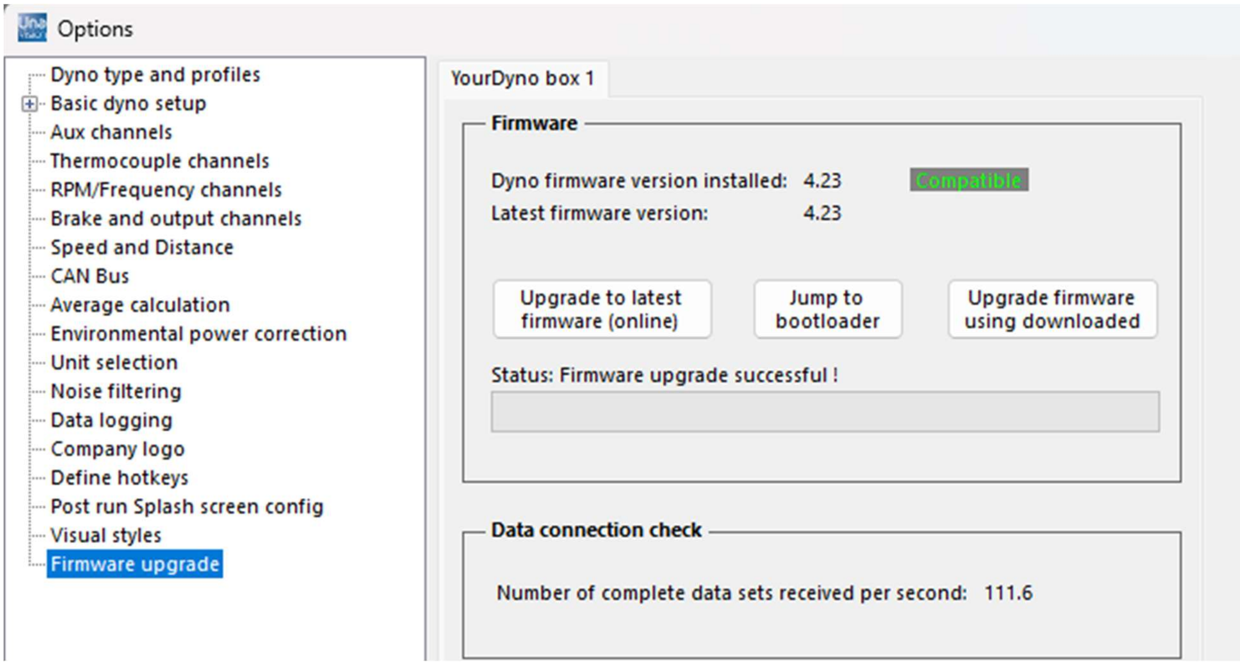


FIGURE 36 FIRMWARE UPGRADE

Choosing “Upgrade firmware to latest” is the most common way to upgrade the firmware. Alternatively, first press “Jump to bootloader” then press “Upgrade to latest”.

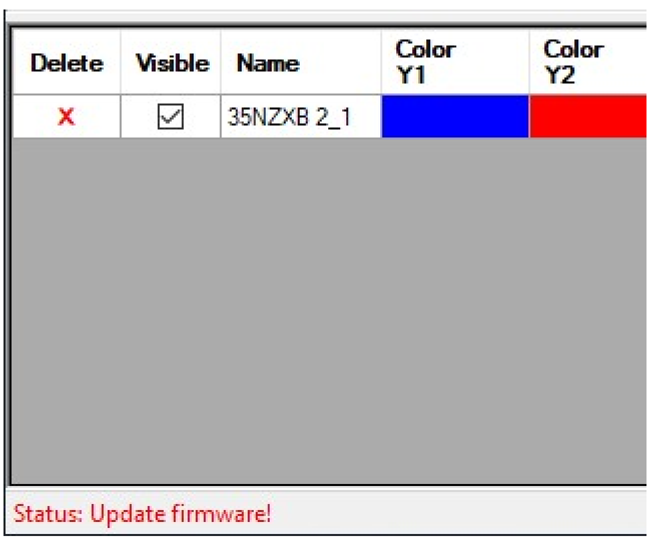


FIGURE 37 FIRMWARE MUST BE UPDATED

⚠

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 Menu: Run

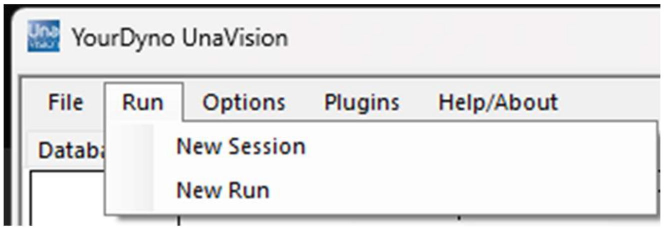


FIGURE 38 RUN MENU

8.1 New 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.

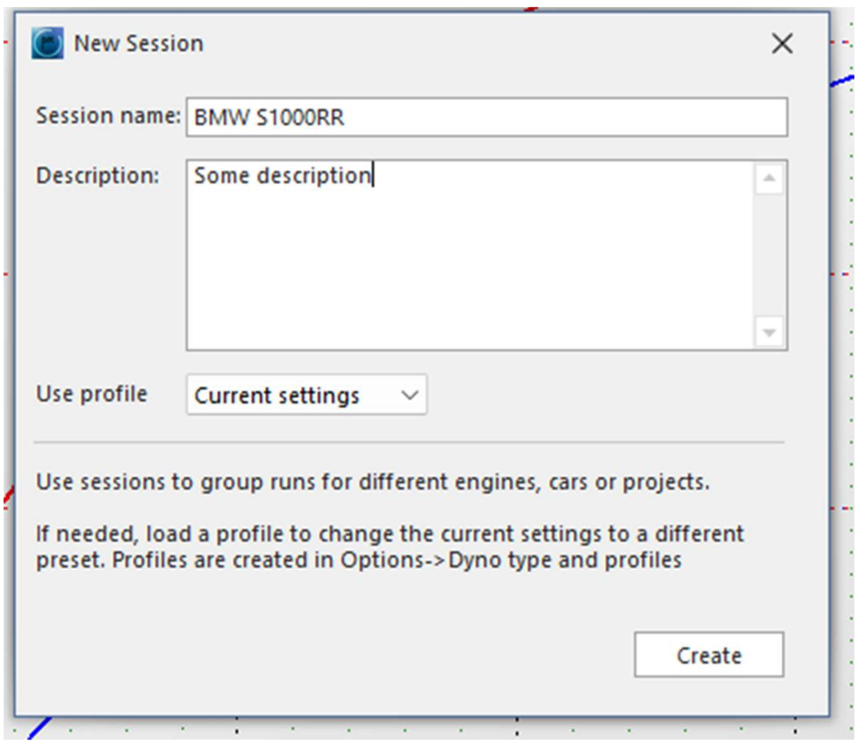


FIGURE 39 CREATE NEW SESSION

Choose a session name and a description. A new session can be created with the current settings, or by selecting a specific profile. More on Profiles later.

8.2 New run / New run + new retardation data

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

In case the option “Measure retardation losses” is turned on, the menu will be called “New run + new retardation data”.

9 Configuring and performing dyno runs

9.1 Overview

The Run window opens when the New run menu is selected. It shows the gauges and various statuses and lets you configure and control the run.

FIGURE 40 THE RUN WINDOW

9.2 Configuring Gauges

9.2.1 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.

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

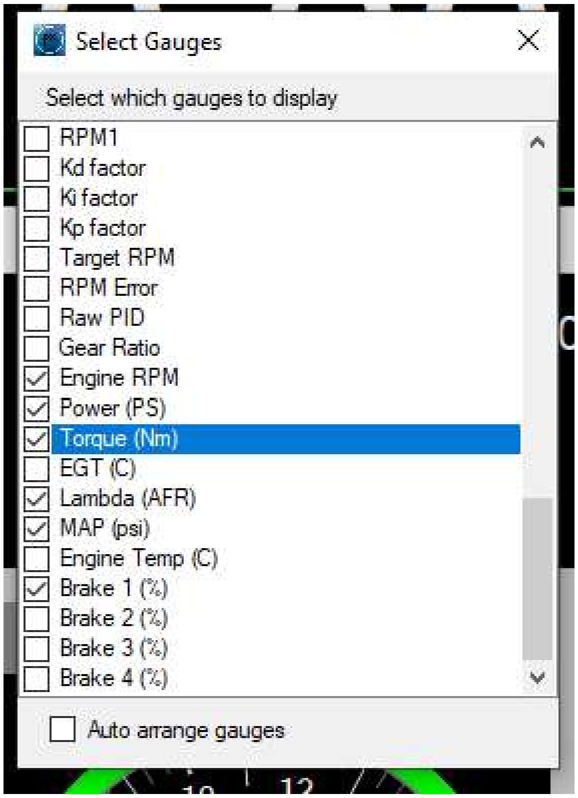


FIGURE 41 SELECT WHICH DATA CHANNELS TO DISPLAY

9.2.2 Types of gauges

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

9.2.2.1 Analog

This is a typical "tacho" style gauge with definable green, yellow and red areas.

FIGURE 42 ANALOG GAUGE

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

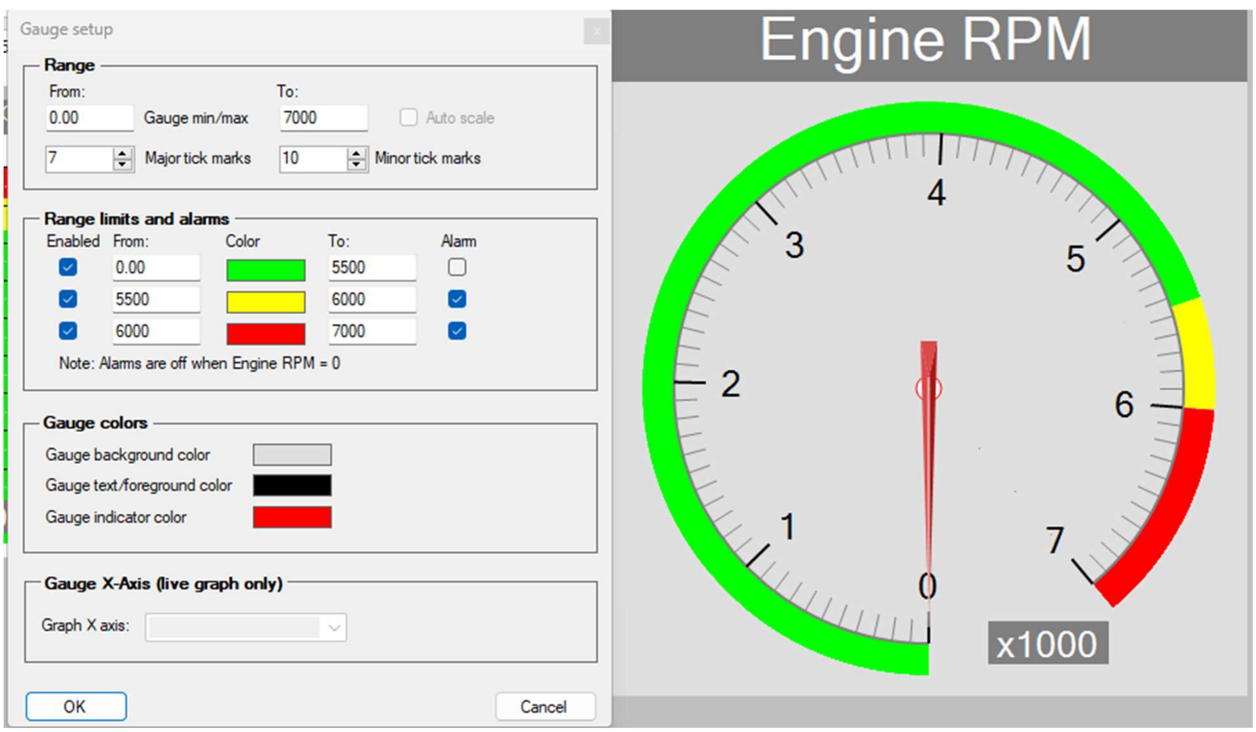


FIGURE 43 RIGHT CLICK BRINGS UP THE CONFIGURATION WINDOW FOR EACH GAUGE

9.2.2.2 Digital

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

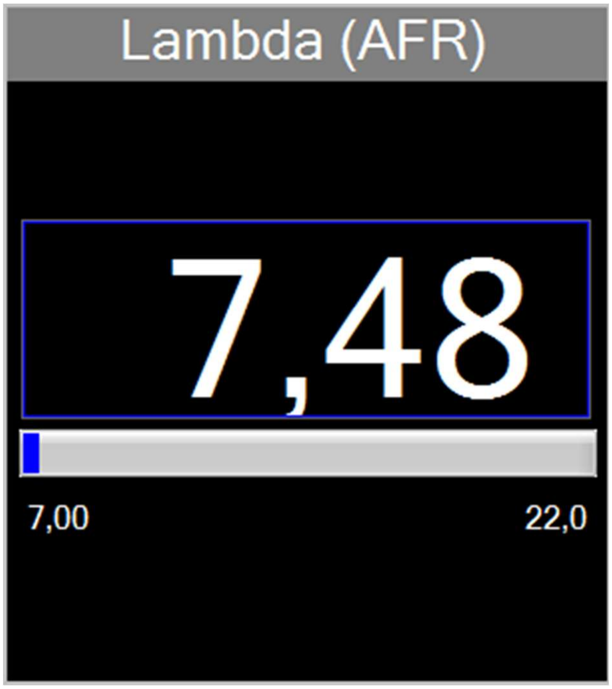


FIGURE 44 DIGITAL GAUGE

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

9.2.2.3 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”.

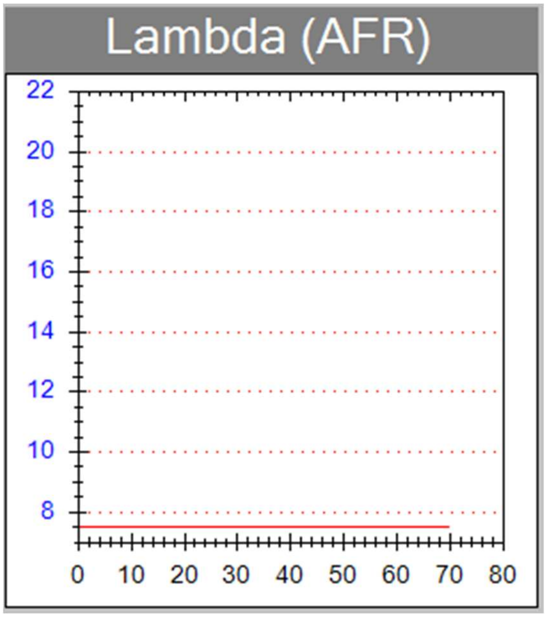


Figure 45 Graph gauge

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).

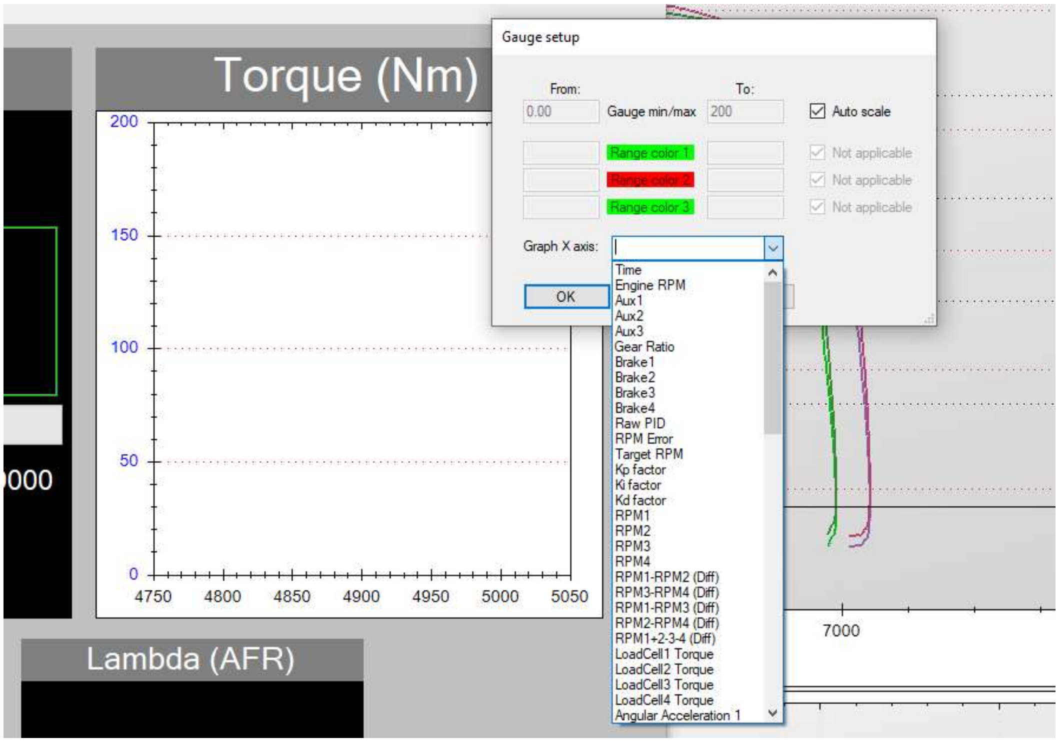


FIGURE 46 DEFINE THE X-AXIS OF THE GRAPH GAUGE

9.2.2.4 Bar gauge

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

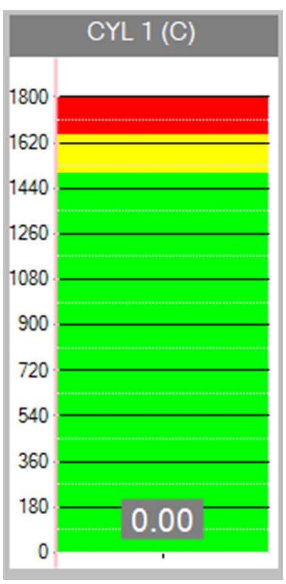


FIGURE 47 BAR GAUGE

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

9.2.2.5 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.

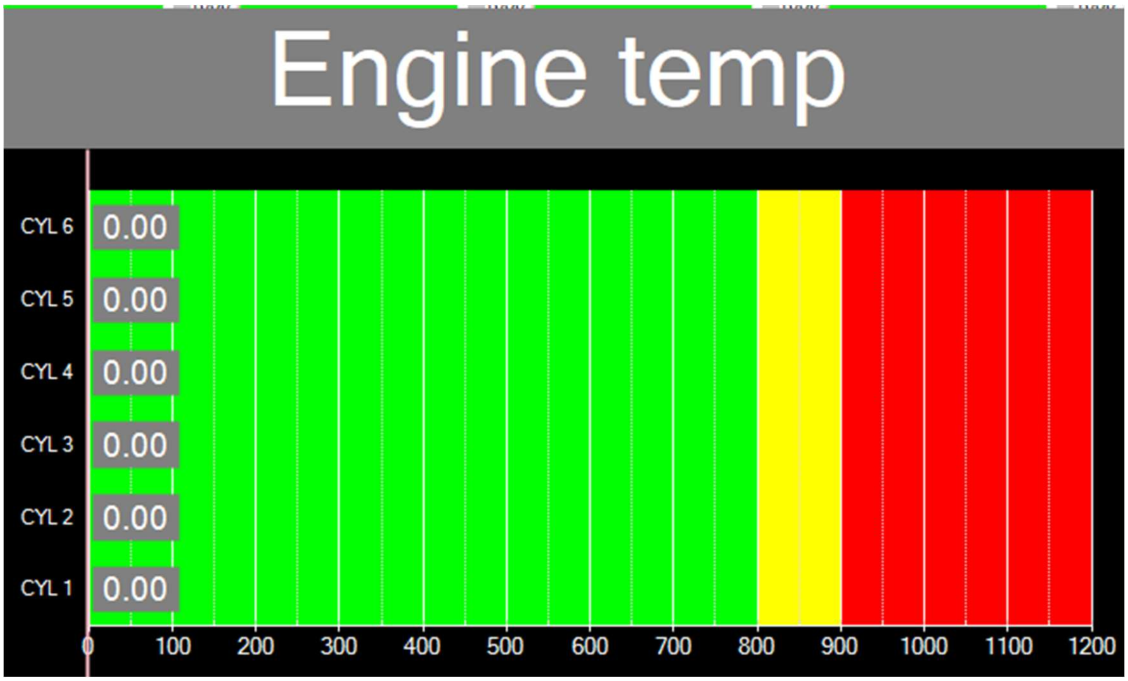


FIGURE 48 EXAMPLE OF A GROUP GAUGE

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).

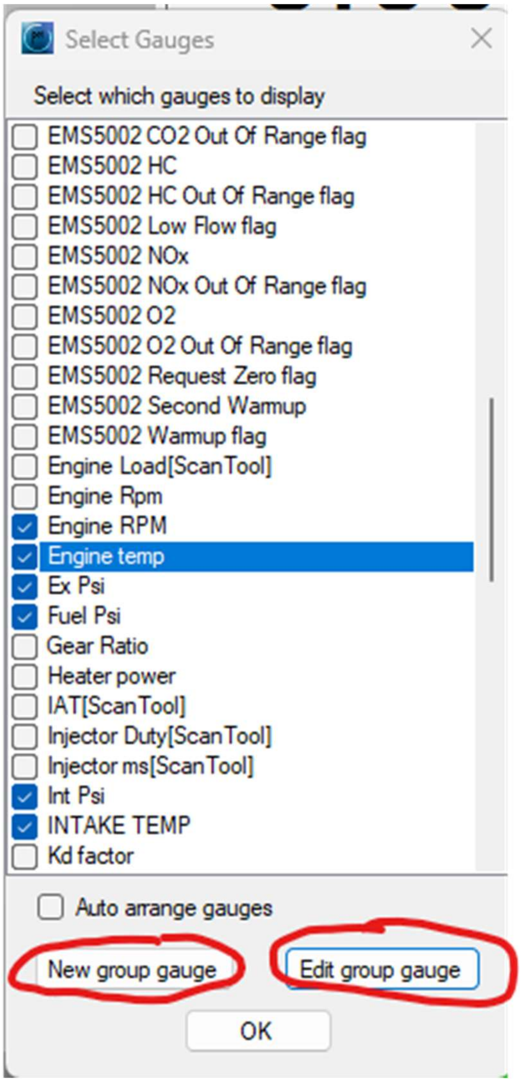


FIGURE 49 EDITING A GROUP GAUGE

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

9.2.3 Example of a gauge console

FIGURE 50 EXAMPLE GAUGE CONSOLE

9.3 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.

9.3.1.1 Tacho

This is a quick and simple way of determining the Gear ratio.

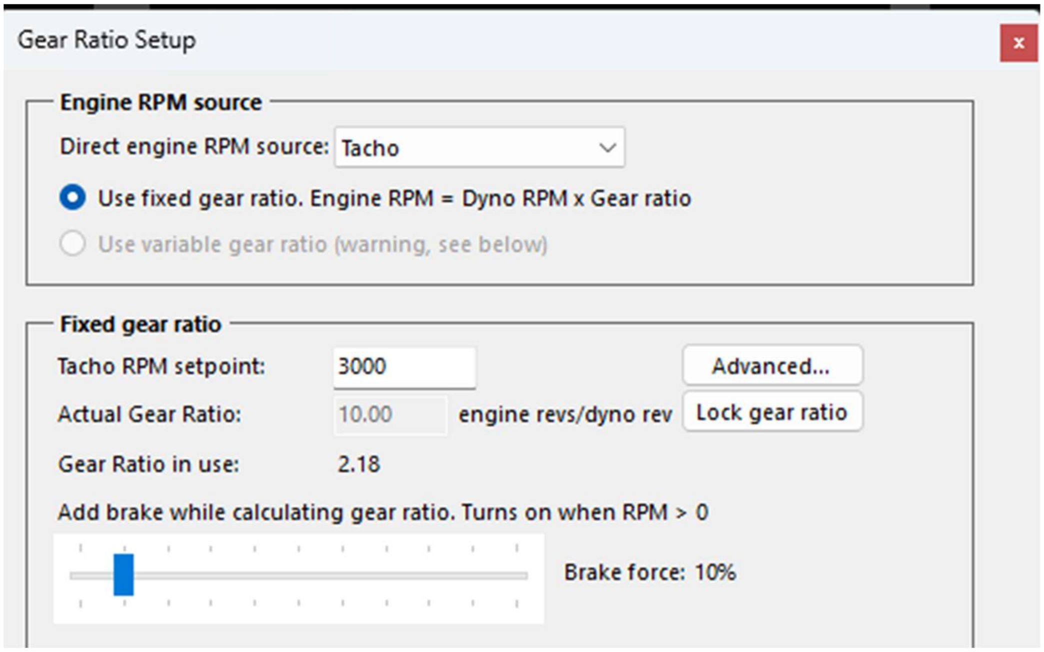


FIGURE 51 USING THE TACHO TO SET THE GEAR RATIO FOR FIXED GEAR RATIO

1. Select Tacho RPM setpoint. It is recommended to use some RPM that is easy to keep 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
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.

Note that whenever you change gear, the Gear ratio will be off and you need to repeat the procedure

9.3.1.2 Using other channels as the direct Engine RPM source

Other channels, for example OBD2, CAN bus or 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. It is not necessary to hold a specific RPM, just hold it steady and press the “Lock gear ratio” button.

9.3.1.3 Variable gear ratio

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

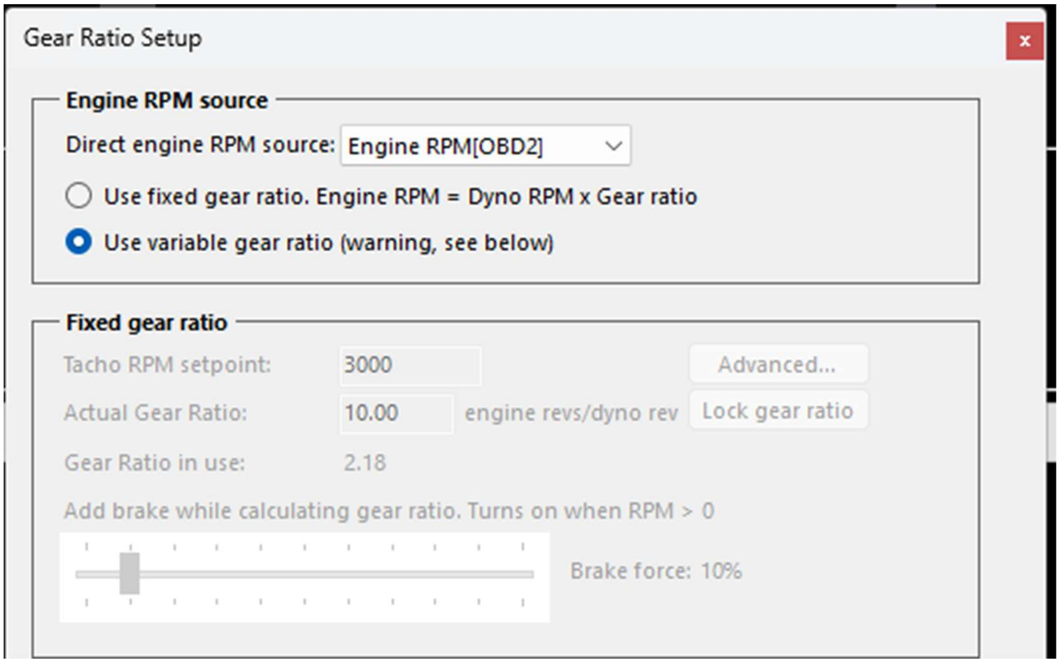


FIGURE 52 VARIABLE GEAR RATIO

This requires a direct engine RPM measurement, for example from the CAN bus, OBD2 or inductive RPM pickup.

With this option, the gear ratio is constantly recalculated based on the direct engine RPM channel and the dyno RPM.

The variable gear ratio option is only viable if the RPM channel is clean (no spikes). Inductive RPM pickups sometimes have noise. This noise will impact the brake response when running sweeps vs RPM. RPM from CAN bus or OBD2 is clean. Note however that some OBD2 systems have a slow update rate, so the gear ratio will not update as often as may be necessary for smooth operation.

9.4 Brake Setup

YourDyno supports many different brake control modes, suitable for almost any scenario and setup. Section 15.3 “Which is the right brake mode?” gives some tips about choosing the best brake mode in various setups and scenarios.

In the Brake setup window you can set up the properties for the different Brake Control / Test Modes. To open the Brake Control Setup click the "Brake setup" button in Run window.

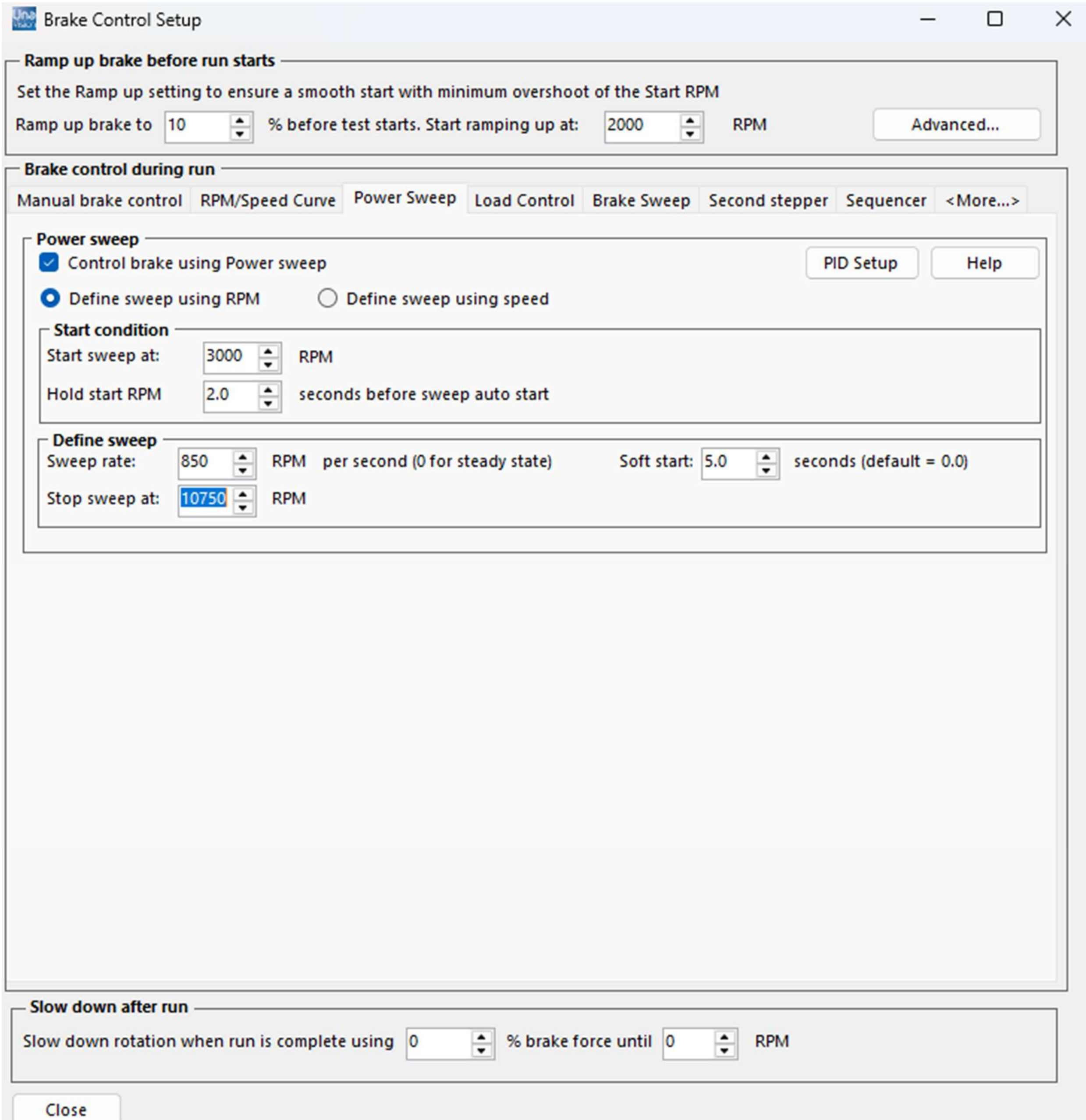


FIGURE 53 BRAKE SETUP: THE SWEEPS AND BRAKE CONTROL ARE SET UP HERE

9.4.1 General

The Brake Control Setup window can be read from top to bottom:

- The top section defines the brake behavior before the run starts
- The middle section defines the brake behavior during the run
- The top section defined the brake behavior after the run is finished

9.4.2 Ramp up brake

Use “Ramp up brake” to ensure the engine is 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.

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

9.4.3 Slow down after run

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

9.5 Brake control during the run

Here is where the run itself is defined in terms of start RPM, end RPM, sweep rate and brake control algorithm.

9.5.1 PID Setup

PID (Proportional, Integral, Derivative) is a standard regulation algorithm for RPM control. The following brake modes use PID:

- Manual Target RPM control
- RPM Curve vs Time
- Speed Curve vs Time
- Power sweep

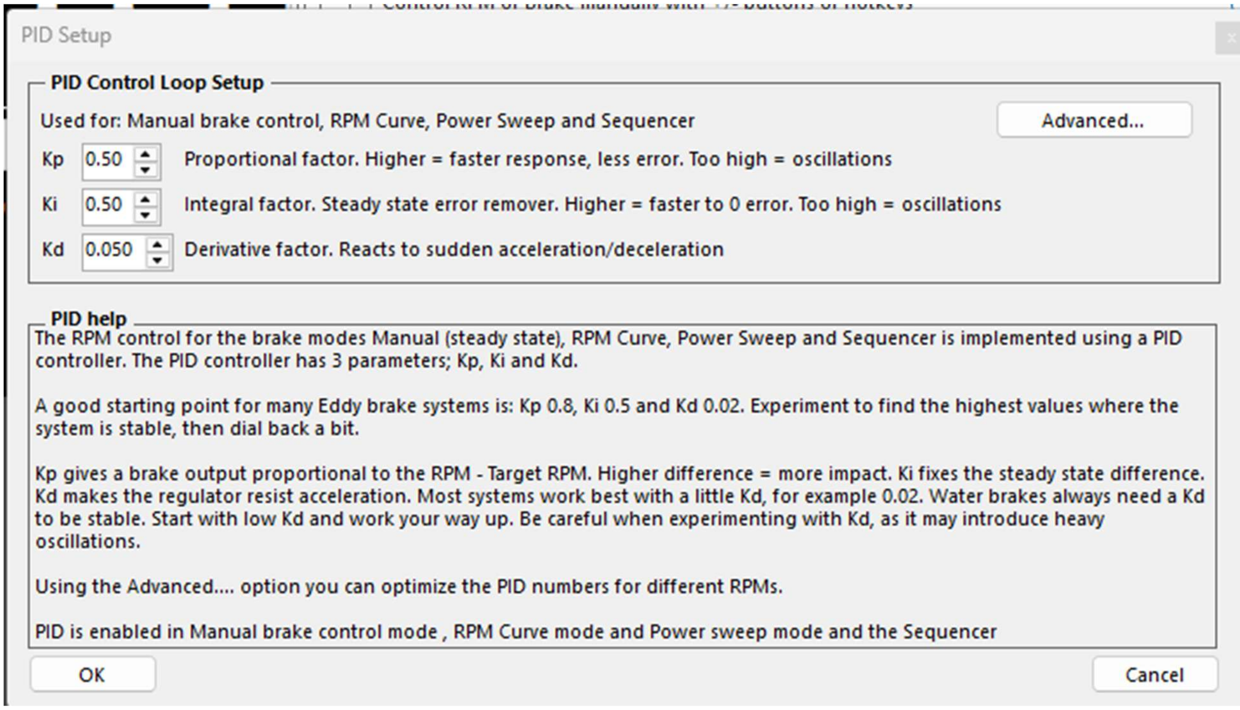


FIGURE 54 ADJUSTING THE PID PARAMETERS

The help text above gives a basic introduction to PID.

ⓘ

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

For users unfamiliar with PID it is recommended to watch a few videos on YouTube or other places to get an understanding. It is a generic regulation algorithm, so it works the same way whether you adjust RPM or anything else.

9.5.2 Manual brake control

Manual brake control is used to either control the Target RPM directly or control the brake(s) directly.

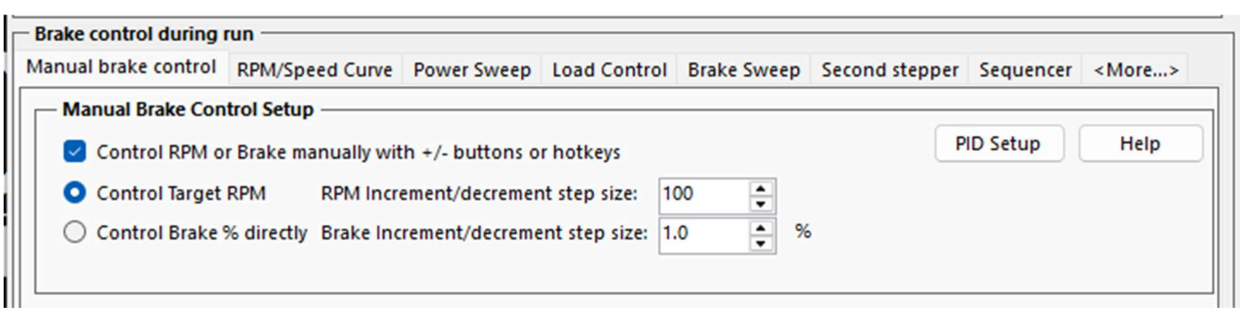


FIGURE 55 MANUAL BRAKE CONTROL

When choosing “Control Target RPM”, the brake control is in PID mode.

In manual mode, the Target RPM or Brake is controlled by the keyboard or mouse or a handheld remote control.

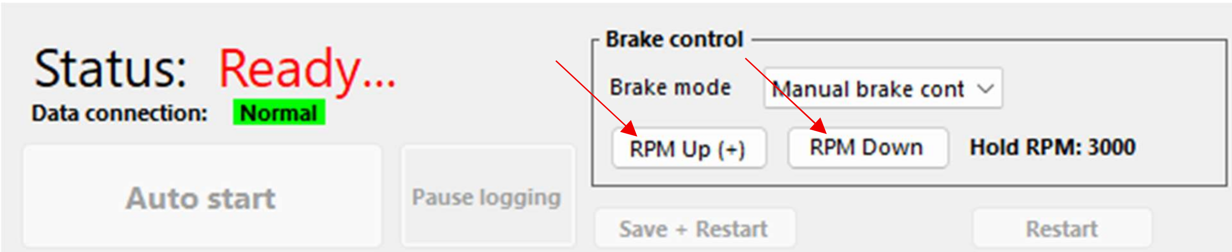


FIGURE 56 CONTROLLING THE BRAKE IN MANUAL BRAKE MODE

9.5.3 RPM/Speed curve

Use this mode to define a curve to control for either:

- Target RPM vs Time
- Target Speed vs Time
- Brake vs Engine RPM
- Brake vs Speed

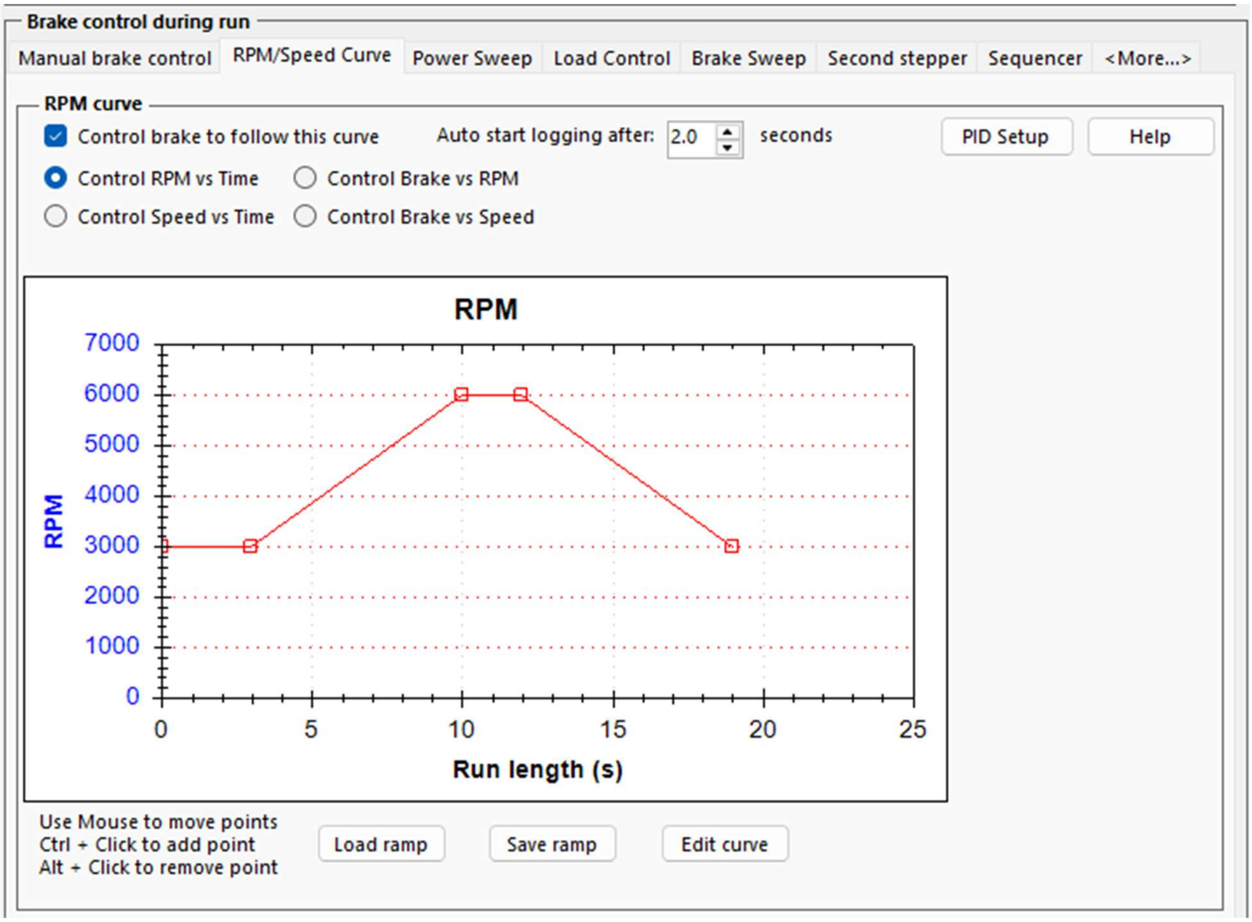


FIGURE 57 EXAMPLE RPM CURVE

The data points can be dragged and added/removed with the mouse or entered in a table by pressing the "Edit curve" button. You can also save and load the curves.

9.5.3.1 What is Brake vs Engine RPM and Brake vs Speed used for?

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

9.5.4 Power sweep

The Power Sweep brake mode sweeps through the RPM range to measure the Engine Power and Torque and draw the known "normal" dyno graph.

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.

Stop sweep is the end RPM.

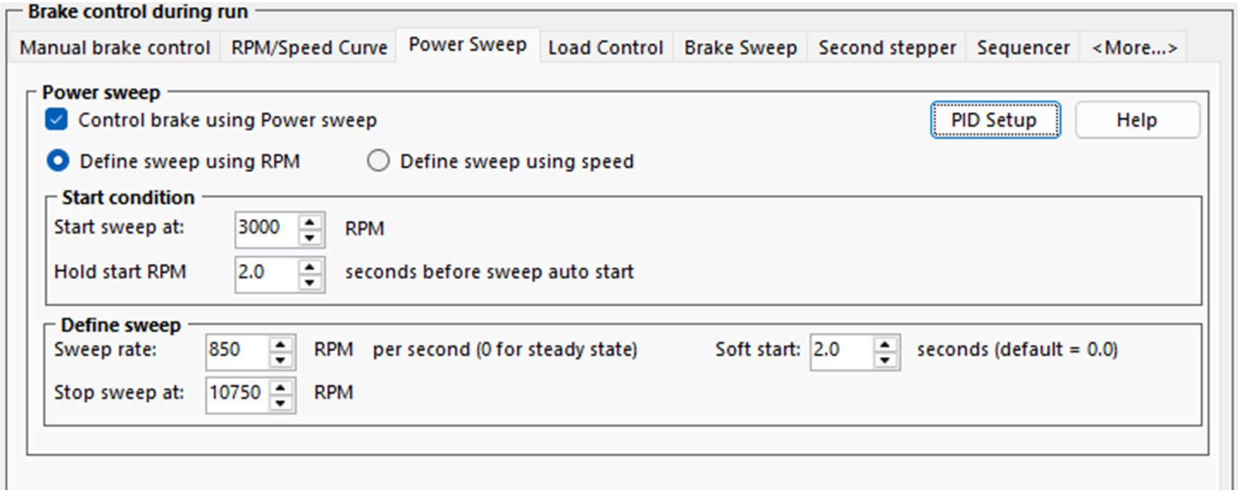


FIGURE 58 POWER SWEEP IS A POPULAR BRAKE MODE

9.5.5 Load control

Load control is an alternative to Power sweep. It uses a different algorithm developed by YourDyno that lets the engine sweep through the RPM range in a more natural way. Where the engine is strong it will sweep faster than where it is weak, just like in a natural acceleration in a vehicle. Load Control 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 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 an 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.

9.5.6 Brake sweep

This test mode was designed especially for ramp down sweeps (high to low RPM). In this Test Mode the brake output is gradually increased (ramp down) or decreased (ramp up) 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.

This brake mode works well from high to low RPM. To enable this, set the start RPM higher than the end RPM. The sweep rate is an absolute number (no + or -).

Note that ramping up the brake before the run is important when doing a Ramp down, otherwise the brake will slam on when the start RPM is reached.

Brake sweep is usually not a good choice for Ramp up sweeps. This is because the brake % can only decrease during the run when ramping up, so when the engine comes onto its torque band there is nothing the regulator can do to increase brake % so the RPM will increase quickly until the torque drops off again

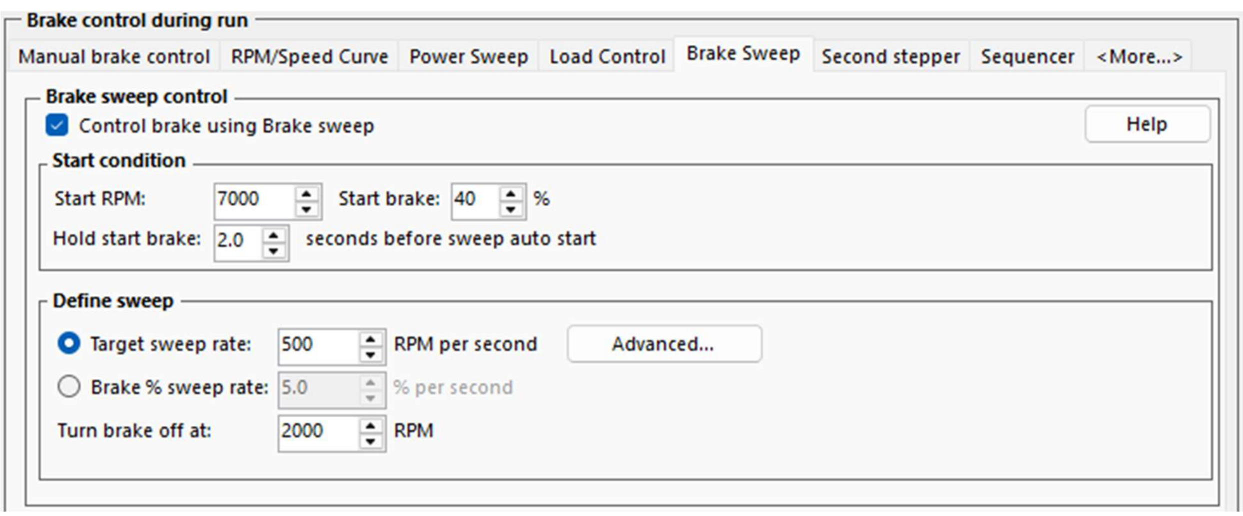


FIGURE 59 BRAKE SWEEP IS USEFUL FOR RAMP DOWN SWEEPS, ESPECIALLY FOR HYDRAULIC DYNOS

9.6 Auto start and stop

This function allows automatic start and stop recording of a Run.

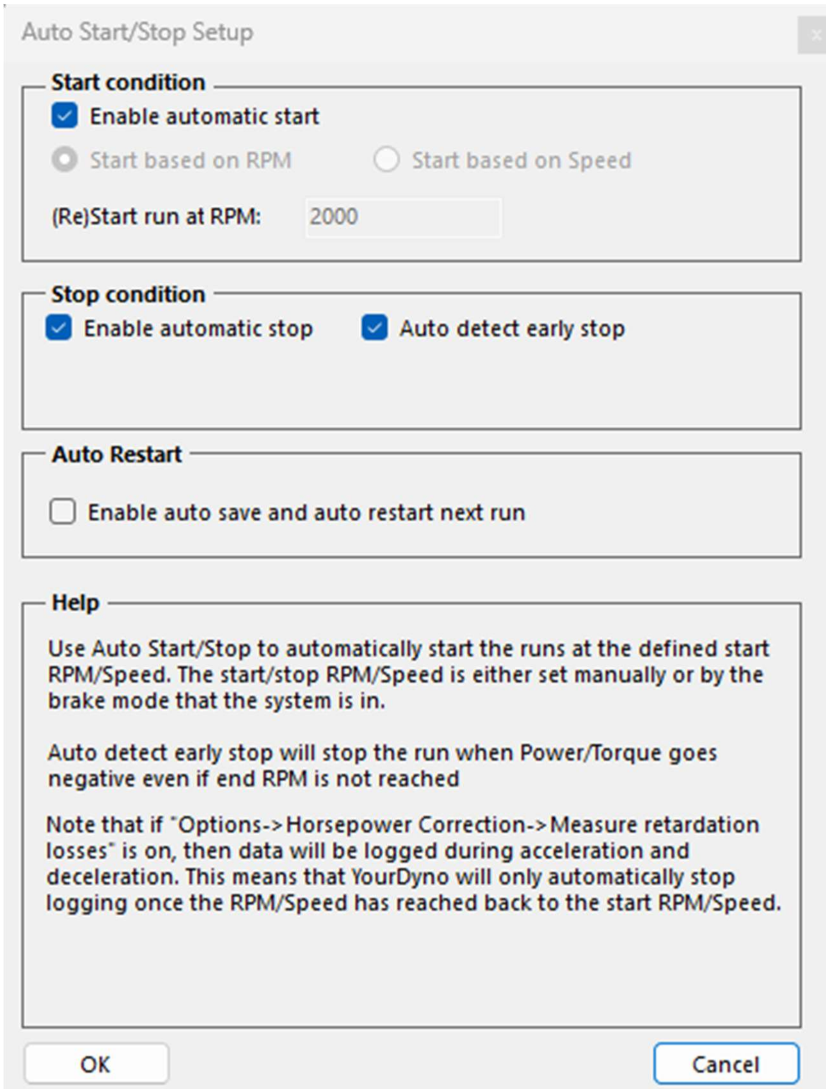


FIGURE 60 AUTO START/STOP CONFIGURATION

9.6.1 Enable automatic start

The start of the run can be controlled manually (by clicking the Manual Start button) or automatically by turning on “Enable automatic start”. For all brake modes except “Off”, the start RPM/Speed is given by the brake control settings. For example, if the sweep starts at 2000 RPM then the automatic start triggers at 2000 RPM.

Many engine dyno operators like to do Manual Start. With manual start, there is no way the run starts accidentally when revving the engine, and the operator can “feel” the engine out before starting the sweep. Automatic start is more common to use in Chassis and Hub dynos.

9.6.2 Enable Automatic stop

Automatic stop and Auto detect early stop are very practical. Here are the end conditions that define the end of the recording:

Conditions for Run auto stop when Auto detect early stop is turned **off**:

- End RPM/Speed must be reached **and**
- RPM drops by 5% **or** torque drops to ¼

When Auto detect early stop is turned **on**, the Run auto stops **also** if:

- RPM has reached at least halfway between the Start and End **and**
- RPM drops by 5% **and** torque drops to ¼

For PID and Load Control brake modes the regulator will keep regulating until the Run stops (i.e. until it detects that the throttle is closed/closing)

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

“Enable auto save and auto restart next run” will do just that; save and restart automatically.

Turning on Auto start, Auto stop and Auto restart enables “hands off” recording of several runs one after the other

9.7 MOI wizard

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

The MOI 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.

9.7.1 Automatic MOI test procedure

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

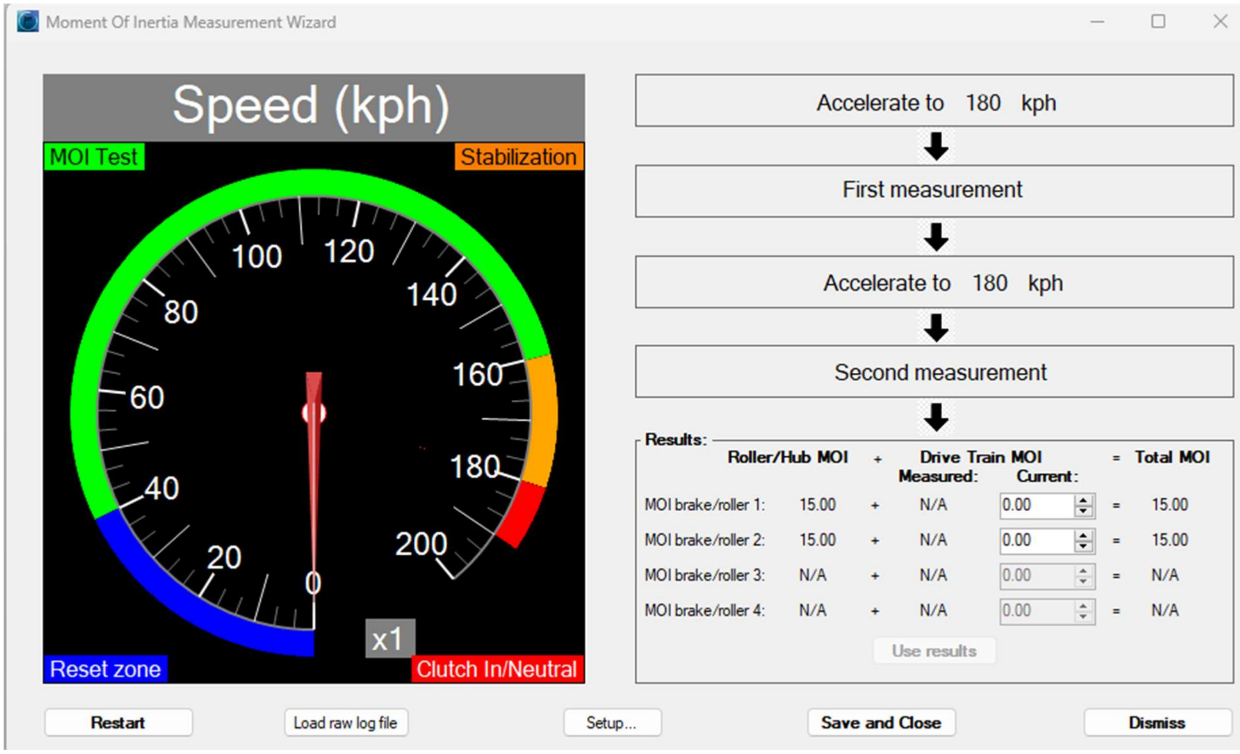


FIGURE 61 THE MOI WIZARD WORKS BEST FOR DYNOS WITH HIGH MOI

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.

9.7.1.1 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.

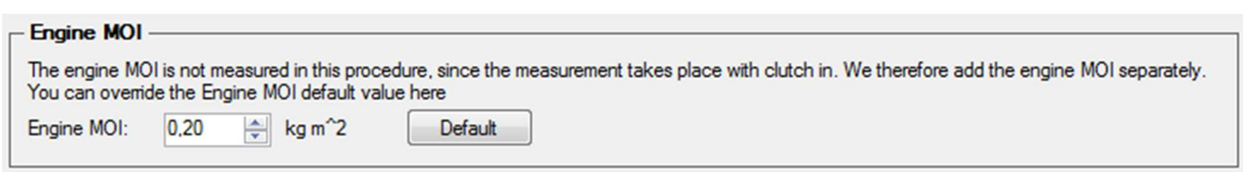


FIGURE 62 ENTER ESTIMATED ENGINE MOI

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.

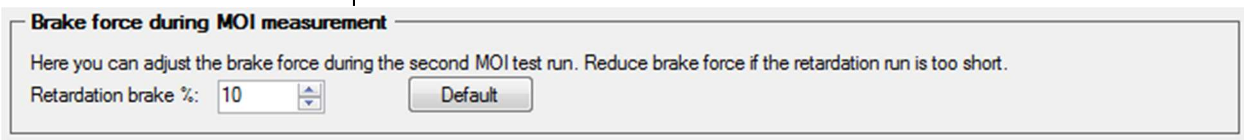


FIGURE 63 EXPERIMENT TO FIND THE BEST RETARDATION BRAKE %

10 Data presentation and analysis

10.1 Graph/Table tabs

Results are presented in graphs and data tables.

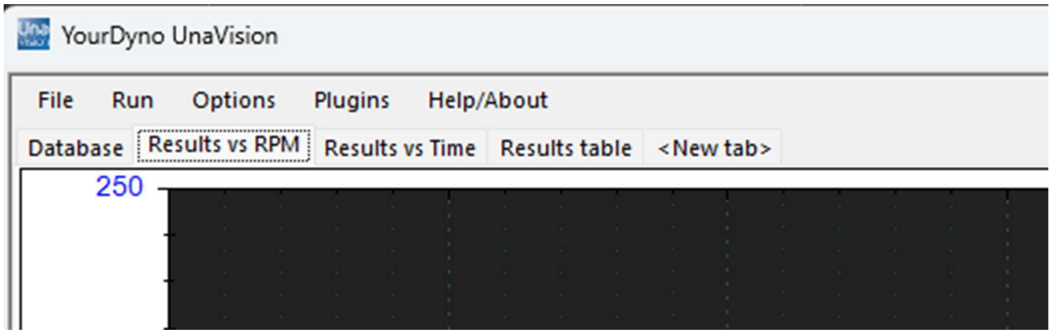


FIGURE 64 DEFAULT TABS

The different tabs contain a configurable graph view or a table view. Tabs are individually configured, and tabs can be added or removed or renamed.

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.:

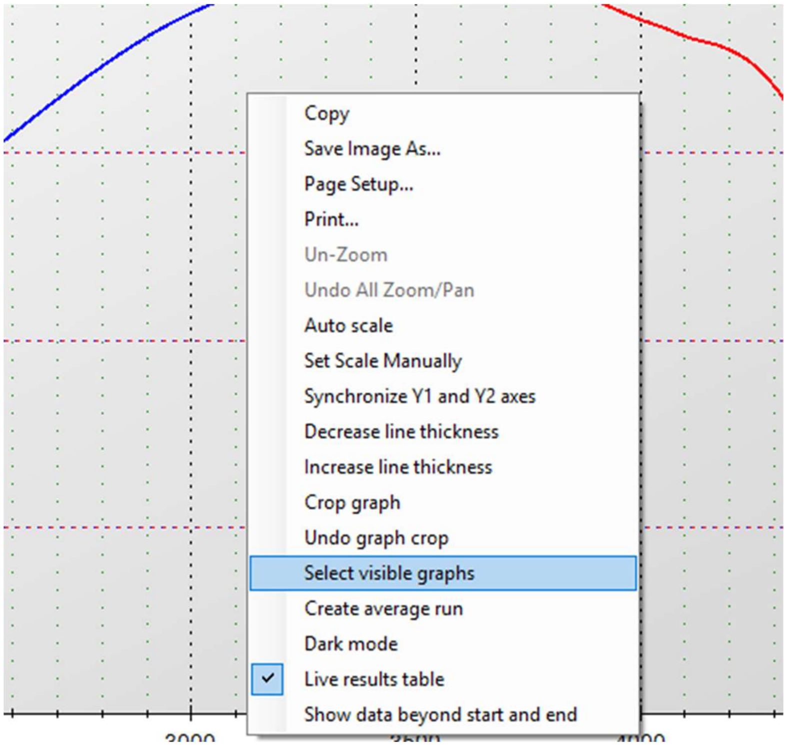


FIGURE 65 SELECTING VISIBLE CHANNELS BY RIGHT CLICKING OR PRESSING THE V BUTTON

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

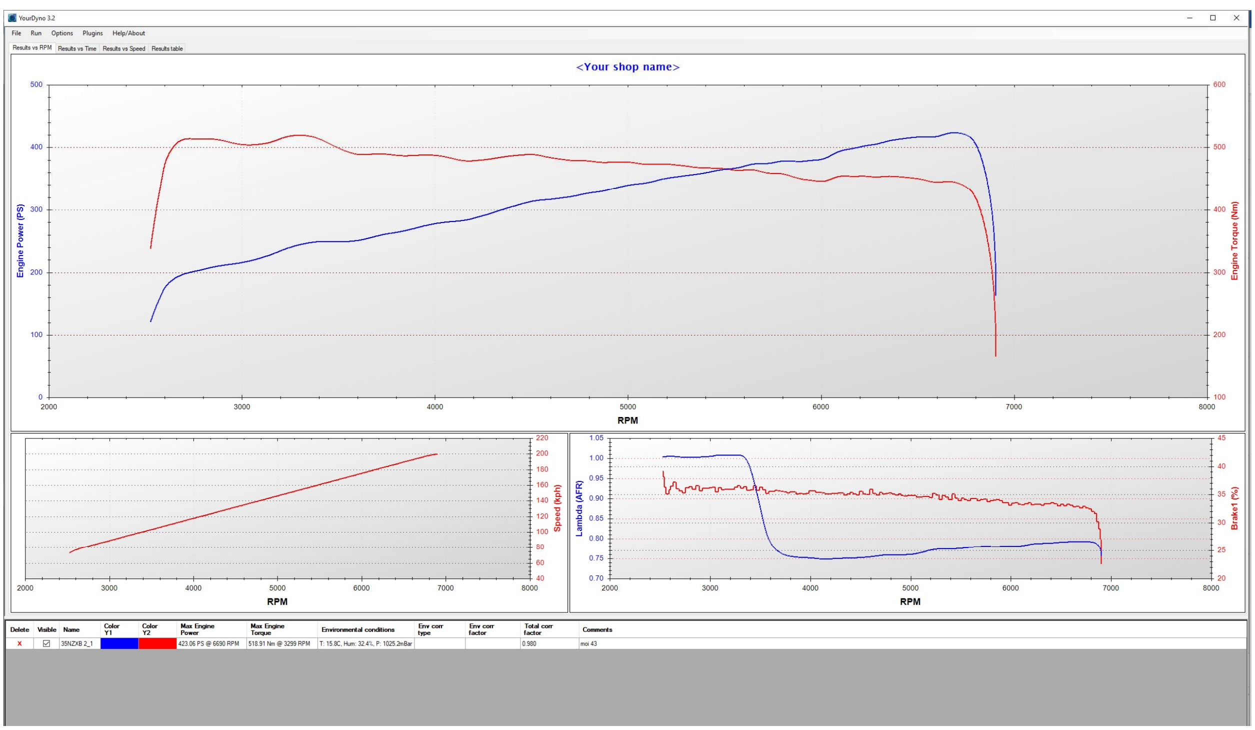
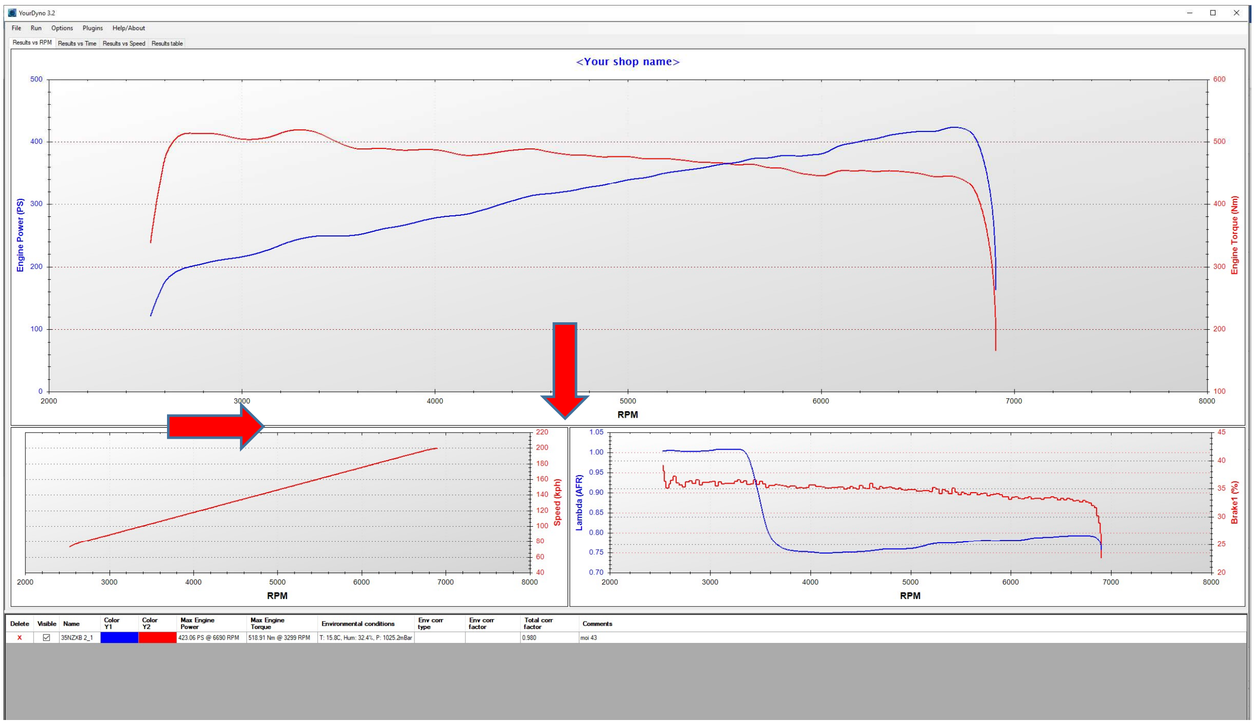


FIGURE 66 ONE TO THREE GRAPHS CAN BE DISPLAYED IN EACH TAB

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

Quick reference guide:

1. Move data channels by LMB + drag of the label
2. Crop area by Ctrl-LMB + drag (undo is RMB and “Undo graph crop”)
3. To pan the graph use MMB or shift LMB
4. Press and hold LMB to drag a Zoom-Area rectangle
5. Press RMB to open context menu
6. Use mouse wheel to Zoom In and Out

10.2.2 Context menu

Copy - copies the graph picture so it can be pasted into documents etc

Auto scale – Adjust scale to fit

Set scale manually – Allows to set each axis range manually

Un-Zoom / Undo All Zoom/Pan - Use this function to reposition the graph back to normal view

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 are applied only in the section where the RMB menu was activated

Crop graph – Info about how to crop

Undo crop graph – Undo the last crop. The full history of crops is undoable

Create average run – Creates an average run of the currently visible runs

Dark mode – Dark background

Live results table – Shows a table with all channel data as the mouse if moved

Show data beyond start and end – Useful command to see what happens after the run reached the defined end RPM or end criteria

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.

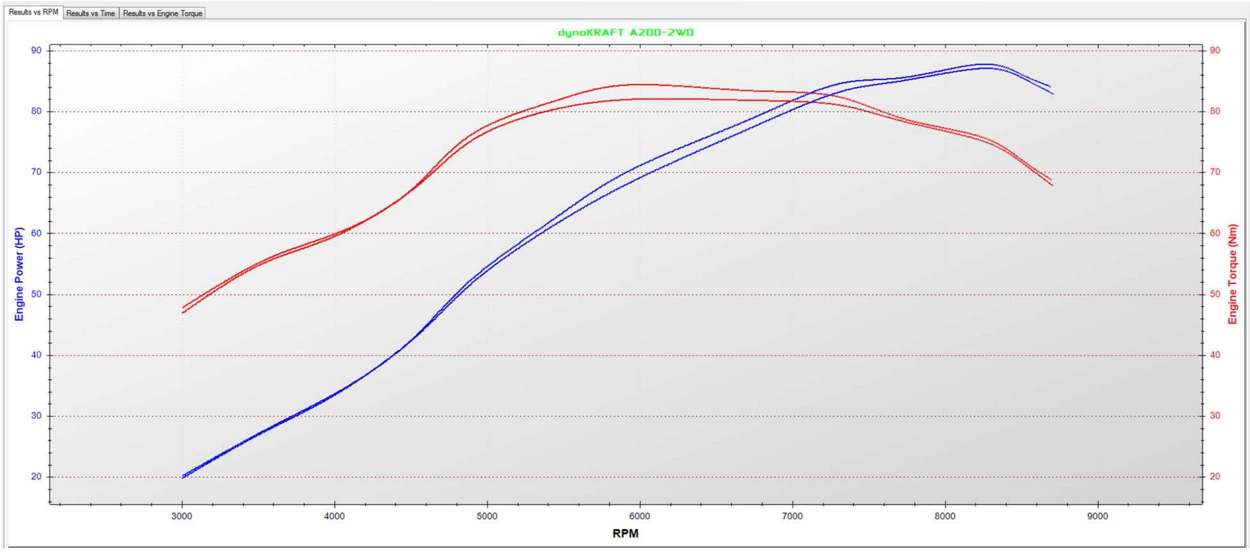
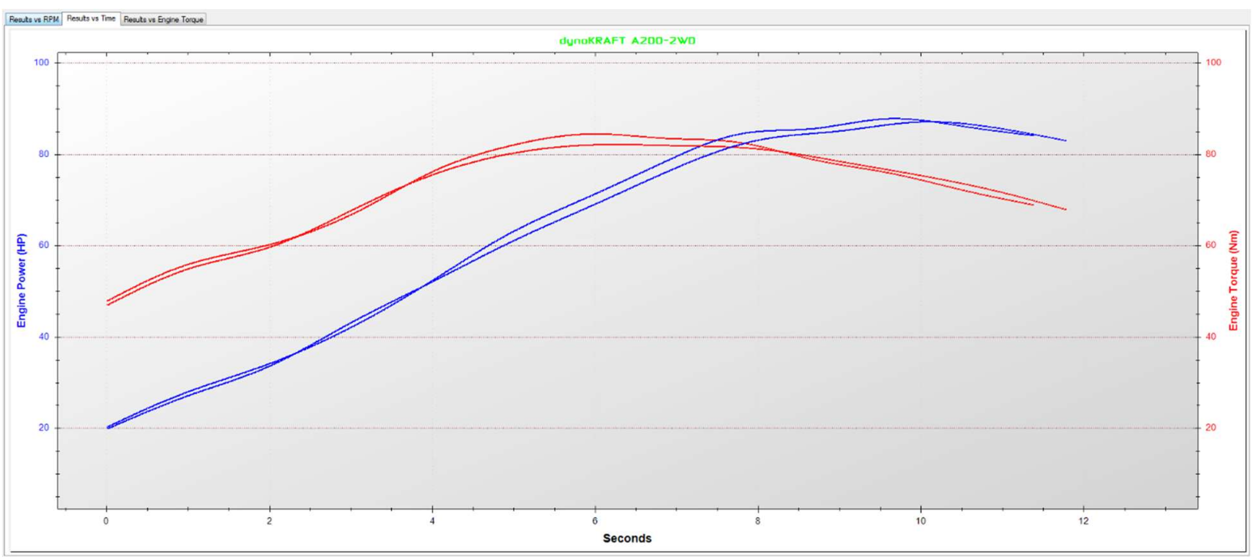


FIGURE 67 RESULTS VS RPM

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. Speed is a good X-axis in some setups for example. Depending on available channels, you can look at for example Engine Torque as function, or Torque vs Ignition angle):

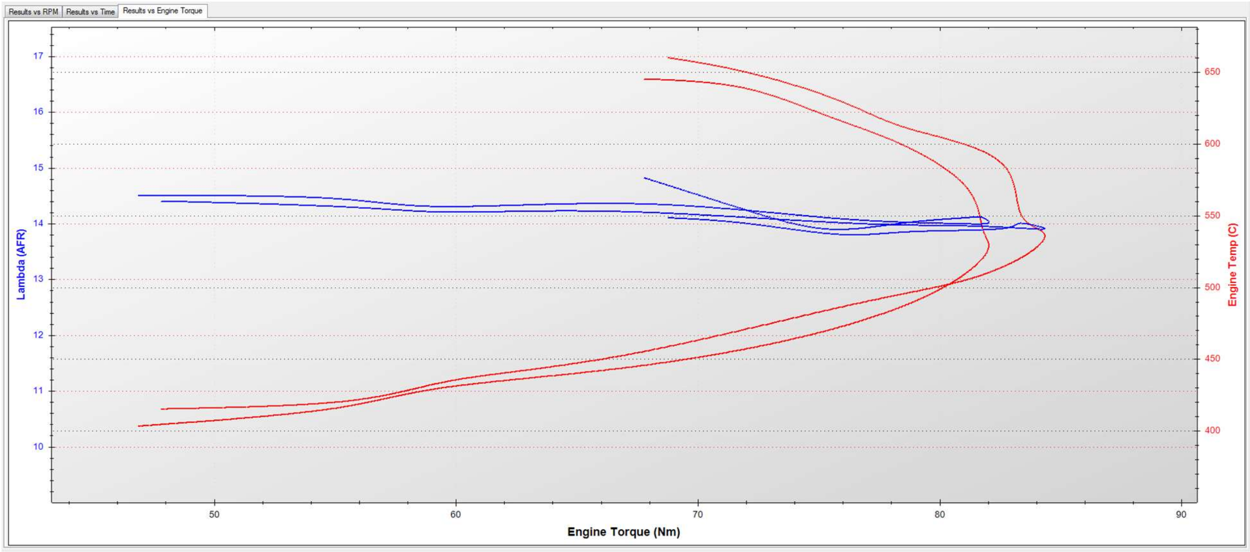
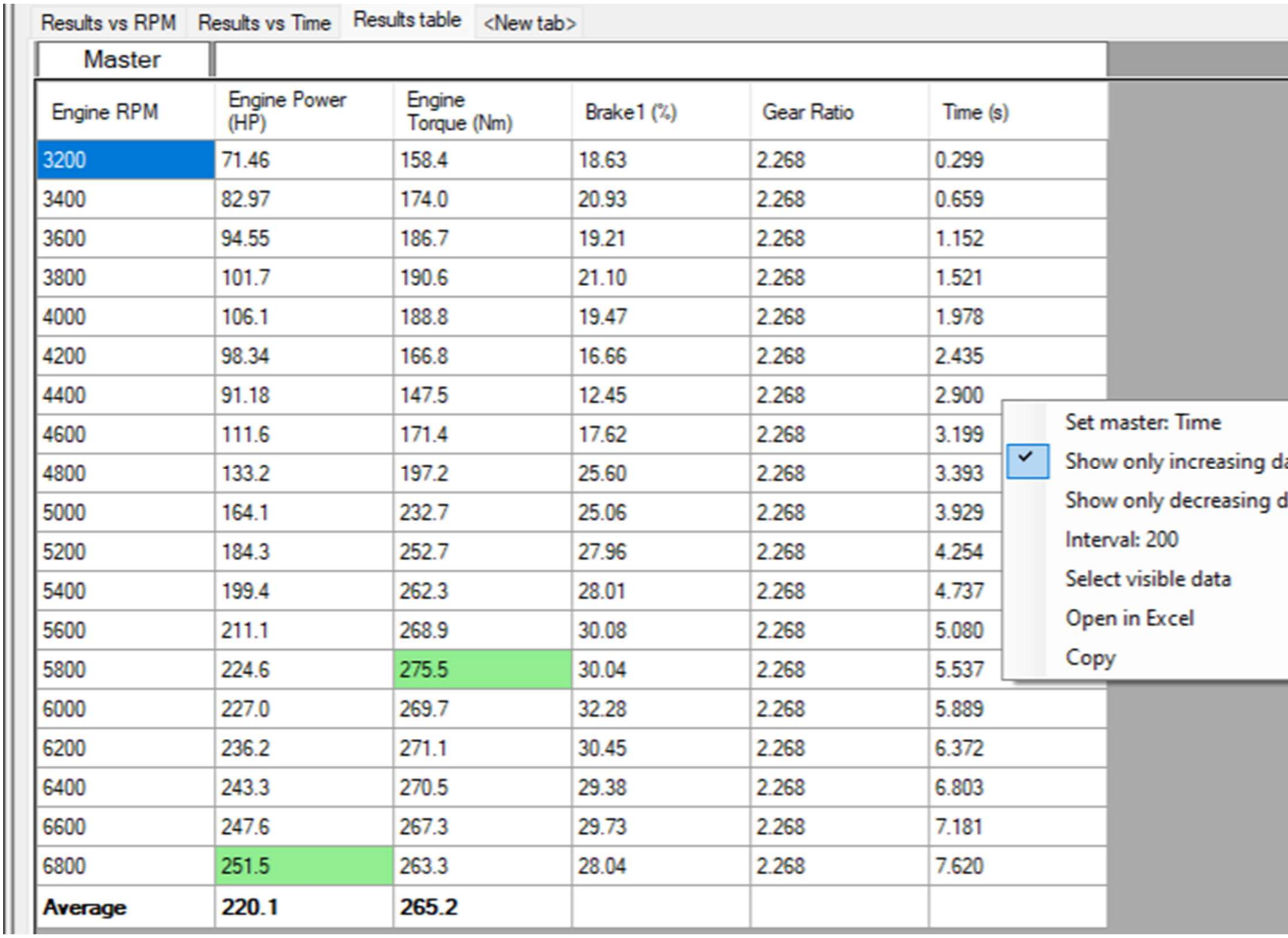


FIGURE 68 ANY CHANNEL CAN BE USED AS X-AXIS

10.3 Results table views

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



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**			

FIGURE 69 RESULTS TABLE

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 Creating new tabs

Click on the <New tab> to create a new tab of graphs or table.

There are some predefined templates, for example 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.

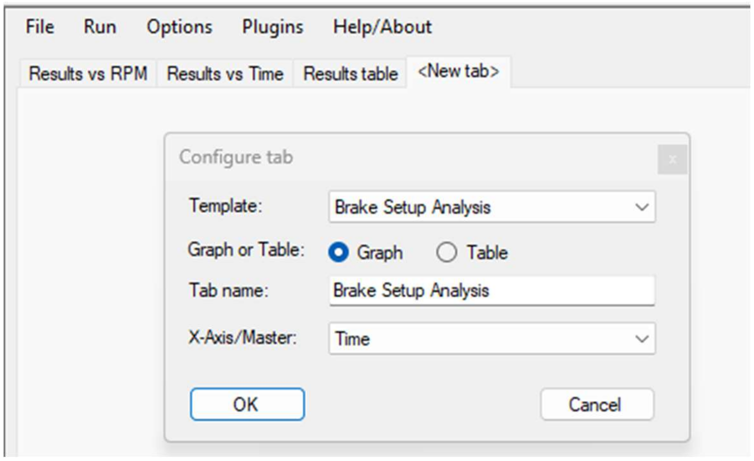


FIGURE 70 CREATING A NEW TAB

The example above creates a new tab with a graph view with Time as the X-axis.

11 The Run summary table

The bottom table contains a list of the open runs, with data from each run.

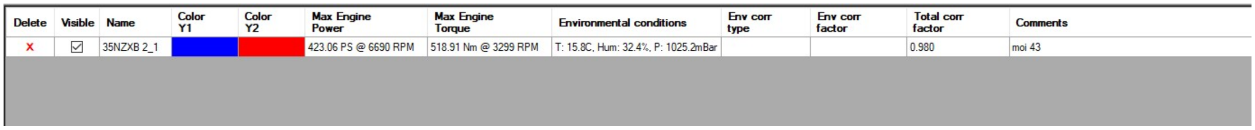


FIGURE 71 THE BOTTOM TABLE

The columns can be turned on and off using the right mouse button.

Unload – Removes the run from the list of loaded runs. It is still stored in the database

Visible – Select whether the run is visible or not

Color Y1 and Y2 – Change the graph colors. Y1 is left Y-axis and Y2 is right

Style – Select the graph style for the run (solid, dotted line, etc)

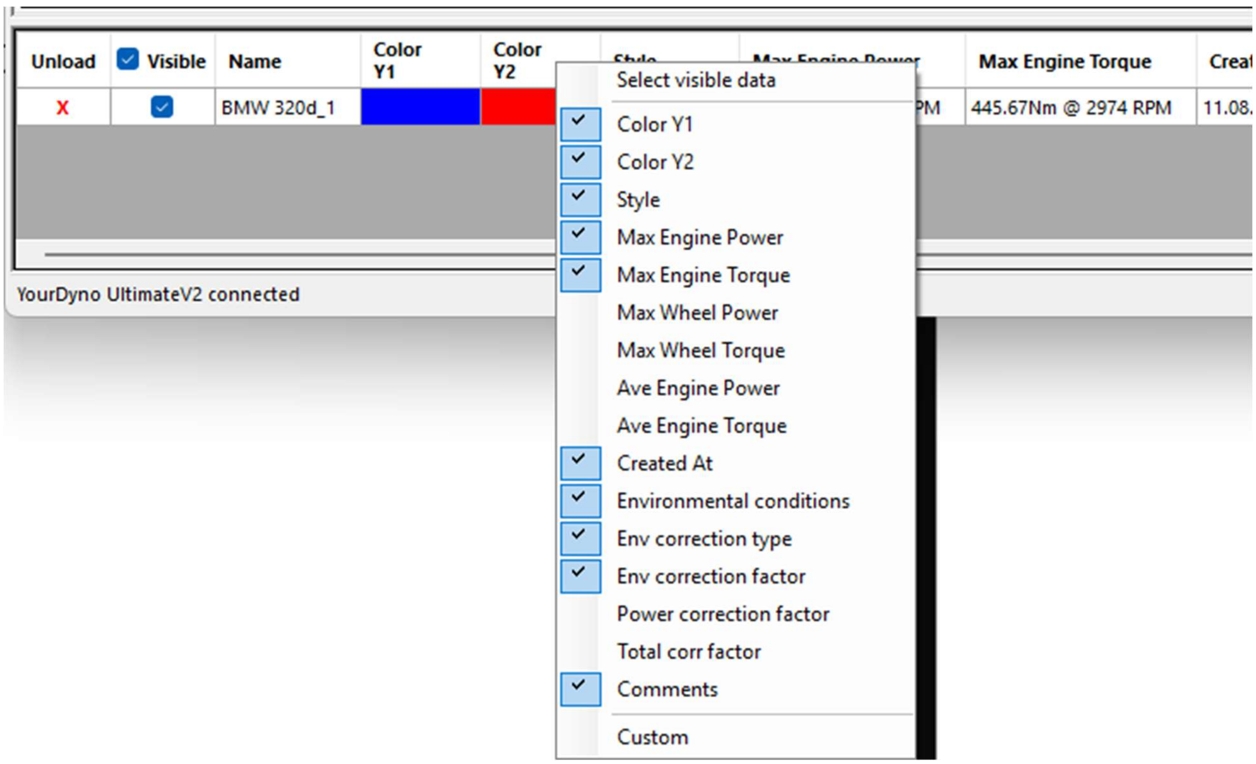


FIGURE 72 SELECTING VISIBLE PARAMETERS IN THE RUN SUMMARY TABLE

Custom parameters from the database can also be displayed.

The position of the parameters can be changed by drag and drop.

12 Dyno sheet print setup

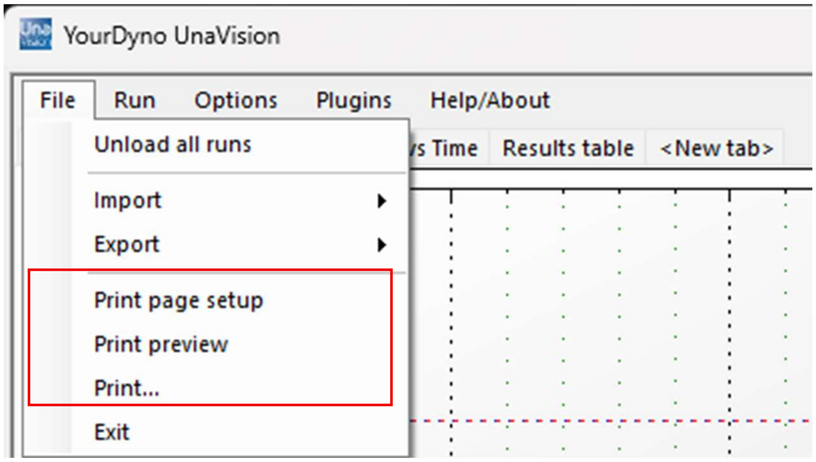


FIGURE 73 DYNO SHEET PRINT SETUP

12.1 Print page setup

This function opens the setup window for the dyno sheet printout:

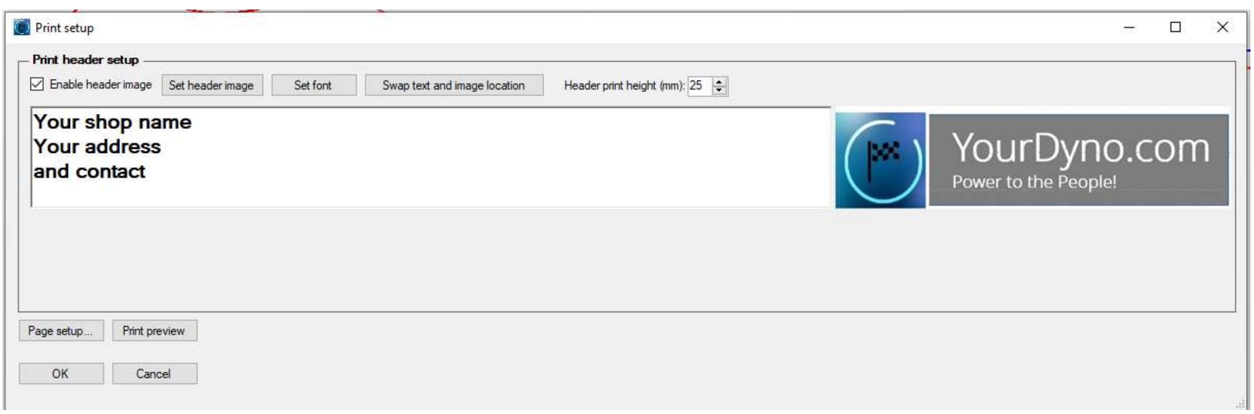


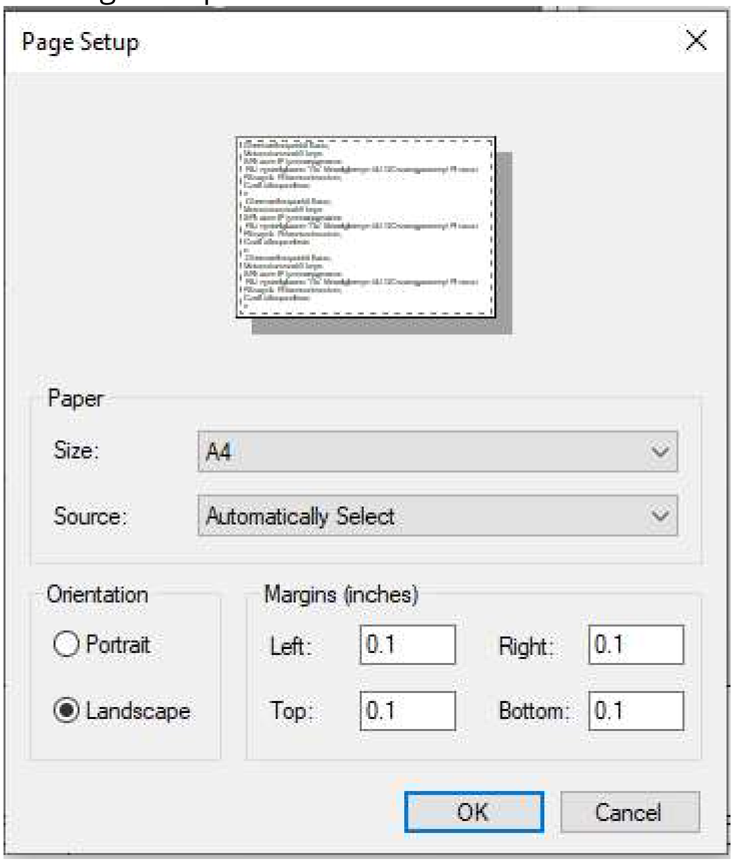
FIGURE 74 PRINT SETUP

Use this window to adjust your print-out page.

12.1.1 Customizing print-out header. Company logo

1. To upload your logo 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.

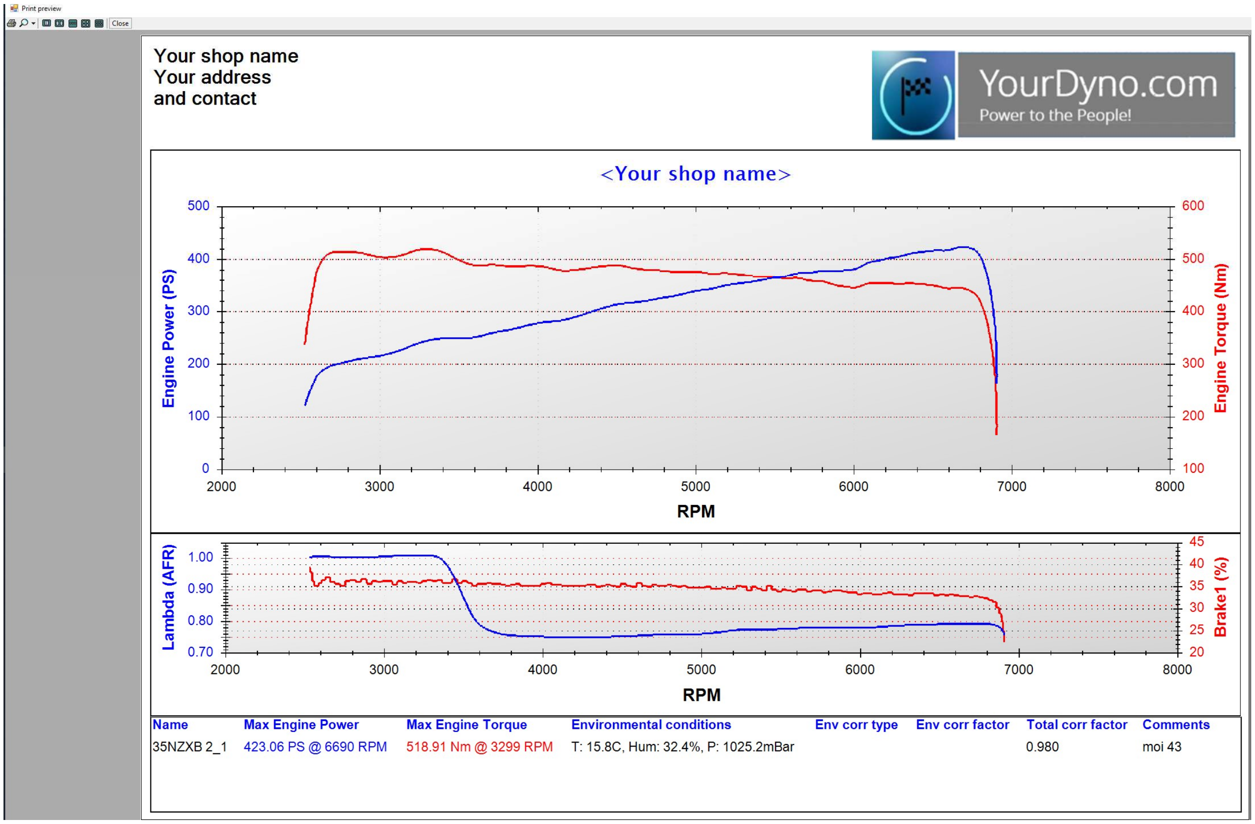


FIGURE 75 EXAMPLE DYNO SHEET PRINTOUT

13 Database

All runs are stored in a database. The database is searchable and sortable, and the user can define the parameters to be stored for the sessions and runs.

The first tab in the program shows the contents of the database.

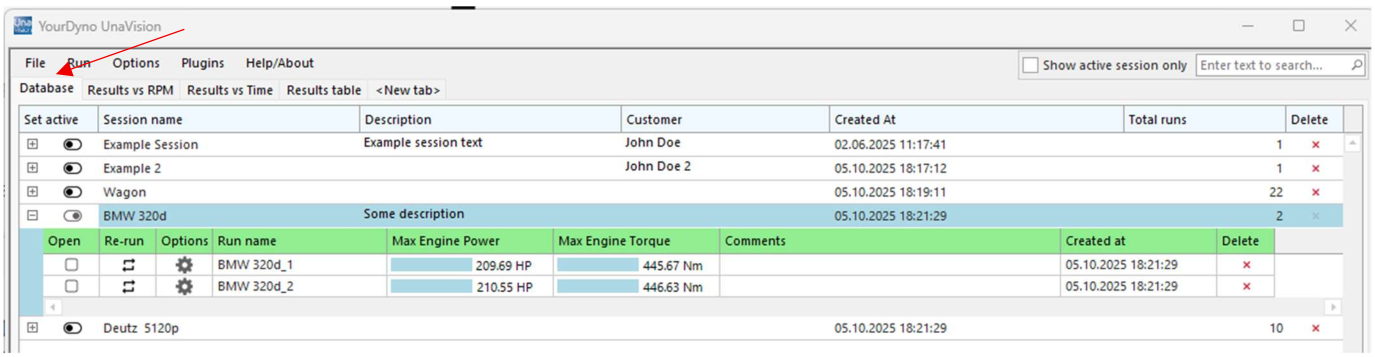


FIGURE 76 MAIN DATABASE VIEW

13.1 Organization of the database

The database is organized in Sessions. A Session is a collection of Runs. A new session is typically created for every new engine or vehicle/bike.

13.2 Importing runs and sessions into the database

Runs and Sessions from a previous version of the YourDyno software can be imported into UnaVision.

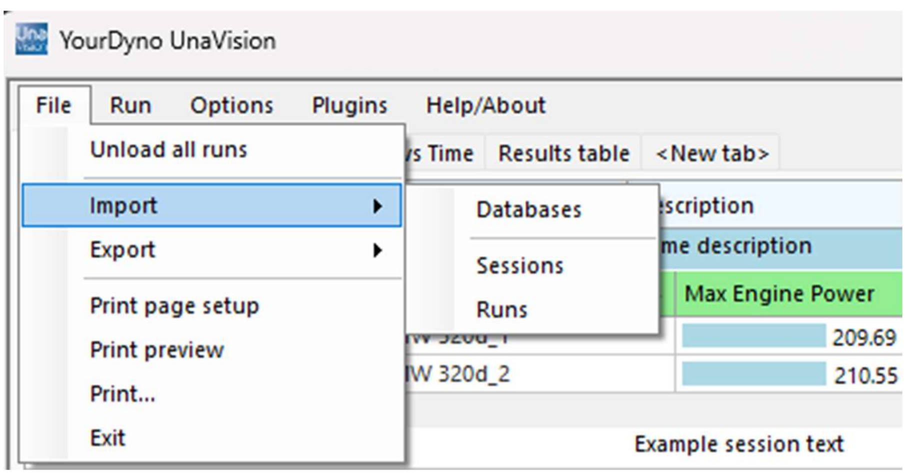


FIGURE 77 IMPORTING RUNS AND SESSIONS

To import Sessions, select the session folders or the top level folder containing all the sessions. The software will traverse the folder hierarchy to find all sessions and runs.

To import runs, select the run files you want to import. The files are either .csv type (old YourDyno version) or .ydrun files.

You can also import an exported database.

13.3 Exporting runs and sessions

Runs and sessions can be exported.

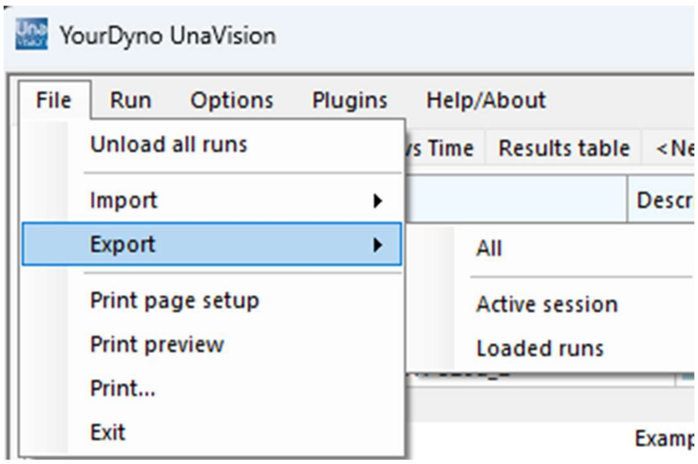


FIGURE 78 EXPORTING RUNS AND SESSIONS

To export the whole database, select All. You can also export only the currently active session or only the open runs. The result will be a .yourdyno file, which is imported by the command Import->Databases.

13.4 Interactions with the database

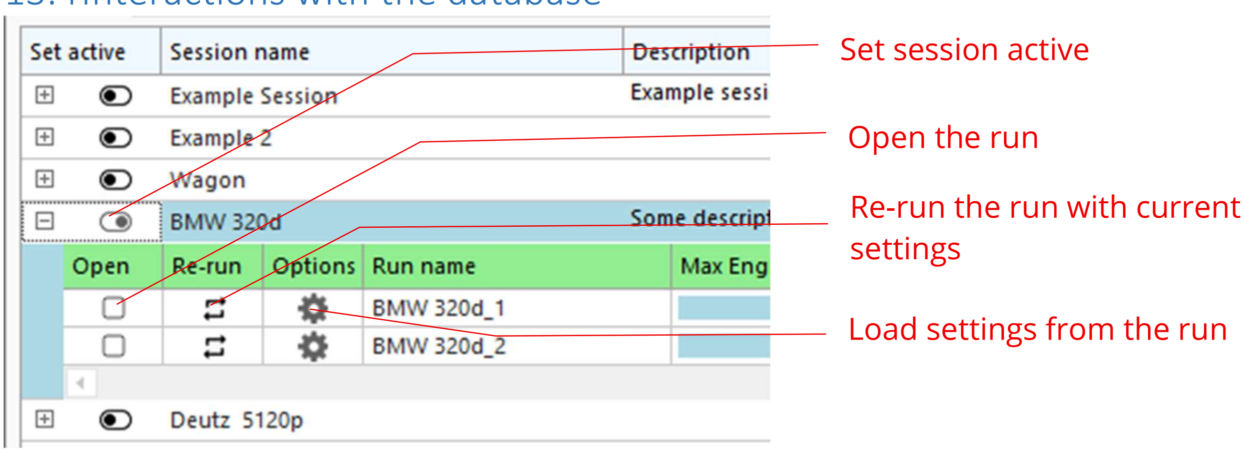


FIGURE 79 INTERACTING WITH THE DATABASE

13.4.1 Set session active

New runs and imported runs are placed into the active session. New sessions are always set active when created, but existing sessions can also be set active by clicking the Set active button, for example if you want to continue a previously started session.

13.4.2 Open

The Open command loads the run from the database and displays it in the graphs/tables. It also appears in the summary table below at the bottom of the window

Clicking again on an open run closes it. It is still stored in the database.

13.4.3 Re-Run

Re-running the run is useful when testing out different settings with the same data. For example, different noise filter levels, different calibration, moment of inertia, etc can easily be tested by clicking the Re-run button. A new run is created with the same name plus a -1, -2, -3, etc.

13.4.4 Load options

All options (software settings) are stored in every run. Clicking the Gear icon will load options from the run. This can be useful when testing a similar engine/vehicle later and you want to have the same settings as you had on a previous run. It can also be used if some settings were lost or similar circumstances.

13.4.5 Selecting visible columns in the database view

Different dyno operators want different parameters for the sessions and runs. This can be tailored for each installation.

Choose parameters by right clicking on the Session header for Session parameters and right click on the Run header to select Run parameters. Some pre-defined parameters exist, and there is support for custom parameters too.

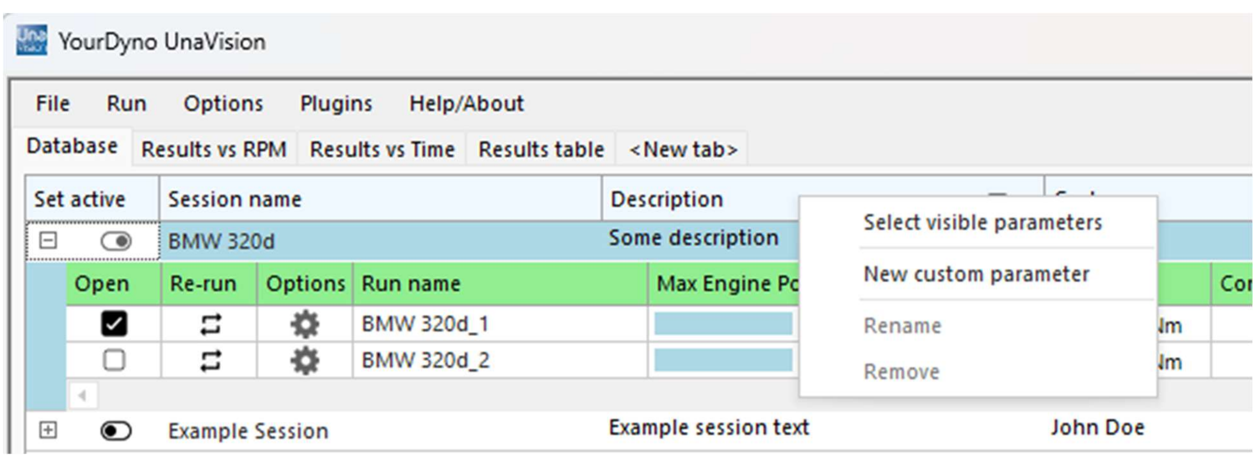


FIGURE 80 RIGHT CLICK TO BRING UP THE PARAMETER SELECTIONS

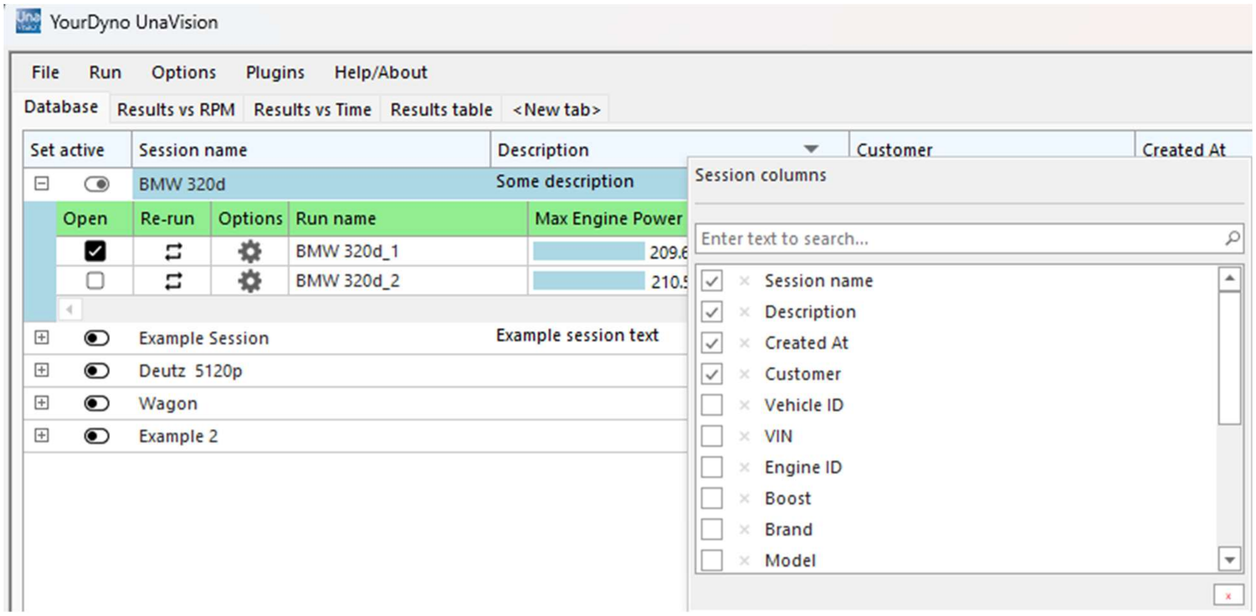


FIGURE 81 SELECT FROM PRE-DEFINED PARAMETERS OR CREATE CUSTOM PARAMETERS

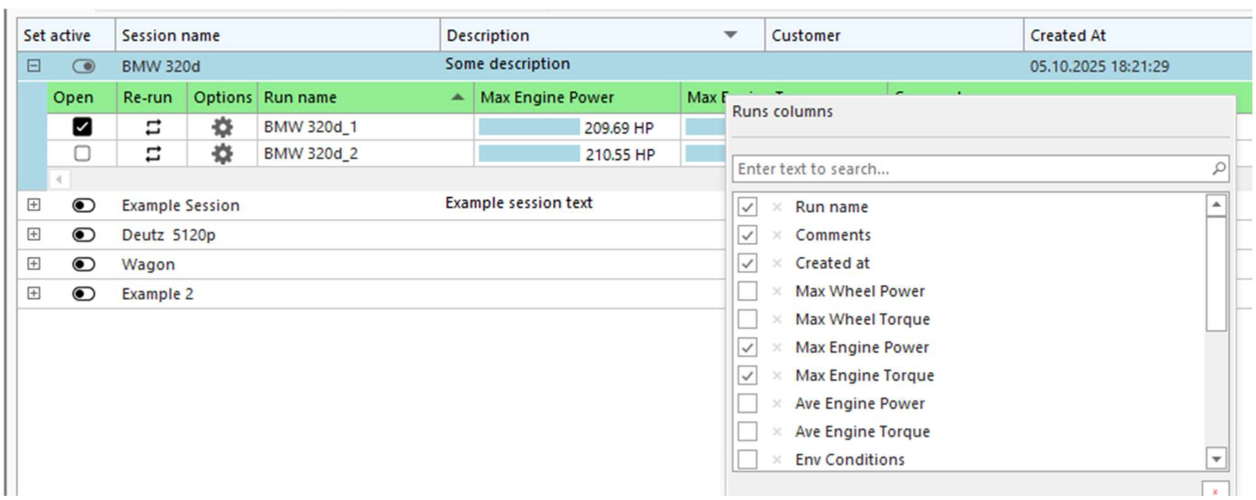


FIGURE 82 SELECTING RUN PARAMETERS

The columns can be moved by dragging them

13.4.6 Deleting Runs and Sessions

Press the red cross to delete runs or sessions. There is no undo, so make sure you know you want to delete.

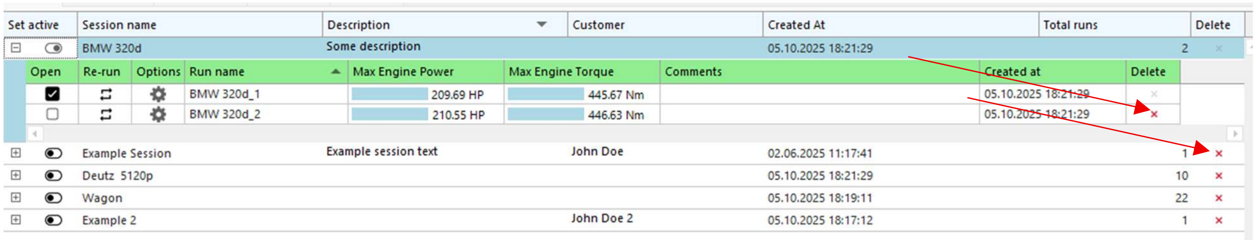


FIGURE 83 DELETE RUNS AND SESSIONS BY CLICKING THE RED CROSS

The active session cannot be deleted.

13.5 Searching and navigating the database

With many sessions and runs it is very practical to click the “Show active session only” box. Unclick it to show all the sessions.
To do a global search, use the upper right text box. You can search for text.

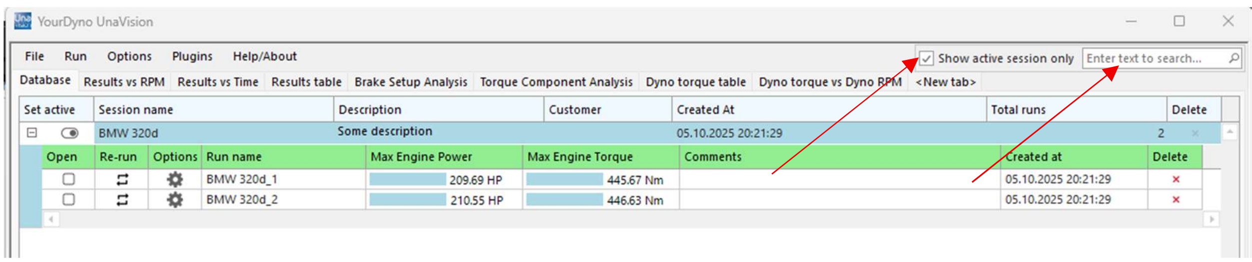


FIGURE 84 SHOW ACTIVE SESSION ONLY AND GLOBAL SEARCH

It is also possible to sort on Session columns by clicking it, and filter within a Sesson column by clicking the small arrow that appears when the mouse is on the column header.

13.6 Understanding the database inner workings

For normal operation of UnaVision, no knowledge of the database workings is necessary. Nonetheless, some awareness is recommended.

13.6.1 Files and folders

The data is stored on the computer’s harddrive, by default under Documents\YourDynoDatabase. The folder location can be changed in Options.

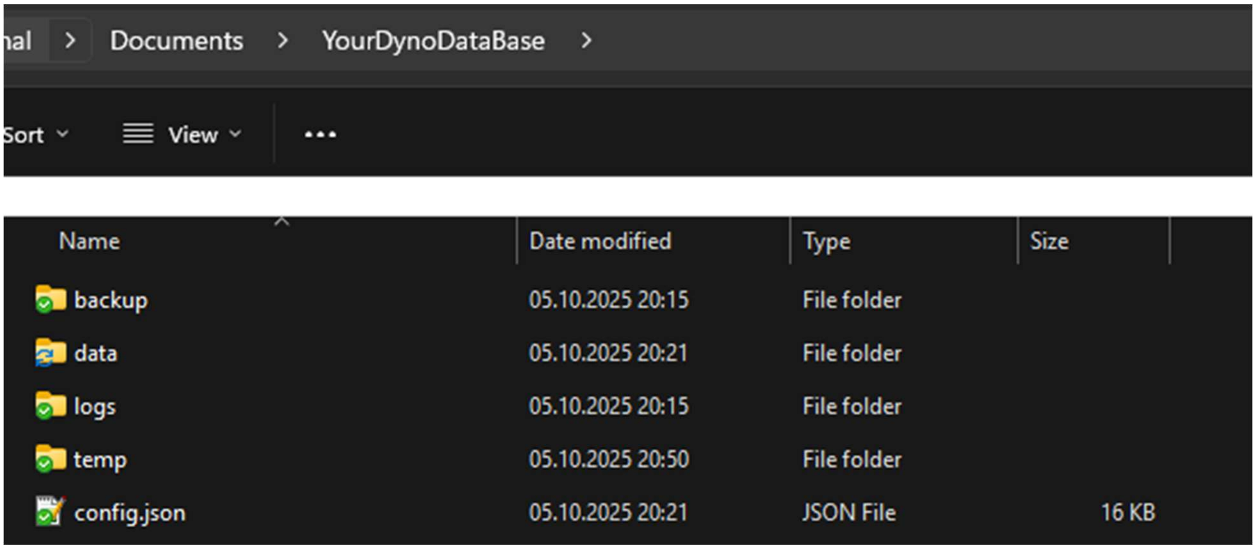


FIGURE 85 FOLDER STRUCTURE IN THE DATABASE

The **config.json** file contains all current options. It is human readable, although it is not meant for manual editing.

The **data** folder contains the runs and sessions. Each session is a folder, and each run is a .ydrun file. This .ydrun file is actually a zip file and contains the config.json for that run, and it contains the raw and processed data as well as some meta-data. Also in the Data folder is the database itself, contained in the files **data.db** and **data-log.db**. These files are not manually editable.

The **backup** folder contains the last 3 **data.db** and **data-log.db** files.

Logs is for internal logging and **temp** is for temporary data.

13.6.2 Backup and emergency recovery

It is recommended to backup the YourDynoDatabase folder automatically, for example by using Microsoft Onedrive or Google Drive. Restore if needed.

If the database is corrupted and you don't have a backup, the **backup** folder can be used. Copy the data.db and data-log.db from one of the 3 backups.

If backup is also unsuccessful, you can still import the sessions in the **data** folder again and re-create the database. No runs are lost, but manually entered data in comments and parameters need to be entered again.

14 Plugins

14.1About plugins

Plugins allow the functionality of UnaVision to be extended. UnaVision comes with a selection of plugins that can be selected at installation time.

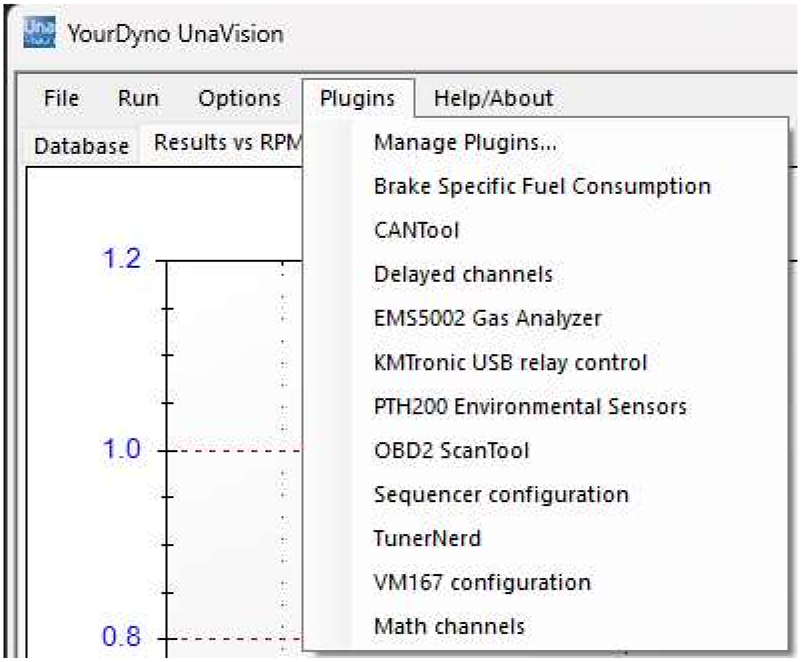
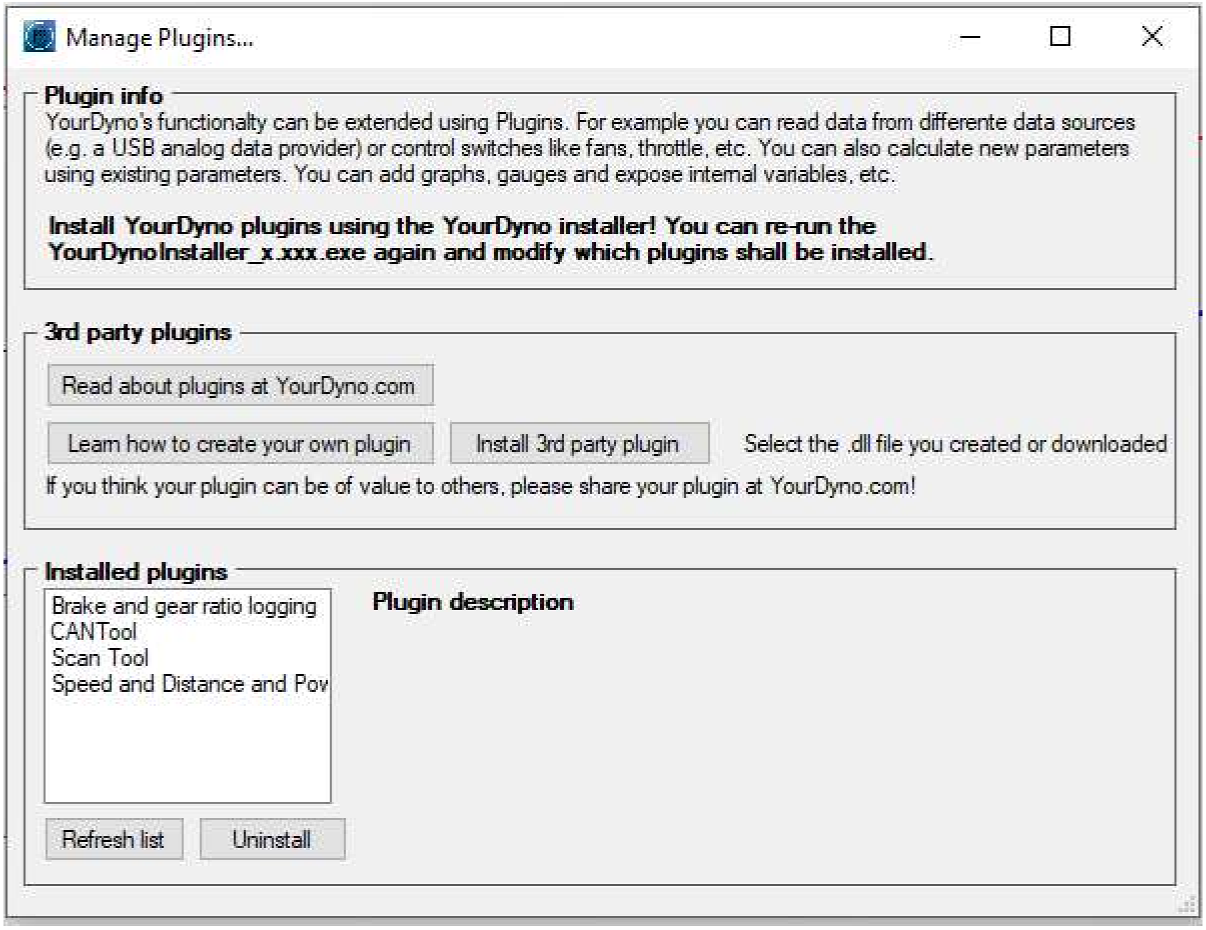


FIGURE 86 PLUGINS ARE CONFIGURED HERE

14.1.1Mange plugins...

This window allows users to add or delete plugins.



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

14.1.2 Installing new plugin

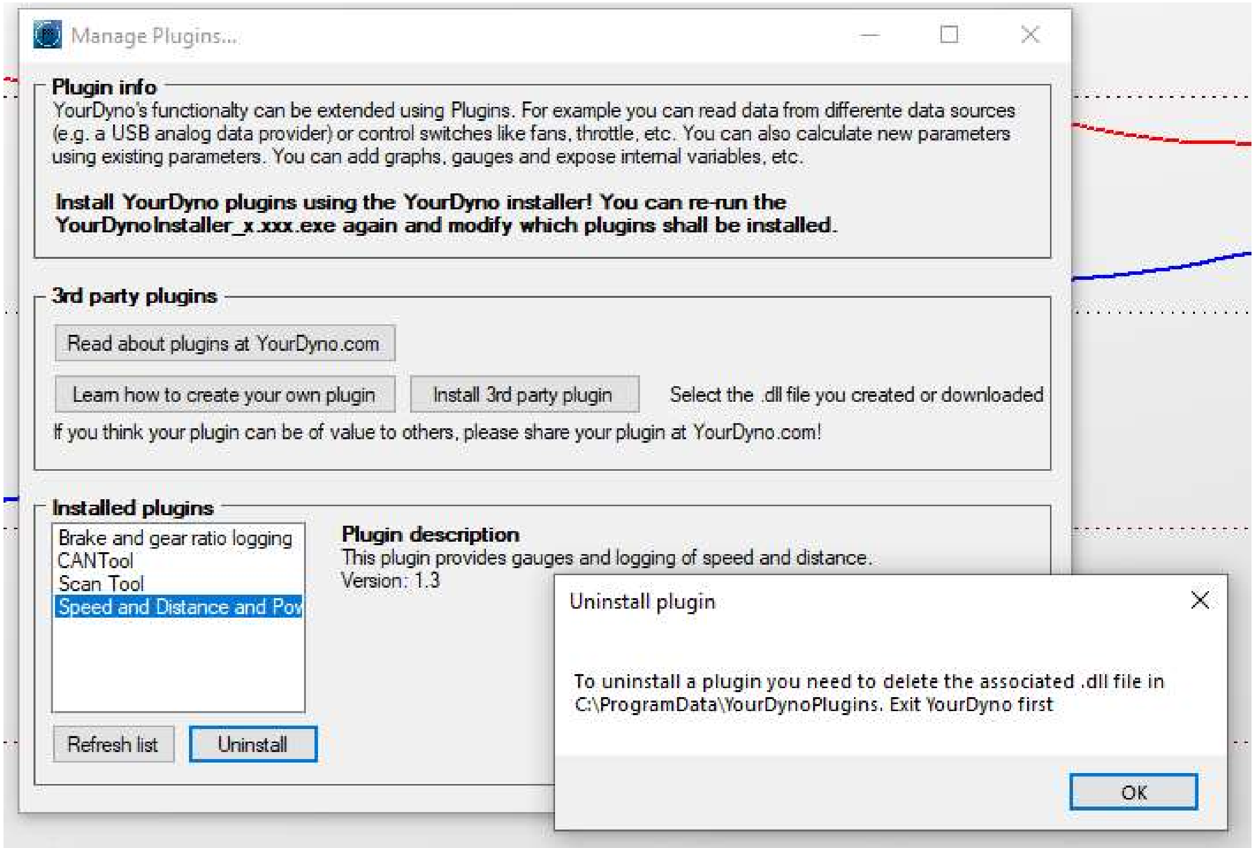
Installing official UnaVision plugins are done during installation of UnaVision. Do not download .dlls and install manually, since they are version dependent. It is possible to add plugins to an existing installation by running the installer again and selecting Modify.

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.

14.1.3 Removing plugins

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



14.2 Description of selected plugins

14.3 Brake Specific Fuel Consumption (BSFC)

BSFC measures an engine's fuel efficiency by determining the amount of fuel consumed per unit of power produced, typically expressed as pounds per hp hour (lbs/hp h).

A fuel flow meter is necessary to calculate the BSFC.

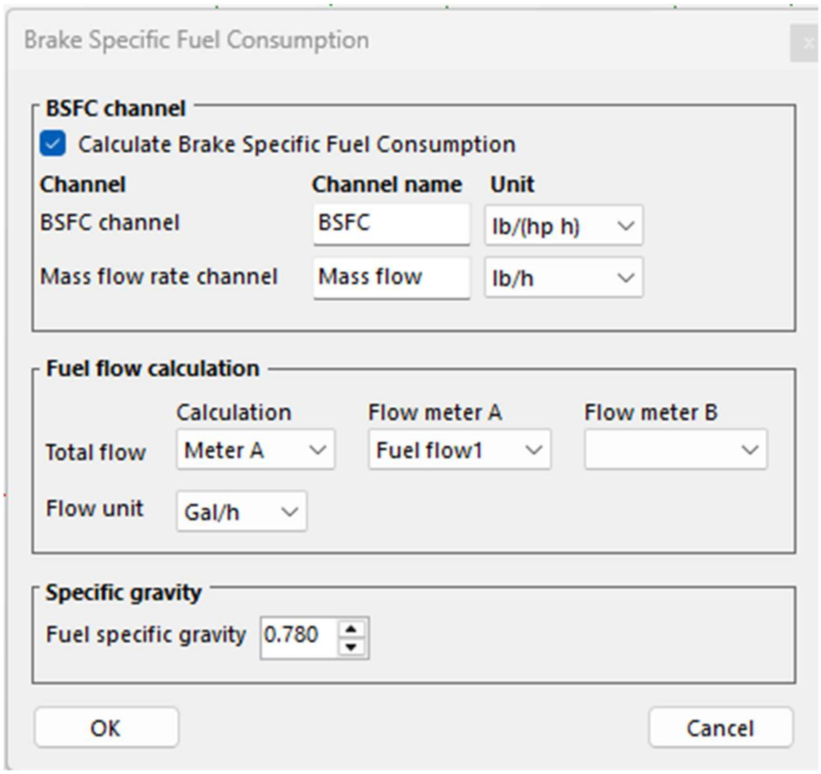


FIGURE 87 BSFC CONFIGURATION

The BSFC plugin provides two data channels; BSFC and Mass Flow. Their names can be modified, as well as the units.

The flow can be defined as Meter A, Meter A+B or Meter A-B for direct measurement, flow in and return etc.

Specific gravity is the gravity of the fuel.

14.4 CAN tool

CAN tool is an alternative way to connect a CAN bus for units without built in CAN bus (i.e. old YourDyno Standard units).

For YourDyno Standard v5 and Ultimates, do NOT use the CAN tool, as the built in CAN bus support is much better.

14.5 Delayed channels

Delayed channels are useful to compare data channels with older values. This is typically used when calculating rate of change. For example, to calculate the number of degrees the temperature changed over the last second, create a delayed channel of the temperature channel, and create a Math channel (see later) that is the current temperature minus the delayed temperature.

14.6 EMS5002 gas analyzer

This connects to a Gas analyzer from EMS called the 5002. It measures parameters like HC, CO, CO2, NO etc.

14.7 Scan Tool (OBDII plugin)

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 38400 typically) and press Connect. It may take up to one minute to connect to car's OBD interface.

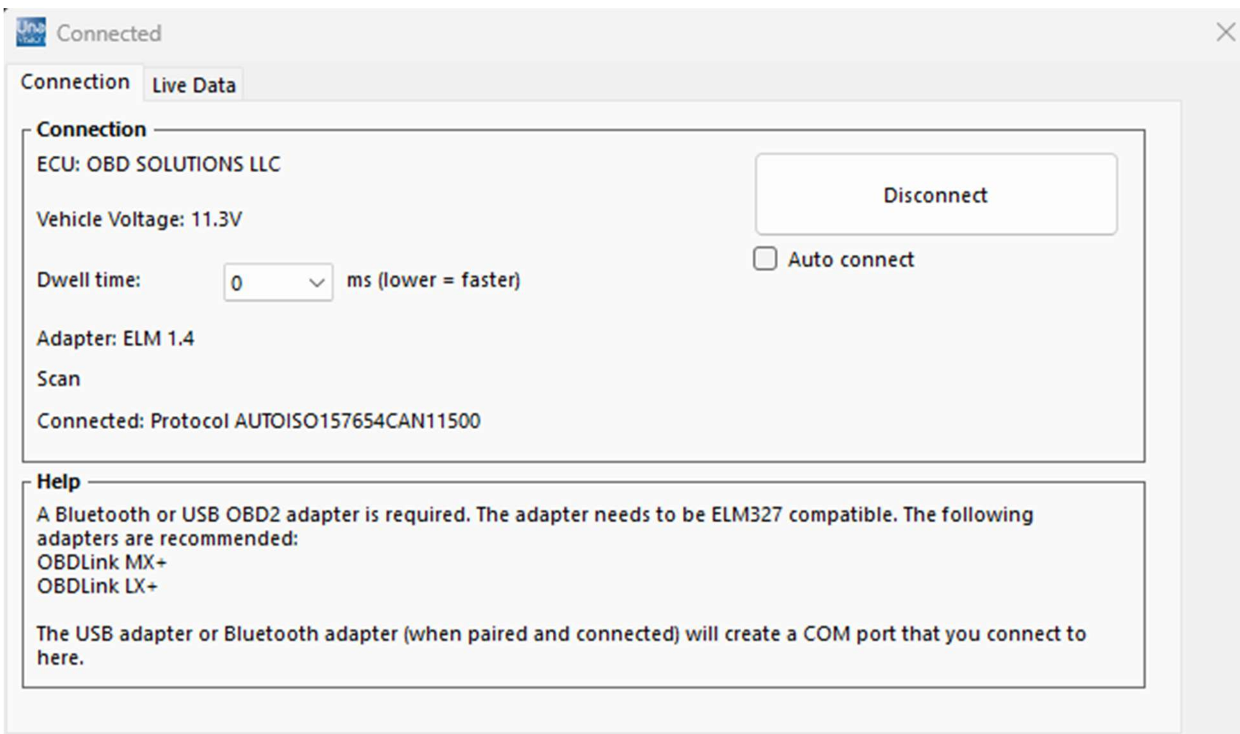


Figure 88 Connecting to an OBD2 adapter

14.7.1 Logging OBD parameters during test run

Navigate to "Live Data" tab in Scan Tool Plugin and select which channels you want to record (double-click).

Don't select more channels that you need. The OBD2 system is polling based, so more channels mean slower update rate.

In Run window you may now add new gauges with respective OBD channels, and they can be graphed as any other data channel.

The Engine RPM channel is of particular interest, since it can be used when setting the gear ratio.

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

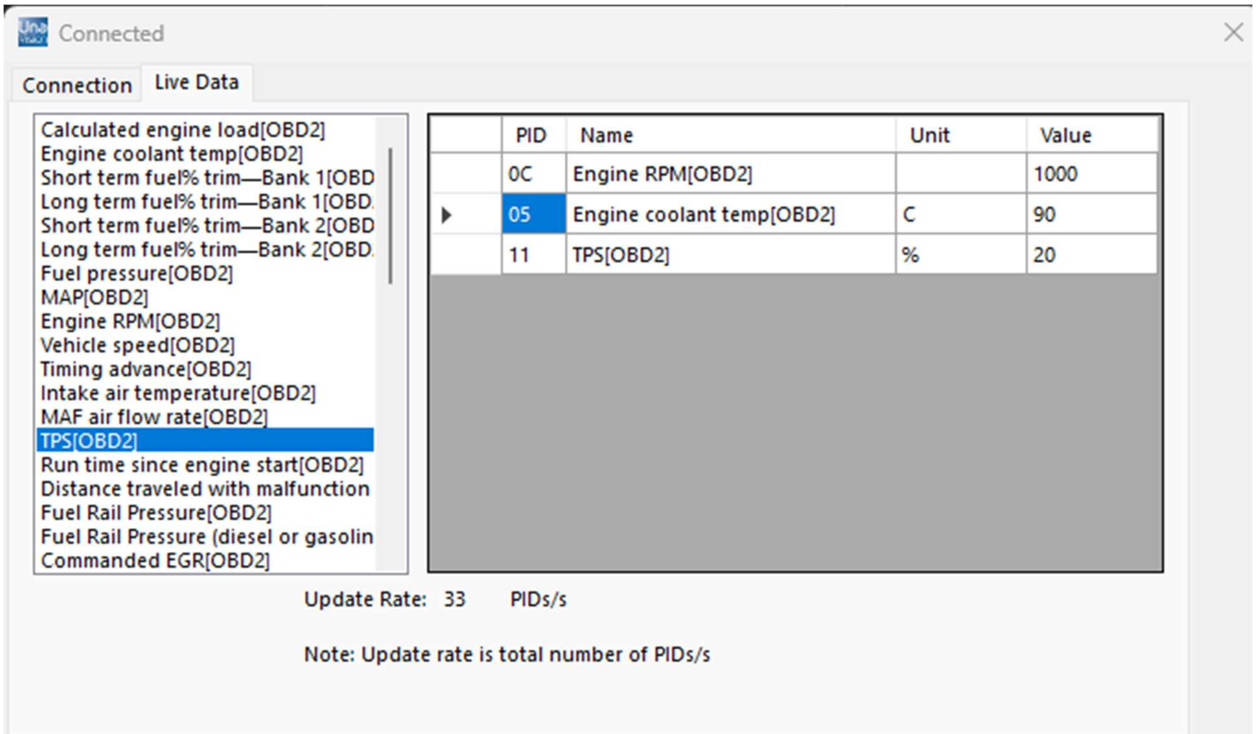


FIGURE 89 SELECT CHANNELS FROM LIST OF AVAILABLE CHANNELS

14.8 Math channels

The Math channel plugin is very useful. It provides the ability to create new channels from mathematical expressions of other channels.

Click the Help button for a detailed description.

14.9 More plugin information

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

15 Tips and tricks

Here is a collection of tips and tricks.

15.1 Getting the basic setup right

The UnaVision software includes default settings for many dyno types. Go to "Options->Dyno type and profiles" and click "Load default configuration for this dyno" to get a good starting point for your setup.

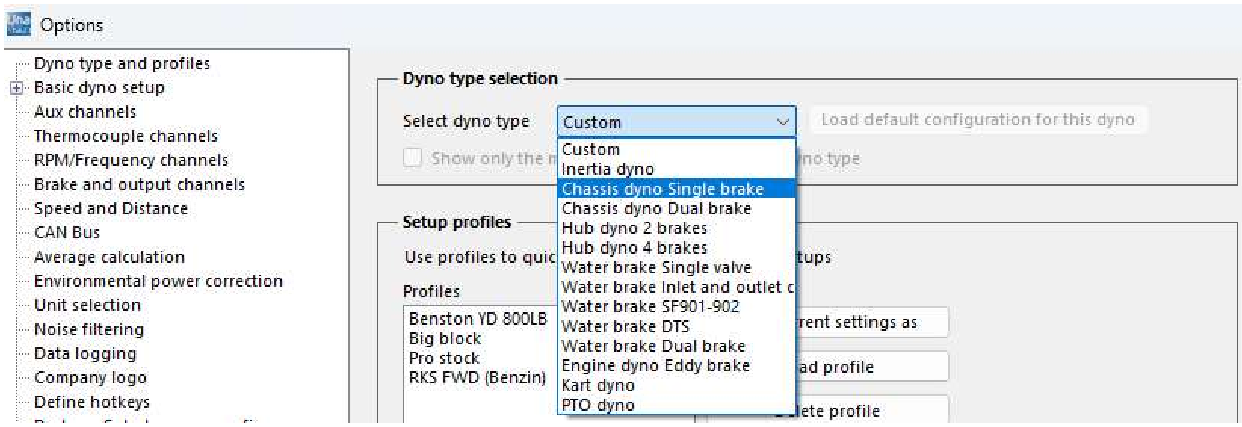


FIGURE 90 SELECTING THE DYNO TYPE GETS YOU GOING

15.2 Getting lost in all the data channels

UnaVision supports a vast number of data channels. However, care should be taken to ensure the system is not cluttered with unused channels. Unused channels can be confusing and will increase the CPU and memory load unnecessarily. Here is how to minimize unused channels:

- Only install plugins you need. Each plugin defines new data channels. To uninstall unused plugins, see section 14.1.3.
- For the CAN bus and OBD2 connections, only choose to log data channels you will use
- Turn off Aux and Thermocouple channels you don't use

15.3 Which is the right brake mode?

The following table is a good starting point for selecting the right brake mode in different setups and scenarios.

Device under test	Dyno type	Test type	Gear box	Gear ratio setting	Recommended brake mode	Ramp up brake	Auto start/stop
Engine	Engine dyno	Sweep	NA	Fixed, 1	Load Control	Ramp up over at least 1000 RPM	Manual start, Auto stop w/Auto detect early stop
Engine	Engine dyno	Fixed RPM	NA	Fixed, 1	Manual RPM	Ramp up over at least 1000 RPM	Manual start, manual stop
Car/Motorcycle	Chassis/Hub	Sweep	Manual	Fixed, using Tacho or Direct engine RPM	Power sweep vs RPM	Ramp up over at least 1000 RPM	Auto start, Auto Stop w/Auto detect early stop
Car/Motorcycle	Chassis/Hub	Fixed RPM	Manual	Fixed, using Tacho or Direct engine RPM	Manual RPM	Ramp up over at least 1000 RPM	Manual start, manual stop
Car/Motorcycle	Chassis/Hub	Sweep	Auto w/ torque converter	Fixed or variable. Torque will only be correct if Variable gear ratio is used	Power sweep vs Speed	Ramp up from low speed	Auto start, Auto Stop w/Auto detect early stop
Car/Motorcycle	Chassis/Hub	Sweep through the gears	Auto or Manual	Fixed or variable. Torque will only be correct if Variable gear ratio is used	Power sweep vs Speed or Load Control vs Speed	Ramp up from low speed	Auto Stop w/Auto detect early stop
Car/Motorcycle with abrupt power band	Chassis/Hub	Fixed RPM	Manual/Auto	Fixed or variable. Torque will only be correct if Variable gear ratio is used	Load Control vs RPM or Load Control vs Speed	Ramp up over at least 1000 RPM	Auto start, Auto Stop w/Auto detect early stop
Tractor	PTO	Sweep	NA	Fixed	Brake sweep (high to low RPM) or Load control (high to low RPM)	Optional	Auto start, Auto Stop
Kart or similar	Hydraulic dyno	Sweep	Fixed	Fixed	Brake sweep (high to low RPM) or Load control (high to low RPM)	Optional	Auto start, Auto Stop
Any	Any brake dyno	Warming up the engine	Any	Any	Any	Optional	Manual start - Don't start the run, let the brake work without starting the run
Any	Inertia	Sweep	Fixed	Fixed, using Tacho or Direct engine RPM	Off	No	Auto start RPM and Auto stop RPM
Any	Inertia	Sweep	Auto w/ torque converter	Fixed or variable. Torque will only be correct if Variable gear ratio is used	Off	No	Auto start Speed and Auto stop Speed

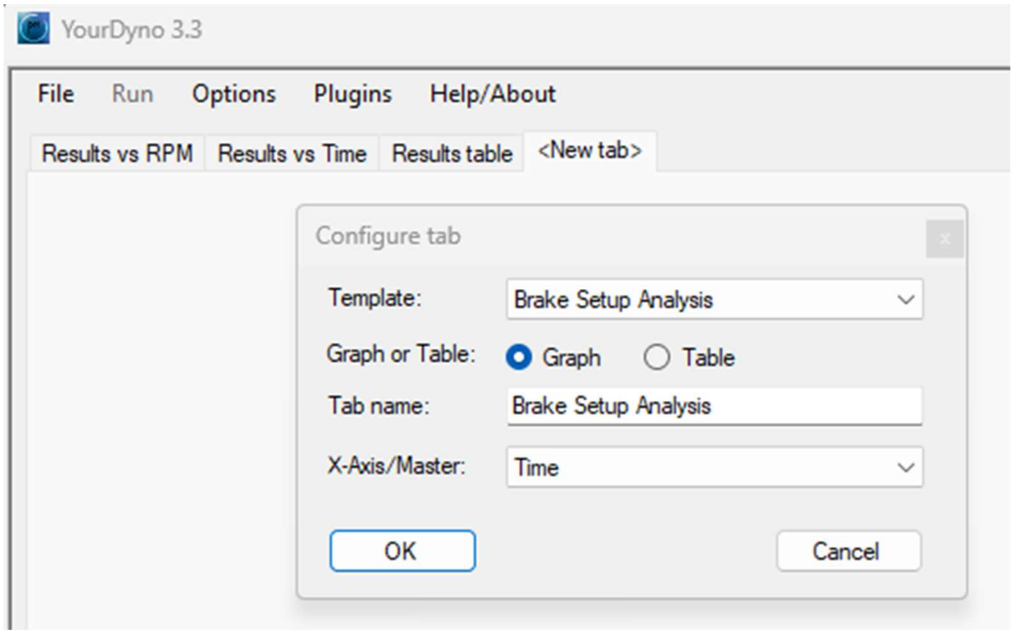
FIGURE 91 SUGGESTED SETTINGS IN DIFFERENT SCENARIOS

15.4 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.

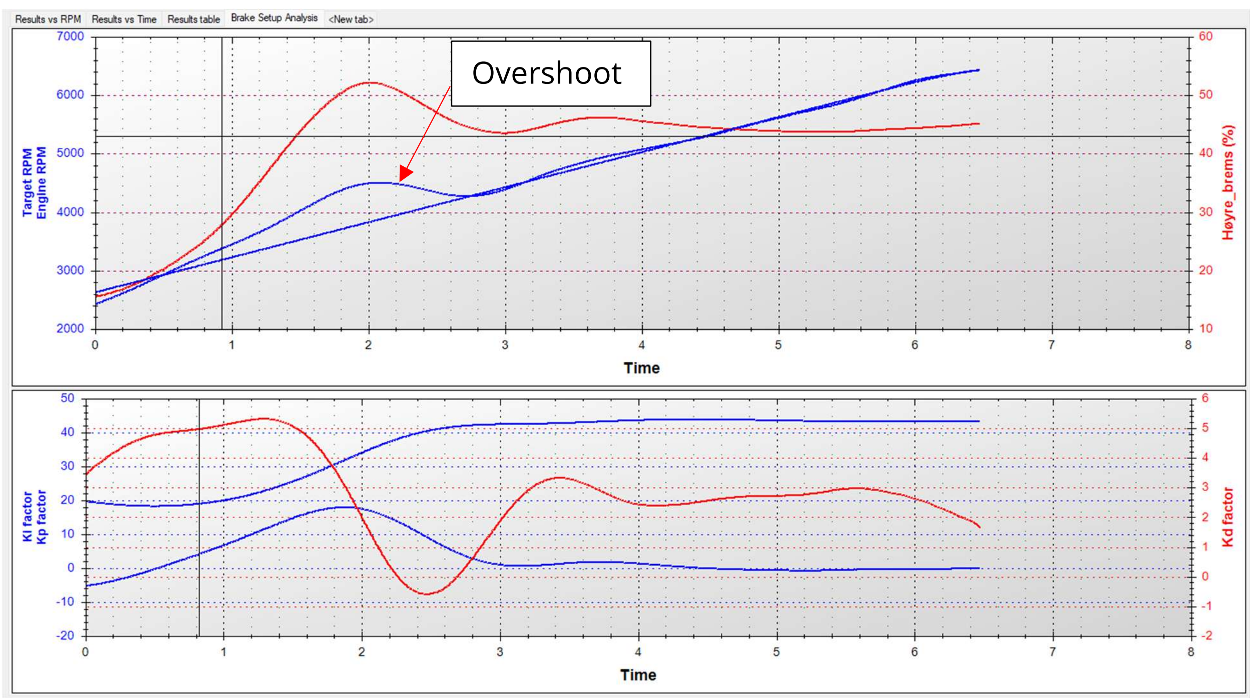
15.4.1 Looking under the hood of the regulator

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 that the steady state error is small once we come over the torque band, which is another sign that the Ki is ok.

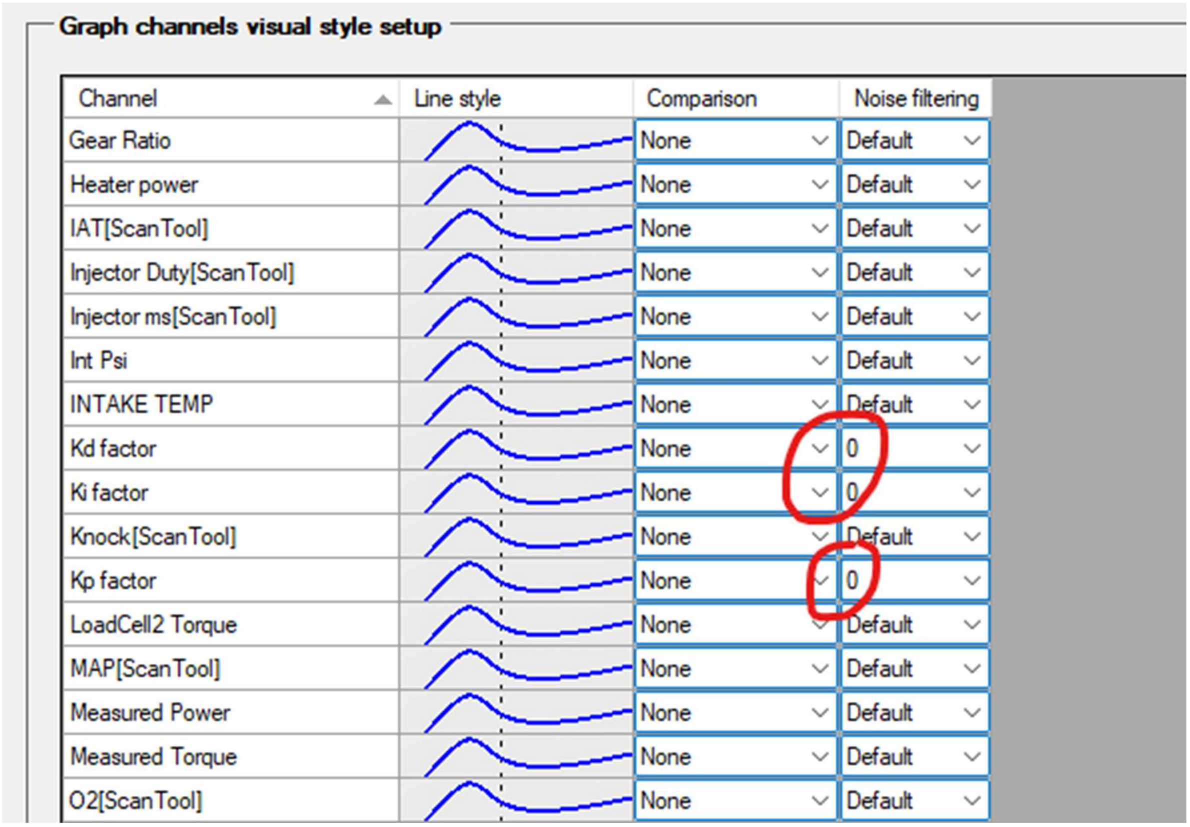
In general, the parameters should not oscillate (much). Oscillations are normally caused by a parameter being too high.

15.4.2 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.

15.4.3 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. You can also do it for Brake1%.



15.5 Finding the right Moment of Inertia (MOI)

The MOI impacts the power and torque readings like this:

Torque at the brake = (Load cell torque + Acceleration * MOI)

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 9.7 there are several ways to find the MOI manually, each one with its own pitfalls.

15.5.1 Double ramp

This is a classic way of measuring 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. Re-run is easily done by clicking the Re-run button in the database

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.

15.5.2 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

15.5.3 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.

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

15.6.1 Non-linked dyno

For a non-linked dyno set 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.

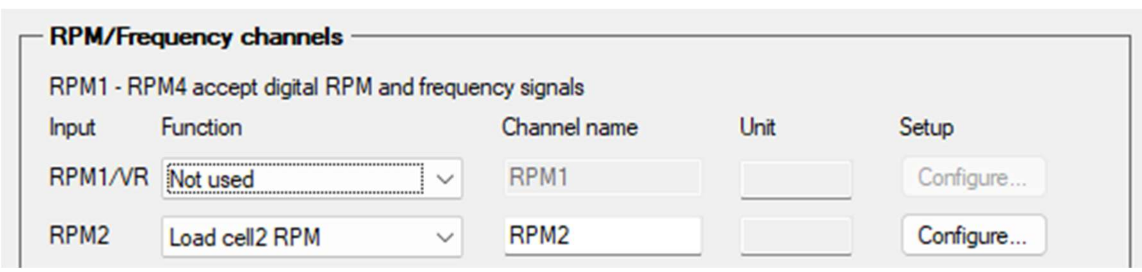


FIGURE 92 TESTING A 2WD CAR ON A 4WD NON-LINKED DYNO

15.6.2 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).

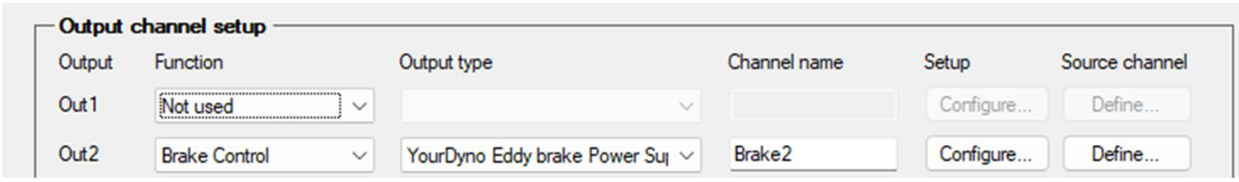


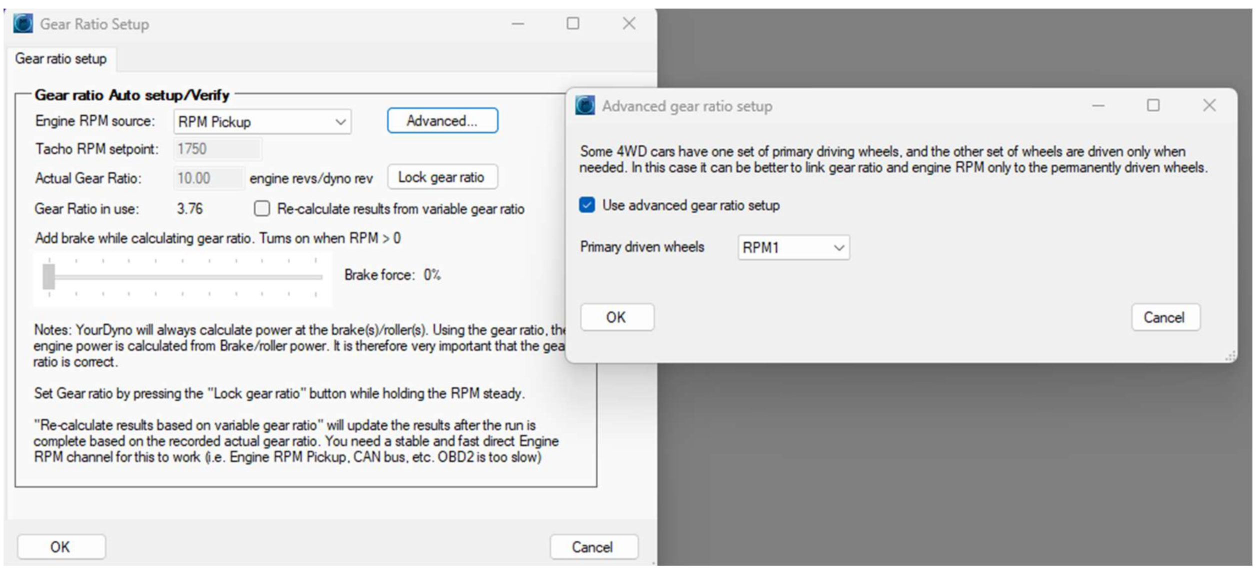
FIGURE 93 TESTING A 2WD CAR ON A 4WD LINKED DYNO

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.

15.7 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.

15.8 Automatic RPM Step test

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

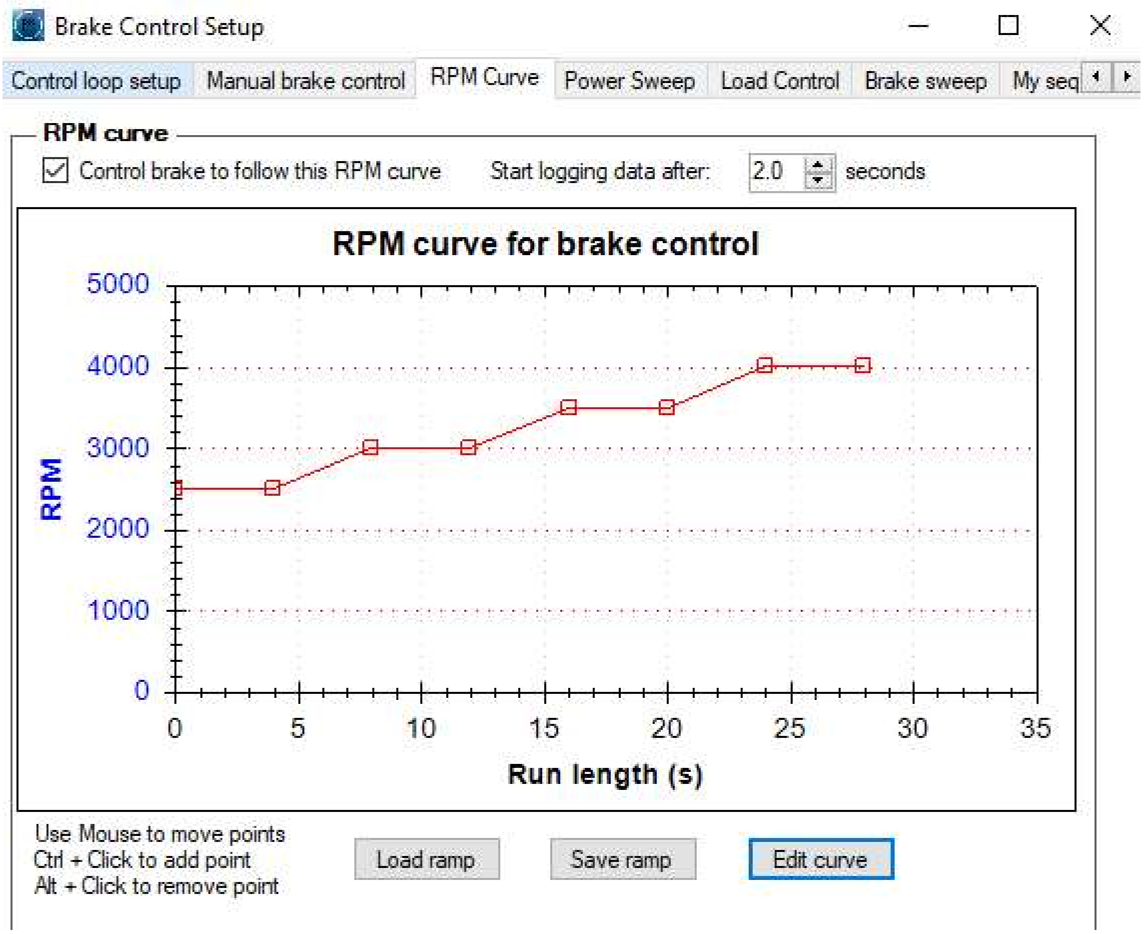


FIGURE 94 STEADY STATE TESTS

16 Support

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

To review runs for potential issues we need:

- The run(s) in question. Export the runs and attach to the mail/message
- Explanation
- Software version

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.

17 (Appendix) Fiber optic ethernet setup (Ultimate v3 only)

17.1 Connection options – USB or Ethernet?

The Ultimate v3 supports both USB and ethernet connection to the PC. In general, ethernet is recommended, due to the fiber's inherent immunity to electro-magnetic interference and it isolates the PC and the dyno system electrically.

It is recommended to leave the USB cable disconnected on the YourDyno side or both sides, to ensure the PC and the dyno are isolated.

When performing firmware upgrades the USB cable must be connected, but for normal operation USB is not needed.

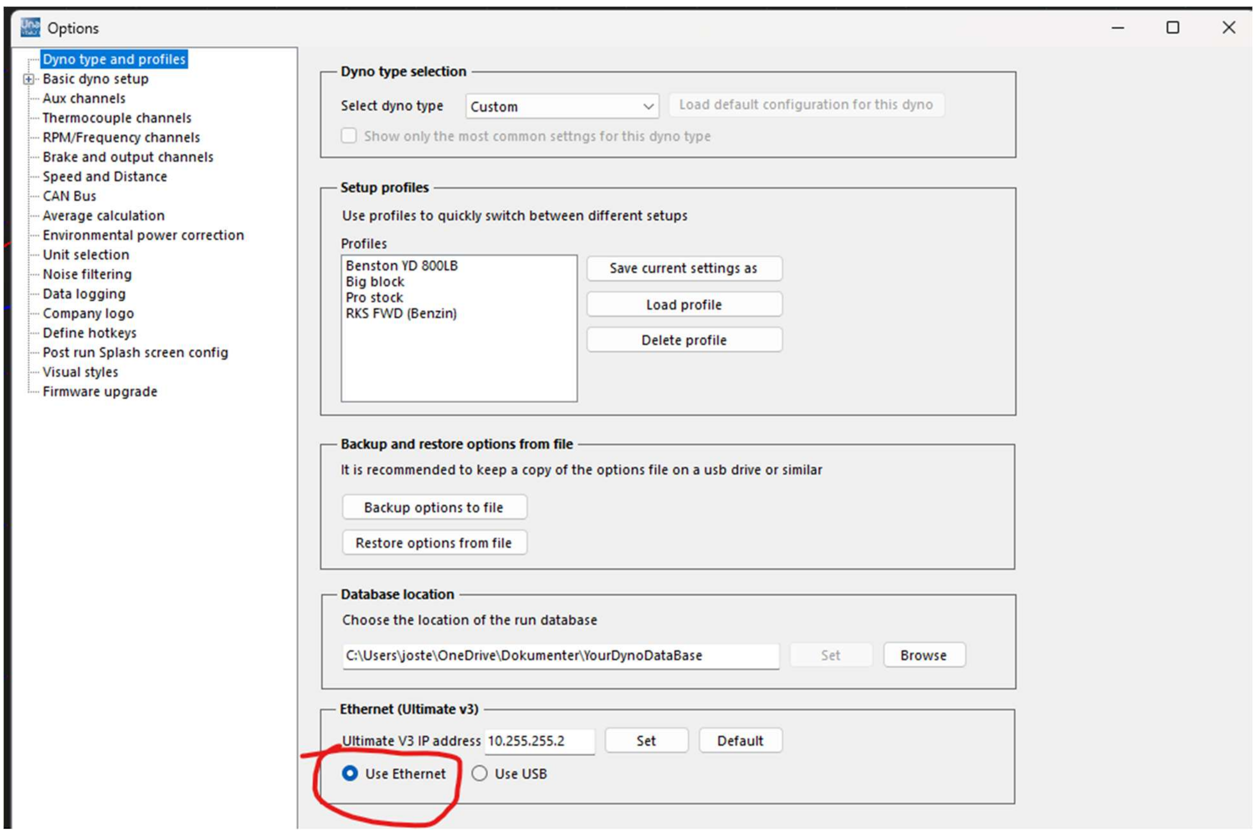


FIGURE 95 SELECTING ETHERNET OR USB

17.2 Setting up the ethernet connection

A USB to fiber optic ethernet module is included in the Ultimate v3 kit.

FIGURE 96 USB TO FIBER OPTIC ETHERNET ADAPTER

1. Connect the USB to Fiber optic ethernet adapter to the computer
2. Open Windows Settings->Network & Internet

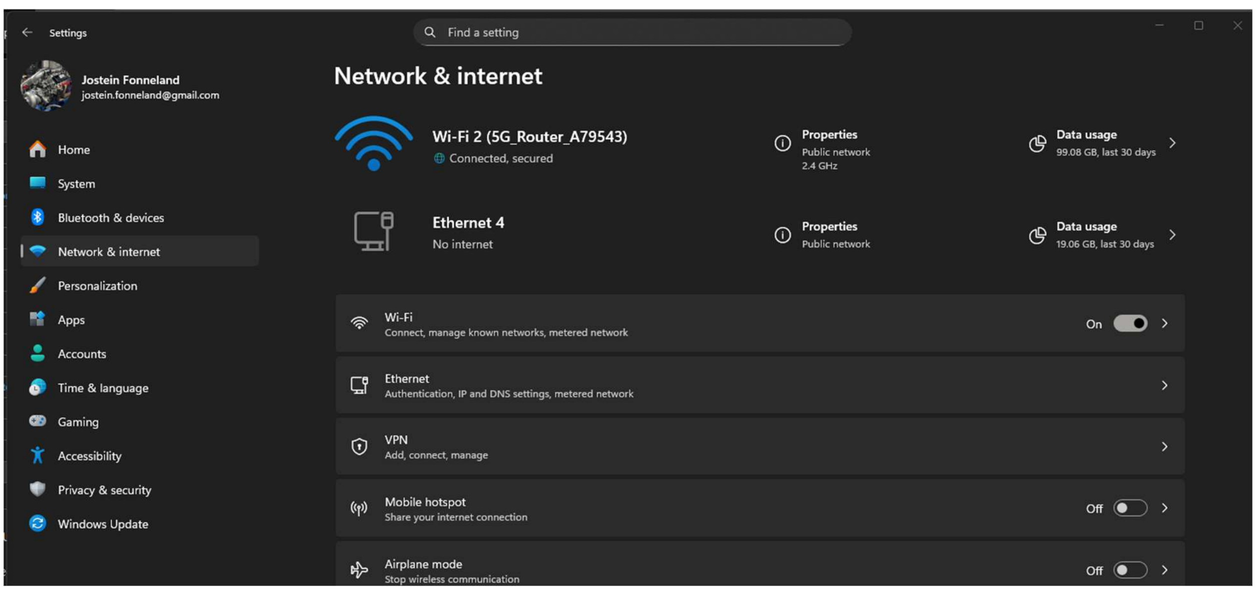


FIGURE 97 WINDOWS SETTINGS (MAY LOOK SLIGHTLY DIFFERENT)

3. Click Ethernet. Open the "Unidentified network" adapter

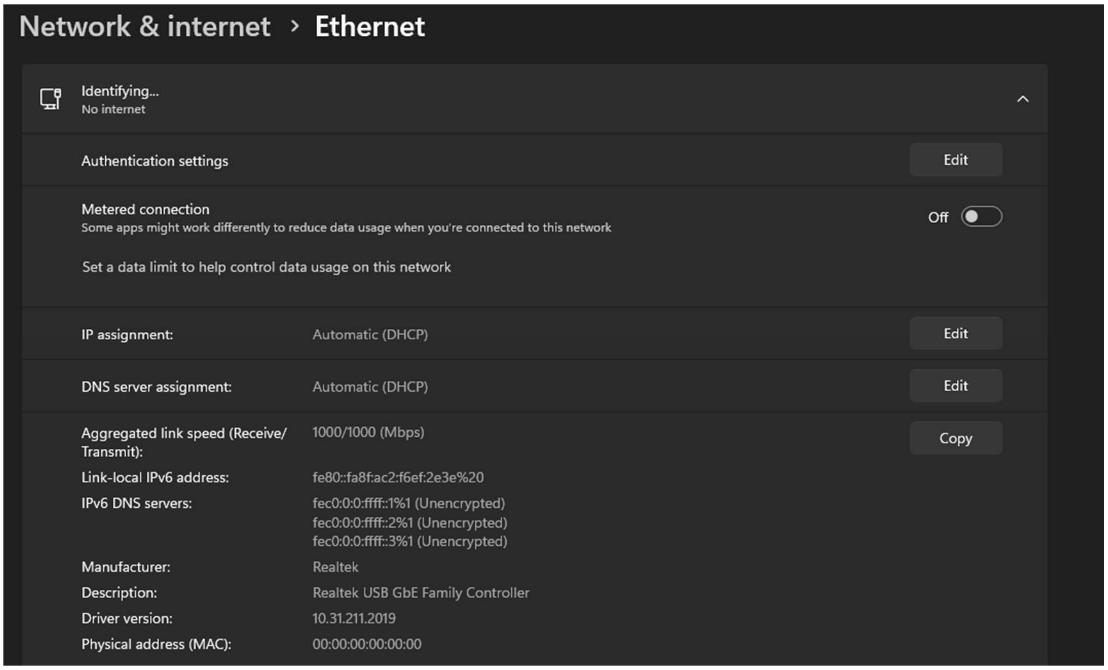
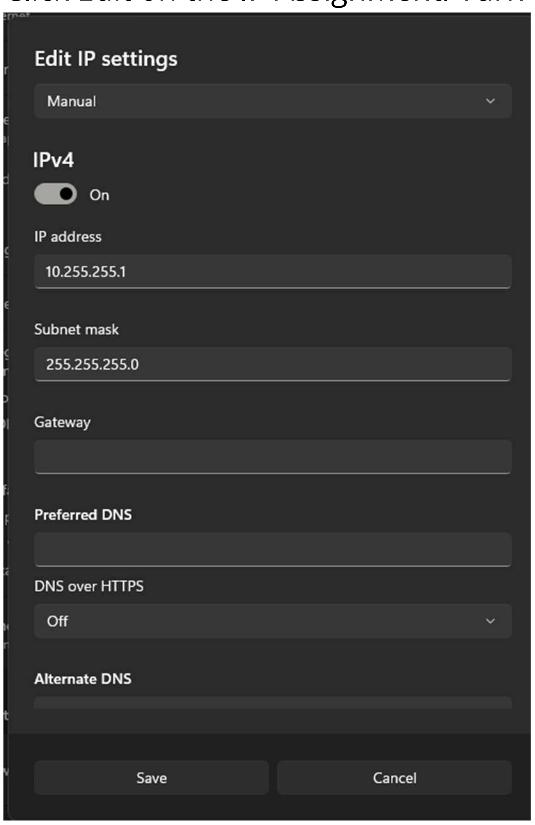


FIGURE 98 ETHERNET CONFIGURATION. NOTE REALTEK USB GBE FAMILY CONTROLLER

4. Click Edit on the IP Assignment. Turn off DHCP and click IPv4



5.

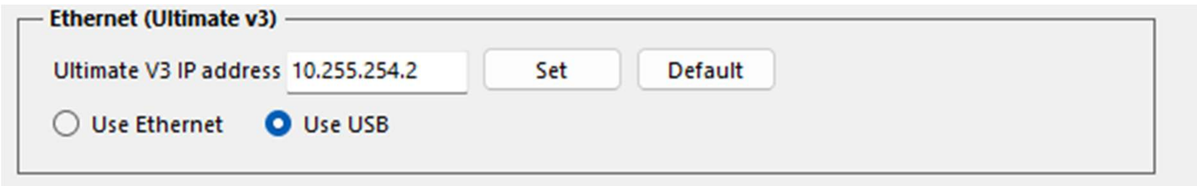
FIGURE 99 CONFIGURE IP ADDRESS LIKE THIS

The fiber optic ethernet is now ready to be used.

17.3 Changing the IP address

YourDyno uses the default IP addresses of 10.255.255.1 for the PC and 10.255.255.2 for the Ultimate V3. The addresses can be changed in the unusual case where these addresses are already in use.

1. Choose another IP address range to use where there are no conflicts. In this example we will use 10.255.254.1/2
2. Set the PC IP address to 10.255.254.1
3. Connect the Ultimate v3 to the PC using the USB cable and select Use USB
4. Change the Ultimate v3 IP address to 10.255.254.2 and click Set



5. Power cycle the Ultimate v3 and restart UnaVision
6. Click Use Ethernet and verify the connection by disconnecting the USB cable

The system is ready.

17.4 Status and troubleshooting

17.4.1 Led indications

The blue led indicates connection status

- Off = No connection (or wrong selection of Use USB or Use Ethernet)
- Steady on = USB connection active
- Slow blink = Ethernet connection active

17.4.2 No ethernet connection

If the blue led blinks slowly but the status in UnaVision is Not connected do the following:

1. Verify that Ethernet is selected in UnaVision (Options->Dyno type and profiles)
2. (Optional advanced): Ping the Ultimate unit

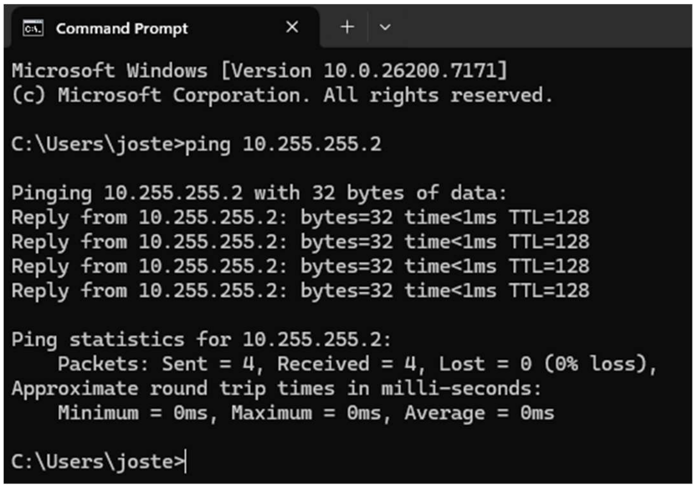


FIGURE 100 THE ULTIMATE V3 SHALL RESPOND TO PINGS

3. Restart the PC and power cycle the Ultimate v3