YourDyno Software user manual

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

©2024 Fonneland Engineering AS, all rights reserved.

This manual is copyrighted by Fonneland Engineering AS, all rights are reserved. Original User Manual for YourDyno dynamometer controller software.

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.

No part of this manual may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, recording, or otherwise, without the prior written permission of Fonneland Engineering AS. Any trademarks, trade names, service marks, or service names owned or registered by any other company and used in this guide are the property of their respective companies.

Manufacturer / Service / Warranty:

Fonneland Engineering AS / YourDyno Solkroken 16A 1394 Nesbru

admin@yourdyno.com

For more information, visit yourdyno.com

| 1 | Cor | ntei | nts | |
|---|-------|---------|--|----|
| 2 | Har | dwai | re setup | 7 |
| 3 | Soft | ware | e installation | 7 |
| 4 | Wha | at is f | the YourDyno software | 10 |
| 5 | Mai | n wir | ndow | 10 |
| | 5.1 | Ove | erview | 10 |
| 6 | Mer | nu: F | ile | 12 |
| | 6.1 | Prir | nt page setup | 12 |
| | 6.1. | 1 | Customizing print-out header. Company logo | 13 |
| 7 | Mer | nu: R | un | 15 |
| | 7.1 | Nev | v/Load Session | 15 |
| | 7.2 | Nev | v Run | |
| 8 | Mer | nu: C | ptions | 17 |
| | 8.1 | Get | the connections right first | |
| | 8.2 | Bas | ic dyno Setup | 18 |
| | 8.3 | Bra | ke Dyno w/Load Cell(s) | 19 |
| | 8.3. | 1 | Inertia compensation | 19 |
| | 8.3.2 | 2 | Load Cell calibration | 19 |
| | 8.4 | Iner | tia Dyno | 21 |
| | 8.5 | Eng | ine power calculation for hub and roller dynos | 22 |
| | 8.6 | Aux | channels | |
| | 8.7 | The | rmocouples | 25 |
| | 8.8 | RPN | //Frequency channels | 25 |
| | 8.8. | 1 | Load cell RPM channels | |
| | 8.8.2 | 2 | Frequency channels | |
| | 8.8.3 | 3 | Digital On/off channels | 27 |
| | 8.8.4 | 4 | Flow meter channels | 27 |
| | 8.9 | Bra | ke controller and other outputs | |
| | 8.9. | 1 | Brake controller setup | |
| | 8.9.2 | 2 | Throttle output | |

| 8.9. | 3 | Generic outputs | 31 |
|----------|-------|--|----|
| 8.10 | CAN | l bus | 31 |
| 8.10 |).1 | CAN bus basics | 32 |
| 8.10 |).2 | The CAN bus analyzer | 32 |
| 8.10 |).3 | CAN Inputs | 32 |
| 8.10 |).4 | CAN Outputs | 33 |
| 8.11 | Ave | rage calculation | 33 |
| 8.12 | Env | ironmental (weather) correction | 34 |
| 8.12 | 2.1 | About environmental correction | 34 |
| 8.12 | 2.2 | Which correction factor to choose | 34 |
| 8.12 | 2.3 | Source of data | 34 |
| 8.13 | Unit | t selection | 35 |
| 8.14 | Nois | se filtering | 36 |
| 8.14 | 4.1 | RPM spike removal | 37 |
| 8.15 | Raw | <i>i</i> data logging | 37 |
| 8.16 | Con | npany logo | 38 |
| 8.17 | Defi | ine hotkeys | 38 |
| 8.18 | Visu | al styles | 40 |
| 8.19 | Firm | nware upgrade | 40 |
| 8.20 | Lan | guage | 41 |
| 8.21 | Res | tore and Backup options | 41 |
| 9 Mer | nu: P | lugins | 41 |
| 9.1 | Mar | nge plugins | 41 |
| 9.2 | Inst | alling new plugin | 42 |
| 9.3 | Ren | noving plugins | 42 |
| 9.4 | Scai | n Tool (OBDII plugin) | 43 |
| 9.4. | 1 | Logging OBD parameters during test run | 44 |
| 9.5 | Spe | ed and distance | 45 |
| 9.6 | Mor | re plugin information | 45 |
| 10 D | ata C | Graph/Table area. Data analysis. Test Run list | 45 |
| 10.1 | Gra | ph/Table tabs | 45 |
| Page 3 | 3 | | |

| 10.2 | Gra | ph views | 46 |
|----------|-------|---|----|
| 10.2 | 2.1 | Manipulating the graph area. Context menu | 48 |
| 10.2 | 2.2 | Context menu | 48 |
| 10.2 | 2.3 | Results vs RPM | 49 |
| 10.2 | 2.4 | Results vs Time | 49 |
| 10.2 | 2.5 | Other X-axis | 50 |
| 10.3 | Res | ults table views | 50 |
| 10.4 | Test | t Run List | 51 |
| 11 R | lun w | indow | 52 |
| 11.1 | Ove | rview | 52 |
| 11.2 | Con | figuring Gauges | 55 |
| 11.2 | 2.1 | Adding new gauges | 55 |
| 11.2 | 2.2 | Types of gauges | 56 |
| 11.2 | 2.3 | Example on one of possible gauges setup | 62 |
| 11.3 | Gea | r ratio setup | 62 |
| 11.4 | Bral | ke Control Setup. PID settings | 64 |
| 11.4 | 4.1 | Basic setup | 64 |
| 11.5 | PID | Control loop setup | 66 |
| 11.6 | Bral | ke Modes | 66 |
| 11.0 | 5.1 | Manual brake control | 66 |
| 11.0 | 5.2 | RPM Curve | 67 |
| 11.0 | 5.3 | Power Sweep | 68 |
| 11.0 | 5.4 | Load Control | 69 |
| 11.0 | 5.5 | Brake sweep | 70 |
| 11.7 | Auto | o start stop | 70 |
| 11. | 7.1 | Automatic recording of test Run | 70 |
| 11.8 | Bral | ke control update frequency | 71 |
| 11.9 | MO | l wizard | 71 |
| 11.9 | 9.1 | Automatic MOI test procedure | 72 |
| 12 S | etup | examples | 73 |
| 12.1 | Wat | er brake example | 73 |
| Page 4 | 1 | | |

| 12.1 | 1.1 | Load cell | 73 |
|------|-------|---|----|
| 12.1 | 1.2 | Do NOT turn on retardation data measurement | 73 |
| 12.1 | 1.3 | RPM | 74 |
| 12.1 | 1.4 | Brake output | 74 |
| 12.1 | 1.5 | Brake control mode | 74 |
| 12.2 | Iner | tia dyno example | 75 |
| 12.2 | 2.1 | Basic | 75 |
| 12.2 | 2.2 | RPM sensor | 75 |
| 12.2 | 2.3 | Run window | 76 |
| 12.3 | 2W[| D chassis dyno example | 76 |
| 12.3 | 3.1 | Load cell | 76 |
| 12.3 | 3.2 | RPM | 76 |
| 12.3 | 3.3 | Brake output | 76 |
| 12.3 | 3.4 | Brake control mode | 77 |
| 12.4 | 4W[| D chassis and 2WD hub example | 77 |
| 12.4 | 4.1 | Using the right inputs and outputs | 77 |
| 12.4 | 4.2 | Load cells | 77 |
| 12.4 | 4.3 | RPM | 78 |
| 12.4 | 4.4 | Brake setup | 78 |
| 12.4 | 4.5 | Brake control mode | 78 |
| 12.5 | 4W[| D hub example | 78 |
| 13 T | ïps a | nd tricks | 78 |
| 13.1 | Find | ling the right Moment of Inertia (MOI) | 78 |
| 13.1 | 1.1 | Double ramp | 78 |
| 13.1 | 1.2 | Steady state + Ramp | 79 |
| 13.1 | 1.3 | Test in different gears | 80 |
| 13.2 | Find | ling the best brake control settings | 80 |
| 13.2 | 2.1 | Looking under the hood of the regulator | 80 |
| 13.2 | 2.2 | Analyzing load control | 82 |
| 13.2 | 2.3 | Turning off noise filtering on brake channels | 82 |
| 13.3 | Driv | e modes when testing a 2WD car on a 4WD dyno | 83 |
| | | | |

| 13.3 | 3.1 Non-linked dyno | 83 |
|------|------------------------------|----|
| 13.3 | 3.2 Linked dyno | 84 |
| 13.4 | Non-linked 4WD dyno concerns | 84 |
| 13.5 | Automatic RPM Step test | 85 |
| 14 S | Support | 85 |
| | | |

2 Hardware setup

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

3 Software installation

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

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

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

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



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

Page | 7

Press button "Next" to continue.

| Optional features to install Select the features to be inst | alled | | |
|--|--|--|--|
| PTH200 external environm VM167 plugin (only install OBD2 scan tool plugin USB Relay KMTronic 4ch USB relay ✓ CANTool USB can bus intermediate | nental sensors plugin if driver is installed) erface | | |
| Select All Vanced Installer | | | |
| namena anacemen | | | |

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

| VourDyno Setup | | | × |
|---|----------------|-------------|-----|
| Select Installation Folder | | 1 | Inc |
| This is the folder where YourDyno will be installed. | | | |
| To install in this folder, click "Next". To install to a different folde "Browse". | r, enter it be | low or clic | k |
| <u>F</u> older: | | | |
| C: \Program Files (x86)\YourDyno\ | | Browse | ŝ |
| | | | |
| | | | |
| | | | |
| | | | |
| vanced Installer | | | |

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

| Ready to Install | | 6 |
|---|---|-----------|
| The Setup Wizard is ready to begin | the YourDyno installation | C |
| Click "Install" to begin the installation installation settings, dick "Back". Cl | n. If you want to review or change an ick "Cancel" to exit the wizard. | y of your |
| | | |
| | | |
| | | |
| | | |
| dvanced Installer | | -0 |

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



4 What is the YourDyno software

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



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

5 Main window

5.1 Overview

The main window consists of four main sections:

1. Top menu bar:



2. Graph area:



3. List of recorded test Runs:

| | visible | Name | Y1 | Y2 | Max Engine Power | Max Engine Torque | Environmental conditions | Env corr type | Env corr factor | Total corr factor | Comments |
|---|---------|------------|----|----|----------------------|----------------------|-------------------------------------|------------------|--------------------|----------------------|----------|
| X | | 35NZXB 2_1 | | | 423.06 PS @ 6690 RPM | 518.91 Nm @ 3299 RPM | T: 15.8C, Hum: 32.4%, P: 1025.2mBar | | | 0.980 | moi 43 |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

4. Status bar:

| Delete | Visible | Name | Color Y1 | Color Y2 | Max Engine Power |
|------------|-----------|------------|-------------|-------------|---------------------|
| × | | 35NZXB 2_1 | | | 423.06 PS @ |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| Status: Yo | urDyno co | onnected | | | |

6 Menu: File

The following functions are available in this menu:

Clear all runs - this function will remove all test runs from the Runs List below the graph area.

Open runs - open previously recorded test.

Save runs - save file with recorded test runs.

Print page setup - opens dialog window with settings for graph print-out.

Print... - opens printer dialog.

Exit - close the software.

6.1 Print page setup

This function opens following setup window:

| Print setup | | | - 0 |
|---|---------------------------------------|----------------------------------|--------------------------------------|
| Print header setup Image Set header image | Set font Swap text and image location | h Header print height (mm): 25 🚖 | |
| Your shop name Your address and contact | | | YourDyno.com Power to the People! |
| Page setup Print preview | | | |

Use this window to adjust your print-out page.

6.1.1 Customizing print-out header. Company logo

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

| | l (Berlachsburgelban) Metantersteild ben Metantersteild tep Metantersteilderen Metantersteilderen | |
|-------------|--|-----|
| | Rough Harmonitation Calification from P P December 2018 Date Station of Porcespeare USA and Porcespeare USA and Porcespeare | |
| | Player, Marconstantion, Lond Angestrian Discontrapation Fam. Discontrapation from 158 and P (contrapation) 258 and P (contrapation) 258 and P (contrapation) | |
| | Contract Transmission | |
| Paper | | |
| Size: | A4 | ~ |
| Source: | Automatically Select | ~ |
| | Margins (inches) | |
| Drientation | |).1 |
| Orientation | Left: 0.1 Right; 0 | |

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



7 Menu: Run

7.1 New/Load Session

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



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

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



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

| Browse For Folder | × |
|---|------|
| Select session or create new folder for a new session | |
| | |
| CompressedPDF Dell T7500 drivere | Â |
| dynoKRAFT dyno tests | |
| J dynoKRAFT | |
| Peter Pan | |
| AMG C63S | |
| Session 1 | |
| Session 2 - Stage 1 | - |
| Make New Folder OK Car | ncel |

i

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

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

| Run | Options Plugins Help/About | |
|-----|---------------------------------------|------|
| u | New/Load Session | able |
| 1 | New Run + Record new retardation data | |
| | New Run using stored retardation data | |
| | | |
| | | 1 |

7.2 New Run

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

8 Menu: Options

8.1 Get the connections right first

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

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

YourDyno.com Fonneland Engineering AS, 2024

| 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 |
| | | Load cell1 | RPM1 = Load cell 1 RPM | Out1 |
| 2 eddy brakes | 2 | Load cell 2 | RPM2 = Load cell 2 RPM | Out2 |
| | | Load cell1 | RPM1 = Load cell 1+2 RPM or | Out1 |
| 2 eddy brakes with 1 RPM sensor | 2 | Load cell 2 | RPM2 = Load cell 1+2 RPM | Out2 |
| | | Load cell1 | RPM1 = Load cell 1+2 RPM | Out1 |
| | | Load cell 2 | | Out2 |
| 4 eddy brakes (2WD Hub w/2 brakes | | Load cell 3 | RPM3 = Load cell 3+4 RPM | Out3 |
| each) | 4 | Load cell 4 | | Out4 |
| | | Load cell1 | RPM1 = Load cell 1 RPM | Out1 |
| | | Load cell 2 | RPM2 = Load cell 2 RPM | Out2 |
| | | Load cell 3 | RPM3 = Load cell 3 RPM | Out3 |
| 4 eddy brakes (4WD Hub) | 4 | Load cell 4 | RPM4 = Load cell 4 RPM | 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 |
| | | | | Out1 + Out2 (main valve) |
| 1 water brake w/2 valves | 1 | Load cell 1 | RPM1 = Load cell 1 RPM | Out3 + Out4 (secondary valve) |
| | | Load cell 1 | | Out1+Out2 |
| 2 linked water brakes | 2 | Load cell 2 | RPM1 = Load cell 1+2 RPM | Out3 + Out4 |

8.2 Basic dyno Setup

This function opens the main software settings window.

| Options | | - | × |
|---|--|---|---|
| | Load Cell 1 LoadCell 2 | | |
| Brake Dyno w/Load Cell(s) Inertia Dyno Engine power calculation Internal dyno Losses Aux channels Thermocourse channels | Dyno Type Image: Comparison of the provided pro | | |
| | Inertia compensation | | |
| ·····CAN Bus ····· Average calculation | Readings will be too low under acceleration unless compensated for. | | |
| - Environmental power correction - Unit selection - Noise filtering | Compensate for inertia effects during acceleration | | |
| Data logging Auto save | | | |
| Company logo | Calibration | | |
| Show/Hide visible control panel | Torque arm length to load cell 50.0 Cm | | |
| Post run Splash screen config | Calibration weight 20.00 😴 kg | | |
| Visual styles Firmware upgrade | Zero calibrate! Load calibrate! Save calibration | | |
| | Roller/Hub Moment of Inertia (MOI) 3.71 - kg°m^2 | | |
| | Calibration direction | | |
| | It is possible to reverse the calibration. This is used when the load is opposite from when the load cell was calibrated. This is can be used for example when testing a Front wheel drive car on a Rear wheel drive drop setup Grake turns the other way). | | |
| | Reverse calibration | | |
| | | | |
| | Weight after calibration: 0.0 kg | | |
| | Torque after calibration: 0.0 Nm | | |
| | Raw loadcell reading (ave): -25 -0.1% of max | | |
| | | | |
| | | | |
| | | | |

8.3 Brake Dyno w/Load Cell(s)

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

| Options | | <u>000</u> 4 | × |
|---|------------------------|--------------|---|
| Options | Load Cell 1 LoadCell 2 | | |
| - Inertia Dyno - Inertia Dyno - Engine power calculation - OBD2 setup - Noise filtering | Dyno Type | | |

8.3.1 Inertia compensation

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

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

| Inertia compensation | | |
|--|--|--|
| Brake dyno readings are affected by the inertia Readings will be too low under acceleration unl | of the dyno and the drive train. ess compensated for. | |
| Compensate for inertia effects during acceleration | | |
| Moment of Inertia associated with each brake | 26,37 🚔 kg*m^2 | |
| Total MOI for the system = MOI for each brake/ for a 4WD hub dyno the total MOI = 4 times the | roller/hub x number of load cells. I.e MOI above | |

i

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

8.3.2 Load Cell calibration

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

8.3.2.1 Using a calibration arm

Often large capacity load cells require the use of a long calibration arm to put enough weight on it. In the following, it is assumed that a calibration arm is used. The

Page | 19

procedure is the same if the weight is placed directly on top of the load cell, but this often will not give enough weight on the load cell.

| Calibration Distance to calibration weig Calibration weight | ht 100.0 ÷ cm 50.00 ÷ kg |
|---|----------------------------------|
| Calibration weight hangs here | Load calibrate! Save calibration |

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

| Γ | Information | | |
|---|-----------------------------|-----------------|------------------------------|
| | Weight after calibration: | 0.0 kg | Aim for 20% or more when the |
| | Torque after calibration: | -0.1 Nm | calibration weight is on |
| | Raw loadcell reading (ave): | -16 0.0% of max | |
| 1 | | | |

8.3.2.2 Calibration procedure

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

8.3.2.3 Calibration direction

Use this setting to invert the calibration of the load cell.

This is useful when you would like to run the dynamometer in opposite driving direction.

Calibration direction -

It is possible to reverse the calibration. This is used when the load is opposite from when the load cell was calibrated. This is can be used for example when testing a Front wheel drive car on a Rear wheel drive dyno setup (brake turns the other way).

Reverse calibration



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

8.4 Inertia Dyno

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

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

| — Dyno Type – | nertia Dyno | | |
|--------------------------------------|-------------|--------|--|
| — Drum setup – System MOI: | 26,37 | kg*m^2 | |

8.5 Engine power calculation for hub and roller dynos

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

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



\wedge

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

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

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

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

Page | 22

| Loning UU/Lengue enlautation (competion |
|--|
| Engine HP7 forque calculation/correction |
| When wheel power is measured, engine power can be estimated. There are two loss components to compensate for: 1) Speed related losses: |
| Enable the Correction for rolling resistance option to calculate and compensate for tire rolling resistance and unloaded transmission losses vs roller speeds. After you have done this measurement once, you can choose to use the stored loss reading for the subsequent runs (redo when changing vehicle or changing air pressure or stran down force) |
| |
| Warning: Brake is immediately turned off when reaching the end RPM when this option is on |
| Enable correction for rolling resistance vs speed from measured retardation data |
| Brake during coast down 0.0 🔭 %. (Experimental). Only recommended when coast down takes > 15 seconds |
| 2) Power related losses: |
| The total friction will be higher than the measured rolling resistance during retardation, since redardation occurs at you load. The additional losses are dependent on the power. An additional power correction factor must |
| therefore be applied |
| Power related losser 5.0 |
| Engine power = (Measured wheel power + measured rolling speed losses) * Power correction Power correction = 1/(1 - Power related losses) |
| |

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

8.6 Aux channels

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



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.

| nput | In use | Channel name | Unit | | Channel value |
|------|--------------|--------------|------|-----------|---------------|
| Aux1 | | WB Lambda | AFR | Configure | 0.01 |
| Aux2 | \checkmark | MAP | psi | Configure | 0.01 |
| Aux3 | | Water temp | С | Configure | 0.01 |
| Aux4 | | Aux4 | Volt | Configure | 0.02 |
| Aux5 | | Aux5 | Volt | Configure | 4.48 |
| Aux6 | \checkmark | Aux6 | Volt | Configure | 4.48 |
| Aux7 | | Aux7 | Volt | Configure | 4.48 |
| Aux8 | | Aux8 | Volt | Configure | 4.48 |



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

8.7 Thermocouples

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

| Therm | ocouple setup — | | |
|--------|---------------------|---------|--|
| Number | of Thermocouples | 8 🜲 | |
| Input | Channel name | Value | |
| Th1 | EGT1 | 0.0 C | |
| Th2 | EGT2 | 0.0 C | |
| Th3 | EGT3 | 0.0 C | |
| Th4 | EGT4 | 0.0 C | |
| Th5 | EGT5 | 0.0 C | |
| Th6 | EGT6 | 0.0 C | |
| Th7 | EGT7 | 0.0 C | |
| Th8 | EGT8 | 0.0 C | |
| | | | |
| Therm | ocouple Offset cali | bration | |
| Offset | 0.0 🚖 0 | : | |

The Offset lets you adjust the thermocouple readings for more accuracy. Let the instrument be on for a few minutes before setting the offset

8.8 RPM/Frequency channels

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

| RPM1/VR Load RPM2 Not u | cell1 RPM sed | ✓ RPM1 ✓ RPM2 | Configure |
|----------------------------|--------------------------|---------------|------------|
| RPM2 Not u | sed | V RPM2 | |
| | | | Configure. |
| PM3 Not u | sed | V RPM3 | Configure |
| RPM4 Load | cell3 RPM cell3+4 RPM | RPM4 | Configure |
| ndRPM Digita | l on/off channel | RPM Pickup | Configure |
| | meter RPM channel | | |

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

8.8.1 Load cell RPM channels

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

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



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

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

8.8.2 Frequency channels

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

8.8.3 Digital On/off channels

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

8.8.4 Flow meter channels

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

| Input | Function | | Channe | Iname | Uni | t | Setup | | |
|--------------------------------|---|--------------------------|------------|--------------|----------|-------------|-----------------------|-----------|---|
| Freq1 | Flow meter | ~ | Flow 1 | | Ga | l/hr | Configure | | |
| Freq2 | Digital on/off | Flowmeter C | hannel Se | etup | | | _ | | > |
| Uela | | Flow 1 channe | el setup | Pulses | | Volume | | | |
| Notes: | | Sensor flow spec | ification: | 3000 | per | Gal | | | |
| Each br Engine In additi | ake/roller must F RPM = Brake or on, Engine RPM | Channel time sca | ale: hr | ~ | | | | | |
| Only en ensor th | Gear ratio (and able RPM senso at is not in use. \$ | Channel unit: (| Gal/hr | | | | | | |
| RPM1 (RPM1 ar | default) or VRRF nd VRRPM input: | Notes Use this option to | o define p | ulse frequer | cy based | I flow chan | nels. Their specifica | tion is a | |

8.9 Brake controller and other outputs

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

| Output | Function | | Output type | | Channel name | Setup | Source channe |
|--------|---------------|--------|----------------------------|--------|--------------|-----------|---------------|
| Out1 | Brake Control | ~ | YourDyno Water brake valve | ~ | Brake1 | Configure | Define |
| Out2 | Brake Control | \sim | YourDyno Water brake valve | \sim | | Configure | Define |
| Out3 | Throttle | ~ | Analog 0-5V output | \sim | Throttle | Configure | Define |
| Out4 | Other | ~ | Pulse Width Modulation | \sim | Out4 | Configure | Define |

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

8.9.1 Brake controller setup

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

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

| Output | channel setup — | | | | | |
|--------|-----------------|---|--|--------------|-----------|----------------|
| Output | Function | | Output type | Channel name | Setup | Source channel |
| Out 1 | Brake Control | ~ | YourDyno Eddy brake Power Suj $ \smallsetminus $ | Brake1 | Configure | Define |
| Out2 | Not used | ~ | YourDyno Eddy brake Power Supply YourDyno Water brake valve | | Configure | Define |
| Out3 | Throttle | ~ | Dynomite water brake valve Analog 0-5V output | Throttle | Configure | Define |
| Out4 | Other | ~ | Pulse Width Modulation Stepper motor | Out4 | Configure | Define |

8.9.1.1 Eddy brake power supply

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



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).

| Max voltage: 192 Volt (default 192V) iest your brake: Brake force: 0% uetooth status (optional) Brake force: 0% Get status via Bluetooth LE (Windows 10 or 11 only) Bluetooth power supply connection Search again Bluetooth Id: Status: Disconnected Connect Auto connect on startup | age: 192 Volt (default 192V) r brake: th status (optional) tatus via Bluetooth LE (Windows 10 or 11 only) ooth power supply connection Bluetooth device Search again oth Id: :: Disconnected Connect Auto connect on startup : Auto connect on startup : Rename : Rename | ax voltage: 192 Volt (default 192V) est your brake: Brake force: 0% setooth status (optional) Brake force: 0% Get status via Bluetooth LE (Windows 10 or 11 only) Bluetooth power supply connection Select Bluetooth device Search again Bluetooth Id: Status: Disconnected Connect Auto connect on startup Name and status Rename Current: 0 A Temperature: 0 C | An Dyno cudy power supply setup ax voltage: 192 Volt (default 192V) est your brake: Image: Search again Buetooth device Search again Bluetooth Id: Status: Disconnected Connect Auto connect on startup Name and status Current: 0 A Temperature: 0 Current: 0 Manual commands (advanced) Write Write Default Data from YourDyno device: Help Make sure to Pair the bluetooth device in Windows Settings to ensure proper automatic reconnection | ULUYIO Edd | nower supply actus |
|---|---|--|--|---|---|
| Max voltage: 192 Volt (default 192V) iest your brake: Brake force: 0% Image: Image: Image: 0% Image: Image: Image: 0% Image: Image: Image: 0% Image: Image: Image: 0% Image: Image: 0% Image: Image: Image: 0% Image: Image: Image: 0% Image: Image: Image: 0% Image: Image: Image: Image: Image: Image: Image: Image: Image: Image: Image: Image: Image: Image: Image: Image: Image: Image: Image: Image: Image: Image: Image: Image: Im | age: 192 Volt (default 192V) r brake: Brake force: 0% th status (optional) tatus via Bluetooth LE (Windows 10 or 11 only) ooth power supply connection Bluetooth device Search again oth Id: Disconnected Connect Auto connect on startup and status Rename | ax voltage: 192 Volt (default 192V) est your brake: Brake force: 0% retooth status (optional) Get status via Bluetooth LE (Windows 10 or 11 only) Bluetooth power supply connection Select Bluetooth device Search again Bluetooth Id: Status: Disconnected Connect Auto connect on startup Name and status Name: Qurrent: 0 A Temperature: 0 C | ax voltage: 192 Volt (default 192V) est your brake: Brake force: 0% Brake force: 0% Brake force: Buetooth status (optional) Get status via Bluetooth LE (Windows 10 or 11 only) Bluetooth power supply connection Select Bluetooth device Select Bluetooth device Search again Bluetooth Id: Status: Disconnected Connect Auto connect on startup Name and status Name: 0 Current: 0 A Temperature: 0 Manual commands (advanced) Write manual code: Write Default Data from YourDyno device: Help Make sure to Pair the bluetooth device in Windows Settings to ensure proper automatic reconnection | | power supply setup |
| est your brake: Uetooth status (optional) Get status via Bluetooth LE (Windows 10 or 11 only) Bluetooth power supply connection Select Bluetooth device Search again Bluetooth Id: Status: Disconnected Connect Auto connect on startup | r brake: Brake force: 0% th status (optional) tatus via Bluetooth LE (Windows 10 or 11 only) ooth power supply connection Bluetooth device Search again oth Id: : Disconnected Connect Auto connect on startup and status : Rename | set your brake: Brake force: 0% setooth status (optional) Get status via Bluetooth LE (Windows 10 or 11 only) Bluetooth power supply connection Select Bluetooth device Search again Bluetooth Id: Status: Disconnected Connect Auto connect on startup Name and status Name: Rename Current: 0 A Temperature: 0 C | Brake force: 0% Brake force: 0% | ax voltage: 19 | Volt (default 192V) |
| uetooth status (optional) Get status via Bluetooth LE (Windows 10 or 11 only) Bluetooth power supply connection Select Bluetooth device Select Bluetooth Id: Status: Disconnected Connect Auto connect on startup | Brake force: 0% Brake | Brake force: 0% Betooth status (optional) Get status via Bluetooth LE (Windows 10 or 11 only) Bluetooth power supply connection Select Bluetooth device Search again Bluetooth Id: Status: Disconnected Connect Auto connect on startup Name and status Name: Current: 0 A Temperature: 0 C | Brake force: 0% | est your brake: | |
| Brake force: 0% Uetooth status (optional) Get status via Bluetooth LE (Windows 10 or 11 only) Bluetooth power supply connection Select Bluetooth device Search again Bluetooth Id: Status: Disconnected Connect O Auto connect on startup | Brake force: 0% th status (optional) tatus via Bluetooth LE (Windows 10 or 11 only) ooth power supply connection Bluetooth device Search again toth Id: Disconnected Connect Auto connect on startup and status Rename | Brake force: 0% | Brake force: 0% Brake force: 0 | 1 () () () | and a second |
| uetooth status (optional) Get status via Bluetooth LE (Windows 10 or 11 only) Bluetooth power supply connection Select Bluetooth device ✓ Search again Bluetooth Id: Status: Disconnected Connect Auto connect on startup | th status (optional) tatus via Bluetooth LE (Windows 10 or 11 only) ooth power supply connection Bluetooth device Search again oth Id: Disconnected Connect Auto connect on startup and status Rename | Juetooth status (optional) Get status via Bluetooth LE (Windows 10 or 11 only) Bluetooth power supply connection Select Bluetooth device Select Bluetooth device Select Bluetooth Id: Status: Disconnected Connect Auto connect on startup Name and status Name: Rename Current: 0 A Temperature: 0 | uetooth status (optional) Get status via Bluetooth LE (Windows 10 or 11 only) Bluetooth power supply connection Select Bluetooth device Select Bluetooth device Select Bluetooth Id: Status: Disconnected Connect Auto connect on startup Name and status Name: Rename Current: 0 Manual commands (advanced) Write manual code: Write manual code: Write Default Data from YourDyno device: Help Make sure to Pair the bluetooth device in Windows Settings to ensure proper automatic reconnection | r e e e | Brake force: 0% |
| uetooth status (optional) Get status via Bluetooth LE (Windows 10 or 11 only) Bluetooth power supply connection Select Bluetooth device Select Bluetooth device Select Bluetooth ld: Status: Disconnected Connect Auto connect on startup | th status (optional) tatus via Bluetooth LE (Windows 10 or 11 only) ooth power supply connection Bluetooth device Search again oth Id: Disconnected Connect Auto connect on startup and status Rename | Jetooth status (optional) Get status via Bluetooth LE (Windows 10 or 11 only) Bluetooth power supply connection Select Bluetooth device Select Bluetooth device Select Bluetooth Id: Status: Disconnected Connect Auto connect on startup Name and status Name: Rename Current: 0 A Temperature: 0 | uetooth status (optional) Get status via Bluetooth LE (Windows 10 or 11 only) Bluetooth power supply connection Select Bluetooth device Select Bluetooth device Select Bluetooth Id: Status: Disconnected Connect Auto connect on startup Name and status Name: Rename Current: 0 Manual commands (advanced) Write manual code: Write manual code: Data from YourDyno device: Help Make sure to Pair the bluetooth device in Windows Settings to ensure proper automatic reconnection | | |
| Get status via Bluetooth LE (Windows 10 or 11 only) Bluetooth power supply connection Select Bluetooth device Search again Bluetooth Id: Status: Disconnected Connect Auto connect on startup | status via Bluetooth LE (Windows 10 or 11 only) status via Bluetooth device Search again status oth Id: Search again oth Id: Search again oth Id: Search again oth Id: Search again Searc | Get status via Bluetooth LE (Windows 10 or 11 only) Bluetooth power supply connection Select Bluetooth device Search again Bluetooth Id: Status: Disconnected Connect Auto connect on startup Name and status Name: Rename Current: 0 A Temperature: 0 C | Get status via Bluetooth LE (Windows 10 or 11 only) Bluetooth power supply connection Select Bluetooth device Search again Bluetooth Id: Status: Disconnected Connect Auto connect on startup Name: Rename Current: 0 A Temperature: 0 Current: 0 A Temperature: 0 Current: 0 A Temperature: 0 C Manual commands (advanced) Write manual code: Write manual code: Write manual code: Write Default Data from YourDyno device: Help Make sure to Pair the bluetooth device in Windows Settings to ensure proper automatic reconnection | uetooth statu | is (optional) |
| Bluetooth power supply connection Select Bluetooth device Search again Bluetooth Id: Status: Disconnected Connect On startup | ooth power supply connection Bluetooth device Search again oth Id: Disconnected Connect Auto connect on startup and status Rename | Bluetooth power supply connection Select Bluetooth device Search again Bluetooth Id: Status: Disconnected Connect Auto connect on startup Name and status Name: Rename Current: 0 A Temperature: 0 C | Bluetooth power supply connection Select Bluetooth device Search again Bluetooth Id: Status: Disconnected Connect Auto connect on startup Name and status Name: Rename Current: 0 A Temperature: 0 C Manual commands (advanced) Write manual code: Write manual code: Write Default Data from YourDyno device: Help Make sure to Pair the bluetooth device in Windows Settings to ensure proper automatic reconnection | Get status via | Bluetooth LE (Windows 10 or 11 only) |
| Select Bluetooth device Search again Bluetooth Id: Status: Disconnected Connect Auto connect on startup | Bluetooth device Search again oth Id: Disconnected Connect Auto connect on startup and status Rename | Select Bluetooth device Search again Bluetooth Id: Status: Disconnected Connect Auto connect on startup Name and status Name: Rename Current: 0 A Temperature: 0 C | Select Bluetooth device Search again Bluetooth Id: Status: Disconnected Connect Auto connect on startup Name: Auto connect on startup Name: Rename Current: 0 A Temperature: 0 C Manual commands (advanced) Write manual code: Write Default Data from YourDyno device: Help Make sure to Pair the bluetooth device in Windows Settings to ensure proper automatic reconnection | Bluetooth po | ower supply connection |
| Search again Bluetooth Id: Status: Disconnected Connect Auto connect on startup | Search again oth Id: Disconnected Connect Auto connect on startup and status Rename | Search again Bluetooth Id: Status: Disconnected Connect Auto connect on startup Name and status Name: Rename Current: 0 A Temperature: 0 | Search again Bluetooth Id: Status: Disconnected Connect Auto connect on startup Name: Name: Rename Current: 0 A Temperature: 0 Current: 0 Current: 0 A Temperature: 0 Current: 0 A Temperature: 0 Current: 0 Manual commands (advanced) Write Default Data from YourDyno device: Help Make sure to Pair the bluetooth device in Windows Settings to ensure proper automatic reconnection | Select Bluetoo | th device |
| Bluetooth Id: Status: Disconnected Connect Auto connect on startup | e and status Rename | Bluetooth Id: Status: Disconnected Connect Auto connect on startup Name and status Name: Rename Current: 0 A Temperature: 0 C | Bluetooth Id: Status: Disconnected Connect Auto connect on startup Name and status Name: Rename Current: 0 A Temperature: 0 C Manual commands (advanced) Write manual code: Write manual code: Help Make sure to Pair the bluetooth device in Windows Settings to ensure proper automatic reconnection | | ✓ Search again |
| Status: Disconnected Connect Auto connect on startup | | Status: Disconnected Connect Auto connect on startup Name and status Rename Name: Rename Current: 0 A Temperature: 0 C | Status: Disconnected Connect Auto connect on startup Name and status Name: Name: Current: 0 A Temperature: 0 C Manual commands (advanced) Write manual code: Write manual code: Write Default Data from YourDyno device: Help Make sure to Pair the bluetooth device in Windows Settings to ensure proper automatic reconnection | Bluetooth Id: | |
| Connect Auto connect on startup | Connect Auto connect on startup and status Rename | Connect Auto connect on startup Name and status Name: Rename Current: 0 A Temperature: 0 | Connect Auto connect on startup Name and status Name: Name: Rename Current: 0 A Temperature: 0 C Manual commands (advanced) Write manual code: Write manual code: Write Default Data from YourDyno device: Help Make sure to Pair the bluetooth device in Windows Settings to ensure proper automatic reconnection | Status: | Disconnected |
| | e and status | Name and status Rename Name: 0 Current: 0 A Temperature: 0 | Name and status Name: Rename Current: 0 A Temperature: 0 C Manual commands (advanced) | Conn | Auto connect on startup |
| | e and status | Name and status Name: Rename Current: 0 A Temperature: 0 C | Name and status Name: Rename Current: 0 A Temperature: 0 C Manual commands (advanced) | | |
| | e and status | Name and status Name: Rename Current: 0 A Temperature: 0 C | Name and status Name: Name: Rename Current: 0 A Temperature: 0 C Manual commands (advanced) Write Default Data from YourDyno device: Help Make sure to Pair the bluetooth device in Windows Settings to ensure proper automatic reconnection | | |
| Name and status | Rename | Name: Rename Current: 0 A Temperature: 0 C | Name: Rename Current: 0 A Temperature: 0 C Manual commands (advanced) Write manual code: Write manual code: Write Default Data from YourDyno device: Help Make sure to Pair the bluetooth device in Windows Settings to ensure proper automatic reconnection | Name and st | atus |
| Name: Rename | | Current: 0 A Temperature: 0 C | Current: 0 A Temperature: 0 C Manual commands (advanced) Write manual code: Write Default Data from YourDyno device: Help Make sure to Pair the bluetooth device in Windows Settings to ensure proper automatic reconnection | | Rename |
| | | Temperature: 0 C | Current: 0 A Temperature: 0 C Manual commands (advanced) | Name: | |
| Current: U A | nt: U A | Temperature. U C | Manual commands (advanced) Write manual code: Write Default Data from YourDyno device: Help Make sure to Pair the bluetooth device in Windows Settings to ensure proper automatic reconnection | Name: | |
| Lemperature: U U | erature: U U | | Manual commands (advanced) Write manual code: Write Default Data from YourDyno device: Help Make sure to Pair the bluetooth device in Windows Settings to ensure proper automatic reconnection | Name: Current: | 0 A |
| | | | Manual commands (advanced) Write manual code: Write Default Data from YourDyno device: Help Make sure to Pair the bluetooth device in Windows Settings to ensure proper automatic reconnection | Name: Current: Temperature: | 0 A 0 C |
| Manual commands (advanced) | al commands (advanced) | | Write Default Data from YourDyno device: | Name: Current: Temperature: Manual com | 0 A 0 C mands (advanced) |
| Manual commands (advanced) | ial commands (advanced) | Write manual code: | Data from YourDyno device: Help Make sure to Pair the bluetooth device in Windows Settings to ensure proper automatic reconnection | Name: Current: Temperature: Manual com | 0 A 0 C mands (advanced) |
| Manual commands (advanced) Write manual code: | ial commands (advanced) manual code: | Write manual code: | Data from YourDyno device: Help Make sure to Pair the bluetooth device in Windows Settings to ensure proper automatic reconnection | Name: Current: Temperature: Manual com Write manual c | 0 A 0 C mands (advanced) ode: |
| Manual commands (advanced) Write manual code: Write Default | manual code: | Write manual code: Write Default | Help Make sure to Pair the bluetooth device in Windows Settings to ensure proper automatic reconnection | Name: Current: Temperature: Manual com Write manual c | 0 A 0 C mands (advanced) ode: Write Default |
| Manual commands (advanced) Write manual code: Data from YourDyno device: | rom YourDyno device: | Write manual code: Write Default Data from YourDyno device: | Help Make sure to Pair the bluetooth device in Windows Settings to ensure proper automatic reconnection | Name: Current: Temperature: Manual com Write manual c Data from Your | 0 A 0 C mands (advanced) ode: Write Default Dyno device: |
| Manual commands (advanced) Write manual code: Data from YourDyno device: | rom YourDyno device: | Write manual code: Write Default Data from YourDyno device: | Make sure to Pair the bluetooth device in Windows Settings to ensure proper automatic reconnection | Name: Current: Temperature: Manual com Write manual c Data from Your | 0 A 0 C mands (advanced) code: Write Default Dyno device: |
| Manual commands (advanced) Write manual code: Data from YourDyno device: | ial commands (advanced) manual code: Write Default rom YourDyno device: | Write manual code: Write Default Data from YourDyno device: | Make sure to Pair the bluetooth device in Windows Settings to ensure proper automatic reconnection | Name: Current: Temperature: Manual com Write manual c Data from Your | 0 A 0 C mands (advanced) :ode: Write Default Dyno device: |
| Manual commands (advanced) Write manual code: Data from YourDyno device: Help | al commands (advanced) manual code: Write Default rom YourDyno device: | Write manual code: Write Default Data from YourDyno device: Help | proper automatic reconnection | Name: Current: Temperature: Manual com Write manual c Data from Your Help | 0 A 0 C mands (advanced) :ode: Vite Default 'Dyno device: |
| Manual commands (advanced) Write manual code: Write Default Data from YourDyno device: Help Make sure to Pair the bluetooth device in Windows Settings to ensure | al commands (advanced) manual code: Write Default rom YourDyno device: sure to Pair the bluetooth device in Windows Settings to ensure | Write manual code: Write Default Data from YourDyno device: Help Make sure to Pair the bluetooth device in Windows Settings to ensure | | Name: Current: Temperature: Manual com Write manual c Data from Your Help Make sure to F | 0 A 0 C mands (advanced) ode: Dyno device: Pair the bluetooth device in Windows Settings to ensure |

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!

8.9.1.2 Water brake valves

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

| Stepper Motor Setup —— | | |
|--|-----------------|------------------|
| Use default stepper settings for | or YourDyno Wat | er brake valve |
| Steps between 0% and 100%: | 1000 🜲 | CNT/DIR mode |
| Max Speed (steps/sec): | 2000 🖨 | CW/CCW mode |
| Max Accleration (steps/sec^2): | 10000 🜲 | Invert direction |
| Adjust to 0% (off) | | |
| | | |
| Steps- Steps+ | Set 0% | Auto zero |
| Steps- Steps+ | Set 0% | Auto zero |
| Steps- Steps+ Steps size: 10 - | Set 0% | Auto zero |
| Steps- Steps+ Steps size: 10 - | Set 0% | Auto zero |
| Steps- Steps+ Steps size: 10 + Test output Position: 0% | Set 0% | Auto zero |

See individual manuals for the valves for the detailed setup.

8.9.1.3 PWM and Analog out

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



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

8.9.2 Throttle output

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

| Out3 | Throttle | ~ F | Pulse Width Modulatio | n v | Throttle | Con | figure | Define |
|--|--|---|---|---|-----------------------|---------|-----------|-------------------|
| Out4 | Other | ~ P\ | VM output config | | | | re | Define |
| Help — Setup th Connect Steppers "Other" (| e brake controller an Out1, RPM1 and Lo use two outputs. St putput channels are o | d other out; adCell1 to t epper 1 use controlled b | PWW signal Setu Signal period (micro Minimum pulse widt Maximum pulse widt Test your output Output: 0% PWM Signal | up 20000 (‡ sec) 20000 (‡ h (%) 4.0 (‡ th (%) 11.0 (‡ t | RC Set max 40000ur | rvo PWM | ave fixed | d source channels |

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



8.9.3 Generic outputs

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

8.10CAN bus

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

8.10.1CAN bus basics

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

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

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

8.10.2The CAN bus analyzer

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

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

8.10.3 CAN Inputs

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

- 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

| CAN | bus setup and Analys | er CAN input chann | els CAN Output cha | annels | | | | | |
|-----|----------------------|--------------------|-----------------------|-----------|-----------------------|------------|-----------|--------|-----|
| C/ | AN bus input chan | nel setup | | | | | | | |
| E | CUMaster lambda | ~ L | oad channels from pre | eset/file | View/hide all fields |) | | | |
| | CAN id (hex) | ld mask (hex) | Channel name | Start bit | Data length (bits) | Big endian | ls signed | Offset | Fa |
| | 00000664 | FFFFFFF | Supply voltage | 0 | 16 | | | 0 | 0.0 |
| • | 00000664 | FFFFFFF | Heater power | 16 | 8 | | | 0 | 0.3 |
| | 00000664 | FFFFFFF | Sensor temp | 24 | 8 | | | 0 | 4 |
| | 00000664 | FFFFFFF | Lambda | 32 | 16 | | | 0 | 0.0 |
| | 00000664 | FFFFFFF | vm short vcc | 49 | 1 | | | 0 | 1 |
| | 2 | | | | | | | | |

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

Channel name: User defined name of the channel

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

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

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

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

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

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

Channel Value: The translated data value

Unit: User defined unit

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

8.10.4CAN Outputs

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

| CAN | bus output char | nnel setup —— | | | | | | | |
|----------|-------------------|---------------|--------------|------------|-----------|-----------|--------|--------|------------|
| E | nable CAN outputs | | | | | | | | |
| | Channel name | CAN id (hex) | CAN Extended | Big Endian | Start bit | ls signed | Factor | Offset | Range |
| • | Engine Rpm 🗸 | 1234ABCD | | | 0 | | 0.2 | 0 | 0 to 13107 |
| * | ~ | | | | | | | | |

The columns are similar in function as for CAN inputs.

8.11 Average calculation

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

| Average channel setup | |
|---|-----------------------|
| Calculate average channel values between: | 5000 RPM and 7000 RPM |
| Calculate average of only Engine Power | and Engine Torque |
| Calculate average of all channels (slower |) |
| Visually indicate average area in RPM gr | aph and Result table |
| | |

8.12 Environmental (weather) correction

8.12.1 About environmental correction

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

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

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

8.12.2 Which correction factor to choose

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

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

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

8.12.3 Source of data

You can choose between the YourDyno environmental sensor, use an off the shelf sensor (Dracal PTH200) or enter the values manually. The Dracal is mostly used for

older YourDyno Standard that had the sensor built into the box, which was not ideal if the box was placed in a cabinet. Newer (v5) version of the Standard, and the Ultimate have external environmental sensor, so there is no point in using the Dracal.

| Use built in se | ensor data 🛛 🔿 Use Plugin | sensor data | O Manually enter data |
|---|---|---|-----------------------|
| urrent temperatu | ire 23.2 C | | |
| urrent ambient p | ressure 1003.1 millibar | | |
| urrent relative h | umidity 23.3 % | | |
| lorsepower c | orrection based on enviro | nment | |
| Apply correct | ion to Wheel Power/Torque ar | d Engine Power | /Torque (default) |
|) Apply compet | ion to Engine Power/Torgue o | nlu | |
| | ion to Engine Fower/Torque of | iny int | |
| OTE: Turn of | f correction for turbo eng | ines with regu | lated boost pressure |
| vironmental co | mection type: DIN 70020 | | |
| | Din /0020 | ~ | |
| | Dily 70020 | ~ | |
| ngine type: | Gasoline engin | | 5 |
| ngine type: CA | $= \frac{P_{ar}}{P_{ao}} \cdot \left(\frac{1}{T}\right)$ | $\left(\frac{T}{Ref}\right)^{0}$ | .5 |
| ngine type: CA Parameter | $= \frac{P_{ar}}{P_{ao}} \cdot \left(\frac{1}{T}\right)$ Explanation | $\left(\frac{T}{Ref}\right)^{0}$ | .5 |
| ngine type: CA Parameter P_ar | $= \frac{P_{ar}}{P_{ao}} \cdot \left(\frac{1}{T}\right)$ Explanation Air reference pressure [mbar] | $\left(\frac{T}{Ref}\right)^{0}$ | .5 |
| ngine type: CA Parameter P_ar P_ao | $= \frac{P_{ar}}{P_{ao}} \bullet \left(\frac{1}{T} \right)$ Explanation Air reference pressure [mbar] Air observed pressure [mbar] | (T)) (Ref)) (Value) (1013.3) (1003.1) | .5 |
| ngine type: CA Parameter P_ar P_ao T | $= \frac{P_{ar}}{P_{ao}} \bullet \left(\frac{1}{T} \right)$ Explanation Air reference pressure [mbar] Air observed pressure [mbar] Observed temperature [K] | Image: Constraint of the second se | .5 |
| Parameter P_ar P_ao T T_ref | $= \frac{P_{ar}}{P_{ao}} \bullet \left(\frac{1}{T} \right)$ Explanation Air reference pressure [mbar] Observed temperature [K] Reference temperature [K] | Image: Constraint of the system Image: Constraint of the system Value Image: Constraint of the system Image: Image: Image: Constraint of the system Image: Constraint of the system Value Image: Constraint of the system Image: Image: Image: Constraint of the system Image: Constraint of the system Value Image: Constraint of the system Image: Image: Image: Constraint of the system Image: Constraint of the system Value Image: Constraint of the system Image: Image: Image: Constraint of the system Image: Constraint of the system Value Image: Constraint of the system Image: Image: Image: Constraint of the system Image: Constraint of the system Value Image: Constraint of the system Image: Image: Image: Constraint of the system Image: Constraint of the system Value Image: Constraint of the system Image: Image: Image: Constraint of the system Image: Constraint of the system Value Image: Constraint of the system Image: Image: Image: Constraint of the system Image: Constraint of the system Image: Image: Image: Image: Constraint of the system Image: Constraint of the system Image: Image: Image: Image: Image: Constraint of the system Image: Constraint of the system Image: Image: Image: Image: Image: Constraint of the system Image: C | .5 |
| Parameter P_ar P_ao T T_ref a | $= \frac{P_{ar}}{P_{ao}} \bullet \left(\frac{1}{T} \right)$ Explanation Air reference pressure [mbar] Air observed pressure [mbar] Observed temperature [K] Reference temperature [K] Factor | Image: Constraint of the system Image: Constraint of the system Value Image: Constraint of the system Image: Value Image: Constraint of the system Value Image: Constraint of the system Image: Image: Image: Constraint of the system Image: Constraint of the system Value Image: Constraint of the system Image: Image: Image: Constraint of the system Image: Constraint of the system Value Image: Constraint of the system Image: Image: Constraint of the system Image: Constraint of the system Value Image: Constraint of the system Image: Image: Constraint of the system Image: Constraint of the system Value Image: Constraint of the system Image: Constraint of the system Image: Constraint of the system Value Image: Constraint of the system Image: Constraint of the system Image: Constraint of the system Value Image: Constraint of the system Image: Constraint of the system Image: Constraint of the system Value Image: Constraint of the system Image: Constraint of the system Image: Constraint of the system Image: Constraint of the system Image: Constraint of the system Image: Constraint of the system Image: Constraint of the system Image: Constraint of the system <td>.5</td> | .5 |

8.13Unit selection

You can choose between different units in this section:

| Temperature and torque | 1 |
|--|---|
| Metric (C, Nm, kph) | |
| O Imperial (F, LbPt, mph) | |
| Power | 1 |
| O HP | |
| O PS (metric HP) | |
| ○kW | |
| Barometric pressure | 1 |
| Millibar (same as hpa) | |
| ◯ InHg | |
| | |

8.14Noise filtering

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

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



Too smooth graphs will obstruct the ability to find faults in engine operation.
| Graph noise filtering |
|---|
| Recommended to keep noise reduction on, but as low as possible. |
| Noise reduction, 0 (off) to 10 (max) 3 |
| Note: You can experiment with different noise settings on the same run by reading back a raw log file in the Run window. |
| Gauge noise filtering |
| Lower number = faster gauge respons, higher number = less noise |
| Noise reduction, 0 (off) to 10 (max) 3 |
| - RPM spike removal |
| Keep at 5 unless there are issues with noise in the RPM measurements |
| RPM filter (5 = normal, 0 = off) 5 |
| If RPM jumps or reacts slowly, then the number is too high |
| |

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

8.14.1 RPM spike removal

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



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

8.15 Raw data logging

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

| - Raw data logging | |
|---|---|
| Enable raw data logging | Playback as fast as possible Playback in real time |
| Raw data logging is useful when ex enabled, the raw data will be stored directory of your session. The raw data can be imported in th (smoothing factor, MOI, etc) will be different parameters for the same ru Playback can be in real time (to wa | perimenting with noise settings, MOIs, etc. When I in a file called "YourDyno <number>.log" in the e "Run!" window, and the selected parameter applied to the data. This way you can compare in. tch gauges) or as fast as possible (no gauge</number> |

8.16Company logo

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

This text will also be visible on print-out.

| dynokkaf i | A2UU-2WU |
|---|-------------|
| Display name on all graphs Display name only on HP/Torque graph Do not display any name | Change Font |

8.17 Define hotkeys

Use this section to define hotkeys on a keyboard.

| Define hotkeys | | |
|---|---------------------------------------|---------------|
| Main window: | | |
| New Run | F3 | Set hotkey |
| New Run w/stored retardation data | F4 | Set hotkey |
| Curve selection menu on/off: | V | Set hotkey |
| RPM window: | | |
| Lock gear ratio: Also opens the RPM setup window | None | Set hotkey |
| Run window: | | |
| Start run/Coast/Stop run: | Space | Set hotkey |
| Set Manual brake mode | None | Set hotkey |
| Set RPM curve brake mode | None | Set hotkey |
| Set Power sweep brake mode | None | Set hotkey |
| Set Load Control brake mode | None | Set hotkey |
| Set Brake Sweep brake mode | None | Set hotkey |
| Set Brake off mode | None | Set hotkey |
| Brake RPM Up (manual mode): | None | Set hotkey |
| Brake RPM down (manual mode): | None | Set hotkey |
| Start MOI Wizard/Use results | None | Set hotkey |
| Save and Restart: | None | Set hotkey |
| Save and Close: | None | Set hotkey |
| Restart: | None | Set hotkey |
| Reset gauge graphs | None | Set hotkey |
| PANIC! Lock brakes at 100 | % None | Set hotkey |
| Load/Unload: Lock brakes at 100% Engages only at 0 RPM | None | Set hotkey |
| Zero calibrate | None | Set hotkey |
| Note: Xencelabs Quick Keys is a recor device. Other pointer devices like Logi wireless keyboard also work as hotkey | mmended ho tech R400 o devices. | tkey r any |

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

8.18 Visual styles

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

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

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

| Channel 🔺 | Line style | Comparison | | Noise filte | ering |
|---------------|------------|------------------|--------|-------------|--------|
| Engine Power | 1 Sec. | Higher is better | \sim | Default | \sim |
| Engine Rpm | ~ | None | \sim | Default | \sim |
| Engine RPM | 100 mars | ,None | ~ | 0 | \sim |
| Engine Torque | ~ | Higher is better | \sim | Default | \sim |
| Ex Psi | ~ | None | \sim | Default | \sim |
| Fuel Psi | ~ | None | \sim | Default | \sim |
| Gear Ratio | \sim | None | \sim | Default | ~ |
| Heater power | \sim | None | \sim | Default | ~ |

8.19 Firmware upgrade

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





Whenever "Update firmware" is shown in the status bar at bottom left, you must update the firmware. The firmware update system includes a failsafe mode such that it

will revert to the previous firmware if an update was unsuccessful. There is also a second failsafe option; a button inside the box that can be pushed to force the unit into bootloader mode such that it is ready for firmware download in case a firmware upgrade failed.

8.20 Language

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

The YourDyno Software will restart automatically.

| le Run | Options Plugins Help/Abo | ut |
|--------------|---------------------------|----------------------------|
| esults vs RP | Options | Results table |
| | Language | About languages |
| | Restore options from file | English |
| 500 | Backup options to file | Czech |
| 500 | 3. 5. | German (google translate) |
| | - | Spanish |
| | | Finnish (google translate) |
| | ē. | French (google translate) |
| | r. | Italian (in progress) |
| 400 - | | Dutch |
| | - | Norwegian (in progress) |
| | - | Polish |
| | - | Ukrainian (in progress) |
| | | Vietnamese |
| - | | 1 |

8.21 Restore and Backup options

(j)

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

9 Menu: Plugins

9.1 Mange plugins...

This window allows users to add or delete plugins.

| Manage Plugins | | 10 | | > |
|--|---|---|------------------------------|--------------|
| Plugin info YourDyno's functionalty can be (e.g. a USB analog data provide using existing parameters. You c Install YourDyno plugins u YourDynoInstaller_x.xxx.ex | extended using Plugins. For example yo r) or control switches like fans, throttle, an add graphs, gauges and expose int sing the YourDyno installer! You te again and modify which plugin | ou can read data from differen etc. You can also calculate emal variables, etc. can re-run the is shall be installed. | nte data sour new paramet | rces ters |
| 3rd party plugins | | | | |
| Read about plugins at YourDy | no.com | | | |
| Learn how to create your own | plugin Install 3rd party plugin | Select the .dll file you cre | ated or down | nloade |
| f you think your plugin can be o | f value to oth <mark>ers, please share</mark> your plu | gin at YourDyno.com! | | |
| Installed plugins | Plugin description | | | |
| orake and gear ratio logging CANTool Scan Tool Speed and Distance and Pov | подни осастрион | | | |
| | | | | |
| Refresh list Uninstall | | | | |



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

9.2 Installing new plugin

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

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

Your Plugin is now installed and ready to use.

9.3 Removing plugins

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

YourDyno.com Fonneland Engineering AS, 2024

| Manage Plugins | extended using Pluging E | r example you can read data from difform | | × | |
|--|--|---|---------------------------|--------------------------------------|---|
| (e.g. a USB analog data provide using existing parameters. You of Install YourDyno plugins u YourDynoInstaller_x.xxx.ex | extended danig rodgins. P er) or control switches like i can add graphs, gauges ar sing the YourDyno ins ke again and modify w | ans, throttle, etc. You can also calculate and expose internal variables, etc. taller! You can re-run the hich plugins shall be installed. | new paramet | iers | |
| - 3rd party plugins | | | | | |
| Learn how to create your own | n plugin Install 3rd pa | inty plugin Select the .dll file you cre | ated or dowr | loaded | |
| Installed plugins | r value to others, please s | nare your plugin at TourDyno.com: | | | |
| Brake and gear ratio logging CANTool Scan Tool | Plugin description This plugin provides ga Version: 1,3 | uges and logging of speed and distance. | | ******** | |
| Speed and Distance and Pov | | Uninstall plugin To uninstall a plugin you need to C:\ProgramData\YourDynoPlugins | delete the Exit YourDy | associated .dll file in /no first | × |
| Refresh list Uninstall | | _ | | ОК |] |

9.4 Scan Tool (OBDII plugin)

(i)

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

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

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

| 18 Scan Tool | 1.0 | | | | | | | 23 | |
|--|---------------------------------|------------------------------------|-------------------------------|--------------------|--------------|------------|--------------|----------|--|
| Connection | Scan | Live Data | Graph | Table | Knock / RPM | Settings | | | |
| - Connection - | | | | | | | | | |
| Port Numb | er: | COM1 | | • | | Connect/P | isconnect | | |
| Baud Rate: | | 38400 | | • | | Connecto | isconnoct | | |
| Connection | n Type: | OBD2 ELM | | • | Remote | e Listener | | | |
| How to u 1# Make 2# Select 3# Click (| ise: sure port i Conne | YourDync number a ect/Discor | o is not ind Bau inect. | curren Id rate, | tly connecte | d to the | ELM. | | |
| Adapter: | | | | | | | | | |
| Features: | | | | | | | | | |
| Disconnect | ed: | | | | | | !! Tool Tips | Stuck !! | |

9.4.1 Logging OBD parameters during test run

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

2. Activate checkbox "Log to gauges"

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

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

Ġ

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

| Connection | Scan | Live Data | Graph | Table | Knock / RPM | Settings | | |
|--|--------------|-----------|----------------|-------------------|-------------------|-------------------|-------------------|----------------------|
| -Loggable | × | | PID | Name | Current | Min | Max | Reset |
| MAP RPM TPS Speed IAT ECT Engine Loz -Status- OBD Comp | id liance | | 0C 11 0B | RPM TPS MAP | 000 000 000 | 000 000 000 | 000 000 000 | |
| Settings: | (PA | |)2 0-5V / | AFR | Refresh Rate: | 350 | C Log | to gauge: Logging |

9.5 Speed and distance

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

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

9.6 More plugin information

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

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

10.1 Graph/Table tabs

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

| Results vs RPM | Results vs Time F | lesults table <new tab=""></new> | |
|----------------|-------------------|----------------------------------|--------|
| | | | |
| | Configure tab | | |
| | Template: | Brake Setup Analysis | ~ |
| | Graph or Table: | O Graph ○ Table | e |
| | Tab name: | Brake Setup Analysis | |
| | X-Axis/Master: | Time | ~ |
| | | | |
| | OK | | Cancel |

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

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

10.2 Graph views

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

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





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

(i)

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

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



10.2.1 Manipulating the graph area. Context menu.

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

1. 🛈

Quick reference guide:

1. To move/drag the graph use MMB.

- 2. Press and hold LMB to drag an Zoom-Area rectangle.
- 3. Press RMB to open context menu.
- 4. Use mouse wheel to Zoom In and Out.

10.2.2 Context menu

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

Set Scale to Default - changes the channel scale back to standard value

Synchronize Y1 and Y2 axes - synchronizes Y-axis for all channels in the selected graph

Increase / Decrease line thickness - use this function to change graph thickness. The changes is applied only in the section where the RMB menu was activated

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

10.2.3 Results vs RPM

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



10.2.4 Results vs Time

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



10.2.5 Other X-axis

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



10.3 Results table views

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

| Results vs RPM | Results vs Time Re | esuits table <new t<="" th=""><th>ab></th><th></th><th></th><th></th></new> | ab> | | | |
|----------------|----------------------|--|------------|------------|----------|------------------------|
| Master | | | | | | |
| Engine RPM | Engine Power (HP) | Engine Torque (Nm) | Brake1 (%) | Gear Ratio | Time (s) | |
| 3200 | 71.46 | 158.4 | 18.63 | 2.268 | 0.299 | |
| 3400 | 82.97 | 174.0 | 20.93 | 2.268 | 0.659 | |
| 3600 | 94.55 | 186.7 | 19.21 | 2.268 | 1.152 | |
| 3800 | 101.7 | 190.6 | 21.10 | 2.268 | 1.521 | |
| 4000 | 106.1 | 188.8 | 19.47 | 2.268 | 1.978 | |
| 4200 | 98.34 | 166.8 | 16.66 | 2.268 | 2.435 | |
| 4400 | 91.18 | 147.5 | 12.45 | 2.268 | 2.900 | |
| 4600 | 111.6 | 171.4 | 17.62 | 2.268 | 3.199 | Set master: Time |
| 4800 | 133.2 | 197.2 | 25.60 | 2.268 | 3.393 | Show only increasing d |
| 5000 | 164.1 | 232.7 | 25.06 | 2.268 | 3.929 | Show only decreasing d |
| 5200 | 184.3 | 252.7 | 27.96 | 2.268 | 4.254 | Interval: 200 |
| 5400 | 199.4 | 262.3 | 28.01 | 2.268 | 4.737 | Select visible data |
| 5600 | 211.1 | 268.9 | 30.08 | 2.268 | 5.080 | Open in Excel |
| 5800 | 224.6 | 275.5 | 30.04 | 2.268 | 5.537 | Сору |
| 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 | | | | |

Some tips for result tables:

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

10.4 Test Run List

Below the Graph Area you'll find list of Runs.

You may change the Name and comments by clicking and editing the respective field.

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

Different columns shown/hidden by right-clicking:

| _ | | 1 | 110-2017-01 | 11-0005200 | | | Select visible data | - |
|--------|---------|---------------------------|-------------|-------------|----------------------|-------|---|-------------|
| Delete | Visible | Name | Color Y1 | Color Y2 | Max Engine Power | ~ | Color Y1 | nental con |
| X | | GQEBA1-MP G7 GTI Hybrid_1 | | | 405.96 PS @ 6140 RPI | * | Color Y2 | Hum: 25.0%, |
| x | | GQEBA1-MP G7 GTI Hybrid_2 | | | 407.27 PS @ 6111 RPI | × . | Max Power | Hum: 25.0%, |
| × | | GQEBA1-MP G7 GTI Hybrid_4 | | | 408.45 PS @ 6172 RPI | ~ | Max Torque | Hum: 25.0%, |
| | | | | | | × × × | Environmental conditions Env correction type Env correction factor Power correction factor | |

Rows can be sorted by clicking on the header.

11 Run window

11.1 Overview

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

1. Test name and comments section



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

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

| 🚺 Running | session: Matt Corolla | a 2rz | | |
|------------|-----------------------|-------|-----------|-------------------------------------|
| Test name: | Test1 | ~ | Comments: | Horsepower correction factor: 1.007 |

2. Gauges

| Running session: Matt Corolla 2rz | Horsenower correction factor: 1 259 | - <u> </u> |
|---|--|-------------------------|
| Test name: Matt Corolla 2r_1 v Comments: | New retardation run | |
| Power (PS) | Engine RPM | Torque (Nm) |
| 0.00 500 | 4.5 5.4 3.6 6.3 2.7 7.2 1.8 9.0 9.0 ×1000 | -923 0.00 200 |
| Brake 1 (% |) MAP (psi) | Lambda (AFR) |
| | | <u>10.1</u> 200 |
| Status: Ready Data connection: Normal RPM Up (-) RPM Down (-) | Brake on Arange gauges Brake setup Auto start setup Arange gauges Brake setup Load raw log file Gauge on/off | MOI setup |
| AUIO STARI Save + Restart | Restart Save + Close Dismiss | |

3. Controls:

| 🥘 Running session: Matt Corolla 2rz | | | | - 🗆 X |
|--|---|--|-----------------------|----------|
| Test name: Matt Corolla 2rz_1 v Commer | nts: | Horsepower correction factor: 1.259 | | |
| Power 0.00 | (PS) | Engine RPM 4.5 5.4 6.3 7.2 1.8 0.9 0.0 x1000 | Torque (N -92 | m) 23 |
| | Brake 1 (%) | MAP (psi) | Lambda (AFR) 100 20.0 | |
| Status: Ready Data connection: Normal Auto start | Brake control Brake mode Power Sweep V Brake on RPM tip (+) RPM Down (+) Held RPM: Ol Save + Restart Restart | Setup RPM setup Auto start setup Arrange gauge ff Brake setup Load raw log file Gauge on/of Save + Close Diamies | es MOI setup f | |

11.2 Configuring Gauges

11.2.1 Adding new gauges

The gauges can be arranged to suit any style of work.

You can add any recorded channel as gauge by pressing the "V" key on Keyboard or "Gauge on/off" button in the Controls area:

| Status: Ready Data connection: Normal | Brake control Brake mode Power Sweep Brake on Brake on | Setup RPM setup Auto start setup Arrange gauges |
|--|--|---|
| Manual start | RPM Up (+) RPM Down (·) Hold RPM: Off Save + Restart Restart | Brake setup Load raw log file Gauge on/off Save + Close Dismiss |

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

| Select which gauges to display | |
|--|---|
| RPM1 Kd factor Ki factor Kp factor Target RPM RPM Error Raw PID Gear Ratio Engine RPM Power (PS) | ^ |
| Torque (Nm) EGT (C) | |
| ⊻ Lambda (AFR) ▼ MAP (psi) □ Engine Temp (C) ▼ Brake 1 (%) | |
| ☐ Brake 2 (%) ☐ Brake 3 (%) ☐ Brake 4 (%) | Ŷ |

11.2.2 Types of gauges

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

11.2.2.1 Analog

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



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

| Gauge setup x | Engine RPM |
|---|------------|
| Range | |
| From: To: | |
| 0.00 Gauge min/max 7000 Auto scale | |
| 7 Mainstick marker 10 Minastick marker | |
| | |
| | |
| Range limits and alarms | |
| Enabled From: Color To: Alarm | <u> </u> |
| 0.00 | |
| 5500 6000 | |
| Ø 6000 7000 Ø | |
| Note: Alams are off when Engine BPM = 0 | |
| | |
| | |
| Gauge colors | |
| Gauge background color | |
| Gauge text/foreground color | |
| Gauge indicator color | |
| | |
| | |
| Gauge X-Axis (live graph only) | |
| | |
| Graph X axis: | ×1000 |
| | ×1000 |
| | |
| Cancel | |

11.2.2.2 Digital

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

| Lambda (AFR) |
|--------------|
| |
| |
| |
| /,40 |
| |
| 7,00 22,0 |
| |
| |
| |

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

11.2.2.3 Live graph

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

| | La | m | bd | а (| AF | R |) |
|------|----|-------|------|------|-------|------|---------|
| 22 T | | | ••• | | | ••• | |
| 20 - | | | | | | •••• | |
| 18 + | | ••••• | •••• | •••• | ••••• | •••• | |
| 16 + | | | | | | | |
| 14 + | | | | | | | |
| 12 + | | | | | | | |
| 10 1 | | | | | | | |
| 8 | | | | | | | <u></u> |
| 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 80 |

í

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



11.2.2.4 Bar gauge

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



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

11.2.2.5 Group gauges

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



The example shows 6 temperatures sensors in one group gauge.

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



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

11.2.3 Example on one of possible gauges setup

| RPM1 | Powe | er (HP) | Torque | (Nm) | Measured Power (HP) Measured Torqu | Engine RPM |
|----------------------------|---------------------|--------------------|--------------------|----------------|------------------------------------|-------------------------|
| 0.00 8000 Oil Psi (PSI) | 0. | .00 | 0. | 00 | 0.00 0.00 | |
| 0.00 | 0.00 | 6000 | 0.00 | 6000 | | |
| Water inj Psi (PSI) | Turbo Oil Psi (PSI) | Int Psi (PSI) | Ex Psi (PSI) | Fuel Psi (PSI) | Pan Psi (PSI) | 6 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 0.00 2500 | 0.00 250 | 0.00 25 | 60 0.00 250 | 0.00 250 | 0.00 50.0 | |
| CYL 1 (C) | CYL 2 (C) | CYL 3 (C) | CYL 4 (C) CYL 5 (C | cyl 6 (C) | INTAKE TEMP (C) TURBO TEMI | x1000 |
| 1620 | 1620 | 1620 1620 | 1620 | 1620 - | 720 | |
| 1260 | 1260 | 1260 1260 | 1260 | 1260 - | 560 840 | Turbo 1 Turbo 2 |
| 900 | 900 | 900 900 900 | 900- | 900- | 480 720 | |
| 720 | 720 | 720 720 | 720 | 720 | 320 480 | |
| 360 | 360 | 540 540 360 360 | 360 | 360 | 240 360 160 240 | 0.00 0.00 |
| 180 0.00 | 180 0 0 | 180 0 0.00 0 | 0.00 | 0.00 | 80 0.00 120 0.00 | 1.00 130000 0.00 100000 |

11.3 Gear ratio setup

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

| Engine DPM sources | Enterna | | Advanced |
|---|-------------|---|---------------------------------------|
| Engine RFM source. | Enter ge | ar ratio manually | Advanced |
| Actual Gear Ratio | 1 | engine revs/dypo rev | Lock gear ratio |
| Gear Ratio in use: | 1.00 | Re-calculate result | ts from variable gear ratio |
| Notes: YourDyno will a | lways calc | ulate power at the brake(s)/ Brake/roller power. It is there | /roller(s). Using the gear ratio, the |
| engine power is calcula atio is correct. | aced from E | | |

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

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

11.3.1.1 Tacho

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

| | | | | 0 | |
|---|---|---|--|---------------------------------------|-------------|
| Engine RPM source: | Tacho | ~ | Advanced | | |
| Tacho RPM setpoint: | 3000 | | | _ | |
| Actual Gear Ratio: | 10.00 | engine revs/dyno rev | Lock gear ratio | | |
| Gear Ratio in use: | 2.01 | | | | |
| Add brake while calcul | lating gear ra | atio. Turns on when RPM | > 0 | | |
| | 14 18 | Brake | force: 0% | | 1011 |
| Notes: YourUyno will a engine power is calcula ratio is correct. Set Gear ratio by press | iways calcu ated from Br ing the Lock | ate power at the brake(s)/ ake/roller power. It is there c gear ratio button while ho | roller(s). Using the (fore very important olding the RPM stea | gearratio, th that the gea idv. | e ir |
| For transmissions with need to look at Results | variable gea s vs Speed. | r ratio, you can enter for ex Engine HP will in this case | cample 1 in the gea | r ratio, then gine Torque | you will |

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

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

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



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

11.3.1.2 Using other channels as the direct Engine RPM source

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

11.3.1.3 Variable gear ratio

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

Re-calculate results from variable gear ratio

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

11.4 Brake Control Setup. PID settings

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

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

| Status: Ready Data connection: Normal | Brake control Brake mode Power Sweep Brake on B | Setup Auto start setup Arrange gauges Optimization Auto start setup Gauge gauges |
|--|---|--|
| Manual start | RPM Up (+) RPM Uown (-) Hold RPM: Off Save + Restart Restart | Save + Close Dismiss |

11.4.1 Basic setup

| 🖲 Brake Co | ontrol Setup | | | | | | - | | × |
|---|--|--|--|--|--|--|---|---------------------------|--------------|
| Basic setup | Manual brake control | RPM Curve | Power Sweep | Load Control | Brake sweep | Sequencer | | | |
| Ramp up | brake before run s | starts — | | | | | | | |
| Tune the R | Ramp up setting to ensu | re a smooth sta | art with minimum | overshoot of th | e Start RPM | | | | |
| Ramp up bi | rake to 10 📫 % t | pefore test star | s. Start ramping | up at: 1000 | ₽ RPM | | Advanc | ed |) |
| PID Con | trol Loop Setup — | | | | | | | | |
| Used for: M | lanual brake control, R | PM Curve, Pov | ver Sweep and | Sequencer | | | Advanc | ed | |
| Кр 0.50 | Proportional facto | or. Higher = fas | ter response, les | ss error. Too hig | h = oscillations | | | | |
| Ki 0.50 | lntegral factor. S | teady state em | or remover. High | ner = faster to 0 | error. Too high = | oscillations | | | |
| Kd 0.050 | Derivative factor | . Reduces ove | r/undershoot (st | tarting point 0.0 | 5 for Eddy brake | es) | | | |
| - Slow do | wn and brake upda | te rate — | | | | | | | _ |
| Brake contr | rol update frequency | 20 🗘 Hz | (default 20Hz) | | | | | | |
| Slow down | rotation when run is co | mplete using | 0 🜲 % bi | rake force until | 0 | RPM | | | |
| _ PID help The RPM c The PID co | control for the brake mo introller has 3 paramete | des Manual (st rs; Kp, Ki and H | eady state), RPI (d. | M Curve, Power | Sweep and Sec | quencer is impleme | ented using a PI | D controlle | ŧ r . |
| A good star stable, then | ting point for many Edd dial back a bit. | y brake system | s is: Kip 0.5, Ki (|).5 and Kd 0.05 | Experiment to f | ind the highest va | lues where the s | system is | |
| Kp gives a l the regulato with low Kd | brake output proportion or resist acceleration. M and work your way up | al to the RPM ost systems wo . Be careful wh | - Target RPM. H which best with a litt en experimentin | Higher difference tle Kd, for exam ig with Kd, as it | e = more impact. ple 0.05. Water may introduce h | Ki fixes the stead brakes always ne eavy oscillations. | y state difference ed a Kd to be sta | e. Kd make able. Start | es |
| Using the A | dvanced option you | can optimize th | ne PID numbers | for different RP | Ms. | | | | |
| PID is enab described in | led in Manual brake co n that tab. | ntrol mode , Ri | PM Curve mode | and Power swe | ep mode. Load | control is a differe | nt control mecha | anism that i | is |
| ОК | | | | | | | (| Cancel | |

11.4.1.1 Ramp up brake

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

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

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

11.4.1.2 Slow down after run

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

11.5 PID Control loop setup

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

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

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

| Г | - Pl | D Control | Loop Setup | | | | | |
|---|------|--|--|--|--|--|--|--|
| | Use | Used for: Manual brake control, RPM Curve, Power Sweep and Sequencer | | | | | | |
| | Кр | 0.50 🜲 | Proportional factor. Higher = faster response, less error. Too high = oscillations | | | | | |
| | Kì | 0.50 🜲 | Integral factor. Steady state error remover. Higher = faster to 0 error. Too high = oscillations | | | | | |
| | Kd | 0.050 🖨 | Derivative factor. Reduces over/undershoot (starting point 0.05 for Eddy brakes) | | | | | |

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

11.6 Brake Modes

11.6.1 Manual brake control

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

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



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

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

| 🗾 Brake C | ontrol Setup | | | | | | _ | | 2 |
|-------------------------|--|--------------------------------------|--|-----------------------------------|--|---------------------------|----------------------|-----------|----|
| asic setup | Manual brake control | RPM Curve | Power Sweep | Load Control | Brake sweep | Sequencer | | | |
| — Manual | Brake Control Setu | | | | | | | | |
| Cont | rol RPM or Brake manu | ally with +/- bu | ttons or hotkeys | i. | | | | | |
| O Cont | rol Target RPM | RPM Incremen | nt/decrement ste | p size: 100 | ÷ | | | | |
| O Cont | rol Brake % directly | Brake Increme | nt/decrement st | ep size: 1.0 | \$ % | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| Choose Co | ntrol Target RPM to ste | p through the | RPM range man | ually (no RPM c | urve/sweep). Ti | his can be useful w | when mapping th | e engine, | by |
| keeping a | set RPM and press the | RPM+ button v | when you are rea | ady for the next | RPM. The syste | m is under PID cor | ntrol in this settin | g. | |
| Choose Co | ntrol Brake % directly to | directly contro | ol the brake. The | brake % is con | trolled with the E | Brake+ and Brake- | buttons. | | |
| The brake Options->H | continues to stay on ur lorsepower correction-> | til it is manually Enable correct | r turned off or the tion for Frictional | e "Coast now" b Losses from Re | outton is pressed tardation data is | l. The Coast now b on. | utton is only ava | ilable if | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

11.6.2 RPM Curve

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

11.6.2.1 Control RPM vs Time

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

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

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



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

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

11.6.2.2 Control Brake vs RPM

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

11.6.3 Power Sweep

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

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

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

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

| ontrol loop setup | Manual brake | control | RPM Curve | Power Sweep | Load Control | Brake sweep | |
|-------------------|----------------|--------------|----------------|--------------------|--------------|-------------|--|
| Power sweep | e using Powers | weep | | | | | |
| Start conditi | on ——— | | | | | | |
| Start run at: | 1250 🚔 | RPM | | | | | |
| Wait: | 1,5 🚔 | second | is before swee | ep starts | | | |
| - Define swee | p ——— | | | | | | |
| Sweep rate: | 500 🚔 | (+/-) R | PM per second | d (0 for steady st | ate) | | |
| Stop sweep at: | 8000 🚖 | RPM | | | | | |
| | [I | SPERITE DRUP | | | | | |

11.6.4 Load Control

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

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

| and control | | | | | | | | |
|---|---|--|--|--|-------|--------|---|--|
| Control bra | ke using Load con | trol | | | | | | |
| Chart and | tion | | | | | | | |
| Start condi | tion | | | | | | | |
| start sweep at | 3000 📮 | RPM Star | t gain: 20 | 🗧 % per 1000 |) RPM | | | |
| lold start RPN | I for: 2.0 🚖 | seconds befo | re auto sweep st | art | | | | |
| | | | | | | | | |
| | | | | in the second se | | | | |
| Regulate : | start RPM (default). | Regulator sp | eed: 1.0 | 🔹 (default = | 0.75) | | | |
| Regulate : | start RPM (default). | Regulator sp | eed: 1.0 | (default = un"tab | 0.75) | | | |
| Regulate : lote: Recomm | start RPM (default). nended to set a ran | Regulatorsp np up brake % i | n the "Basic setu | (default = up"tab | 0.75) | | | |
| Regulate : Note: Recomm Define any interview. | start RPM (default). nended to set a ram | Regulatorsp np up brake % i | n the "Basic setu | (default = | 0.75) | | | |
| Regulate solution Note: Recomm Define sweet | start RPM (default). nended to set a ran | Regulator sp np up brake % i | n the "Basic setu | (default = | 0.75) | | | |
| Regulate solution Note: Recommin Define swee Sweep rate: | start RPM (default). nended to set a ran pep 500 🗼 R | Regulator sp np up brake % i PM per second | n the "Basic setu d (0 for steady sta | (default = up" tab ate) | 0.75) | vanced | | |
| Regulate s Note: Recomm Define swe Sweep rate: Stop sweep at | start RPM (default). nended to set a ran 500 🗼 R t: 6400 🊔 R | Regulator sp np up brake % i PM per second | n the "Basic setu d (0 for steady sta | (default = up"tab | 0.75) | vanced |] | |
| Regulate solution in the second se | start RPM (default). nended to set a ran 500 	 R t: 6400 	 R | Regulator sp np up brake % i PM per second PM | n the "Basic setu d (0 for steady sta | (default = up" tab | 0.75) | vanced | | |
| Regulate : Note: Recomm Define swee Sweep rate: Stop sweep al Sain: | start RPM (default). nended to set a ran 500 \$ R 500 \$ R 6400 \$ R 20 \$ % | Regulator sp np up brake % i PM per second PM per 1000 RPM | n the "Basic setu d (0 for steady sta | (default = up"tab | 0.75) | vanced | | |

Page | 69

The main parameters here are Gain and Derivative factor.

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

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

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

11.6.5 Brake sweep

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



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

| Control loop setup Ma | anual brake control | RPM Curve | Power Sweep | Load Control | Brake sweep | |
|-----------------------|---------------------|-----------------|-------------|--------------|-------------|---|
| - Brake sweep co | ntrol | | | | | 1 |
| Control brake us | sing Brake sweep | | | | | |
| _ Start condition | | | | | | |
| Start RPM: | 1500 🚔 Sta | nt brake: 50 | \$ | | | |
| Hold start brake: | 2.0 🛋 second | ls before sweer | starts | | | |
| | | | | | | |
| - Define sweep - | | | | | | |
| Target sweep rate | : 500 🔶 (+/ | -) RPM per sec | cond | | | |
| Tum brake off at: | 8000 A BP | M | | | | |
| | - III | | | | | |

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

11.7 Auto start stop

11.7.1 Automatic recording of test Run

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

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

| Auto Start/Stop Setup Start condition Enable automatic start Start based on RPM Start based on RPM Start based on Speed (Re)Start run at RPM: 3000 Advanced Stop condition | Advanced Auto Start | 2 2 2 |
|--|---------------------|-------|
| Enable automatic stop Stop logging at RPM: 6400 Auto detect early stop Auto Restart Enable auto save and auto restart next run | OK Cancel | |

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

11.8 Brake control update frequency

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

11.9 MOI wizard

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

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

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

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

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

11.9.1 Automatic MOI test procedure



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

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

11.9.1.1 MOI wizard settings

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

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

| _ | - Engine MOL | | | |
|---|---|---------------------------------|--|--|
| | The engine MO You can overrid Engine MOI: | l is not m le the En 0,20 | easured in this proc gine MOI default va gine MOI default va kg m^2 | dure, since the measurement takes place with clutch in. We therefore add the engine MOI separately. e here Default |

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.

Page | 72
- Brake force during MOI measurement

| Here you can adjust th | ne brake | force during the | second MOI tes | st run. Reduce brake force if the retardation run is too short. |
|------------------------|----------|------------------|----------------|---|
| Retardation brake %: | 10 | × | Default | |

12 Setup examples

12.1 Water brake example

12.1.1 Load cell

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



12.1.2 Do NOT turn on retardation data measurement

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

| | - Engine UD/Terrue colouistion (correction - |
|---|---|
| | Engine HP7 forque calculation/correction |
| | When wheel power is measured, engine power can be estimated. There are two loss components to compensate for: 1) Speed related losses: Enable the Correction for rolling resistance option to calculate and compensate for tire rolling resistance and unloaded transmission losses vs roller speeds. After you have done this measurement once, you can choose to use the stored loss reading for the subsequent runs (redo when changing vehicle or changnig air pressure or strap down force). |
| 1 | Warning: Make is immediately turned off when reaching the end RPM when this option is on |
| 1 | |
| | Enable currection for rolling resistance vs speed from measured retardation data |
| | Brake during coast down 0.0 🚖 %. (Experimental). Only recommended when coast down takes > 15 seconds |
| | 2) Power related losses: The total friction will be higher than the measured rolling resistance during retardation, since redardation occurs at very low load. The additional losses are dependent on the power. An additional power correction factor must therefore be applied. |
| | Power related losses: 0.0 😴 % Advanced |
| | |

12.1.3 RPM

Use RPM1 and configure it like this:

| RPM/Frequency | channels | | | |
|------------------|----------------------------|--------------|------|-----------|
| RPM1 - RPM4 acce | ept digital RPM and freque | ency signals | | |
| Input Function | n | Channel name | Unit | Setup |
| RPM1/VR Load c | ell1 RPM 🗸 🗸 | RPM1 | | Configure |

12.1.4 Brake output

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

| Output | channel setup — | | | | | | |
|--------|-----------------|--------|----------------------------|--------|--------------|-----------|----------------|
| Output | Function | | Output type | | Channel name | Setup | Source channel |
| Out1 | Brake Control | \sim | YourDyno Water brake valve | \sim | Valve 1 | Configure | Define |
| Out2 | Brake Control | \sim | YourDyno Water brake valve | \sim | | Configure | Define |

12.1.5 Brake control mode

Load Control is recommended. Good starting point:

| 🗑 Brake Control Setup | - | \times |
|---|---|----------|
| Basic setup Manual brake control RPM Curve Power Sweep Load Control Brake sweep Sequencer | | |
| Control Control | | |
| ┌ Start condition | | |
| Start sweep at: 3000 🜩 RPM Start gain: 20 🜩 % per 1000 RPM | | |
| Hold start RPM for: 2.0 🜩 seconds before auto sweep start | | |
| Regulate start RPM (default). Regulator speed: 1.0 (default = 0.75) | | |
| Note: Recommended to set a ramp up brake % in the "Basic setup" tab | | |
| | | |
| Sweep rate: 500 RPM per second (0 for steady state) Advanced | | |
| Stop sweep at: 6400 🖨 RPM | | |
| Gain: 20 🚖 % per 1000 RPM | | |
| Derivative factor: 0.030 (w numbers like 0.01-0.05 are normal) | | |

12.2 Inertia dyno example

12.2.1 Basic

Turn on Inertia mode

|) 🧑 Options | |
|--|------------------------------|
| Basic dyno setup Besic Dyne w/Load Cell(s) Unertia Dyno Engine power calculation | Dyno Type |
| - Internal dyno Losses | Drum setup |
| | System MOI: <u>30</u> kg*m^2 |

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

12.2.2 RPM sensor

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

| - RPM/Free | quency channels | | | |
|------------|----------------------------------|--------------|------|-----------|
| RPM1 - RP | M4 accept digital RPM and freque | ency signals | | |
| Input | Function | Channel name | Unit | Setup |
| RPM1/VR | Load cell1 RPM V | RPM1 | | Configure |

12.2.3 Run window

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

12.3 2WD chassis dyno example

12.3.1 Load cell

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

| ✓ This is a Brake Dyno with 1 + | Land Call(a) | |
|---|------------------------|--------------------|
| | Load Cell(s) | |
| The brakes are physically linked (| same RPM) | |
| Inertia compensation | | |
| Brake dyno readings are affected by the | inertia of the dyno an | d the drive train. |
| Readings will be too low under accelera | tion unless compensat | ed for. |
| Compensate for inertia effects durin | acceleration | |
| | | |
| | | |
| - Calibration | | |
| Distance to calibration weight 10 | 0.0 🚖 cm | |
| Calibration weight | 0.00 🜩 ka | |
| | | |
| Zero calibrate! | ad calibrate! | Save calibration |
| Roller/Hub Moment of Inertia (MOI) | 35.00 🚖 kg*m | ^2 |

12.3.2 RPM

Use RPM1 and configure it like this:

| | RPM/Frequency channels | | | | | | |
|-----|--|-----------------------|--------------|------|-----------|--|--|
| RP | RPM1 - RPM4 accept digital RPM and frequency signals | | | | | | |
| Inp | ut | Function | Channel name | Unit | Setup | | |
| RP | M1/VR | Load cell1 RPM \sim | RPM1 | | Configure | | |

12.3.3 Brake output

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

| Output | channel setup — | | | | | |
|--------|-----------------|---|--|--------------|-----------|----------------|
| Output | Function | | Output type | Channel name | Setup | Source channel |
| Out1 | Brake Control | ~ | YourDyno Eddy brake Power Suj $ \smallsetminus $ | Brake 1 | Configure | Define |
| Out2 | Not used | ~ | ~ | | Configure | Define |

12.3.4 Brake control mode

Power sweep is recommended for normal sweeps.

12.4 4WD chassis and 2WD hub example

12.4.1 Using the right inputs and outputs

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



12.4.2 Load cells

Configure 2 load cells and configure the MOI

12.4.3 RPM

| - RPM/Free | quency channels — | | | | |
|------------|--------------------------|-----------|--------------|------|-----------|
| RPM1 - RP | M4 accept digital RPM an | nd freque | ncy signals | | |
| Input | Function | | Channel name | Unit | Setup |
| RPM1/VR | Load cell1 RPM | ~ | RPM1 | | Configure |
| RPM2 | Load cell2 RPM | \sim | RPM2 | | Configure |

12.4.4 Brake setup

| - Output | channel setup — | | | | | |
|----------|-----------------|---|--|--------------|-----------|----------------|
| Output | Function | | Output type | Channel name | Setup | Source channel |
| Out1 | Brake Control | ~ | YourDyno Eddy brake Power Suj $ \smallsetminus $ | Brake 1 | Configure | Define |
| Out2 | Brake Control | ~ | YourDyno Eddy brake Power Suj $ \smallsetminus $ | Brake 2 | Configure | Define |

12.4.5 Brake control mode

Power sweep is recommended for normal sweeps.

12.5 4WD hub example

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

13 Tips and tricks

13.1 Finding the right Moment of Inertia (MOI)

The MOI impacts the power and torque readings like this:

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

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

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

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

13.1.1 Double ramp

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

• Define an RPM curve like this:



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

| Status: Idle | | Brake control | | Setup Gear ratio Auto start setup Arrange gauges MOI setup | | |
|-------------------------|------------------|---------------|---------|---|-------------------------------|------------------------------------|
| Data connection: Normal | Pause logging | Brake + | Brake - | Hold RPM: Off | Brake setup Load raw log file | Gauge on/off Load session settings |
| Manual start | | Save + Rest | art | Restart | Save + Close | Dismiss |

Pitfalls:

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

13.1.2 Steady state + Ramp

The procedure is to do a steady state test at a certain RPM and do a sweep. The sweep and the steady state run shall have the same power/torque at the steady state RPM, if

not adjust the MOI and re-run the sweep. The steady state does not need to be rerun, since MOI does not impact steady state power.

Pitfalls: Same as for double ramp

13.1.3 Test in different gears

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

Procedure:

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

Pitfall:

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

13.2 Finding the best brake control settings

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

13.2.1 Looking under the hood of the regulator

First step is to create a Brake setup analysis tab:

| ile Run Option | s Plugins Help/ | About | |
|---------------------|-----------------------|----------------------|--------|
| Results vs RPM Resu | ts vs Time Results ta | <new tab=""></new> | |
| | Configure tab | | x |
| | Template: | Brake Setup Analysis | ~ |
| | Graph or Table: | ◯ Graph 🛛 Table | |
| | Tab name: | Brake Setup Analysis | |
| | X-Axis/Master: | Time | ~ |
| | | | |
| | ОК | C | Cancel |

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

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



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

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

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

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

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

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

13.2.2 Analyzing load control

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

13.2.3 Turning off noise filtering on brake channels

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

| - Graph channels | visual | style | setup |
|------------------|--------|-------|-------|
|------------------|--------|-------|-------|

| Channel 🔺 | Line style | Comparison | Noise filtering |
|-------------------------|------------|-------------|-----------------|
| Gear Ratio | \sim | None 🗸 🗸 🗸 | Default \vee |
| Heater power | ~ | None 🗸 🗸 | Default \sim |
| IAT[ScanTool] | \sim | None 🗸 🗸 🗸 | Default \vee |
| Injector Duty[ScanTool] | \sim | None 🗸 🗸 | Default \vee |
| Injector ms[Scan Tool] | \sim | None 🗸 🗸 🗸 | Default \vee |
| Int Psi | \sim | None 🗸 🗸 🗸 | Default \vee |
| INTAKE TEMP | \sim | None 🗸 | Default \sim |
| Kd factor | \sim | None 🗸 🗸 🗸 | 0 ~ |
| Ki factor | \sim | None 🗸 🗸 🗸 | 0 ~ |
| Knock[ScanTool] | \sim | None | Default \sim |
| Kp factor | \sim | None 🗸 | 0 ~ |
| LoadCell2 Torque | \sim | None 💆 | Default \vee |
| MAP[ScanTool] | \sim | None 🗸 🗸 🗸 | Default \vee |
| Measured Power | \sim | None 🗸 🗸 🗸 | Default 🗸 🗸 |
| Measured Torque | \sim | None 🗸 🗸 | Default 🗸 🗸 |
| O2[ScanTool] | ~ | None \sim | Default \sim |

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

13.3.1 Non-linked dyno

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

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

| RPM/Frequency channels | | | | |
|------------------------|----------------------------------|--------------|------|-----------|
| RPM1 - RP | M4 accept digital RPM and freque | ency signals | | |
| Input | Function | Channel name | Unit | Setup |
| RPM1/VR | Not used V | RPM1 | | Configure |
| RPM2 | Load cell2 RPM V | RPM2 | | Configure |

13.3.2 Linked dyno

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

| Output | channel setup —— | | | | |
|--------|------------------|---|--------------|-----------|----------------|
| Output | Function | Output type | Channel name | Setup | Source channel |
| Out1 | Not used |) ~ | | Configure | Define |
| Out2 | Brake Control | \sim YourDyno Eddy brake Power Suj \sim | Brake2 | Configure | Define |

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

13.4 Non-linked 4WD dyno concerns

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

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

| 🚺 Gear Ratio Setup | - | |
|--|---|--|
| èear ratio setup | | |
| Gear ratio Auto set | up/Verify | Advanced gear ratio setup |
| Engine RPM source: | RPM Pickup V Advanced | |
| Tacho RPM setpoint: | 1750 | Some 4WD cars have one set of primary driving wheels, and the other set of wheels are driven only when |
| Actual Gear Ratio: | 10.00 engine revs/dyno rev Lock gear ratio | needed. In this case it can be better to link gear ratio and engine RPM only to the permanently driven wheels. |
| Gear Ratio in use: | 3.76 Re-calculate results from variable gear ratio | Se advanced gear ratio setup |
| Add brake while calcul | ating gear ratio. Tums on when RPM > 0 Brake force: 0% | Primary driven wheels RPM1 ~ |
| Notes: YourDyno will al engine power is calcula ratio is correct. | ways calculate power at the brake(s)/roller(s). Using the gear ratio, ted from Brake/roller power. It is therefore very important that the g | the OK Cancel |
| Set Gear ratio by pressi | ng the "Lock gear ratio" button while holding the RPM steady. | |
| "Re-calculate results ba complete based on the RPM channel for this to | ased on variable gear ratio" will update the results after the run is recorded actual gear ratio. You need a stable and fast direct Engir work (i.e. Engine RPM Pickup, CAN bus, etc. OBD2 is too slow) | e |
| ок | | Cancel |

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

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

13.5 Automatic RPM Step test

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



14 Support

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

To review runs for potential issues we need:

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

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

Page | 85