

T12Tech.com LambdaBlock



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Purpose of the T12Tech lambda block.

This block is primarily developed for professional use in combination with a Dynanometer, but can also be used as a cheap alternative to a gas meter, for people with a small budget.

The main purpose of the block, is to fill the void between the well known test forms such as the stationary 4-5 gas meter and in-exhaust lambda probes.

The block is designet to create uniform test conditions over the entire rev range.

The biggest and most important advantages of using the block, is that gas flow, temperature and pressure will be stabilized.

For example, pressure waves in a slow running V2 engine, will be transformed into a stabile gas flow.

The constantly changing temperature you will find when testing in an "open loop" system, will be converted to a stabile low temperature. These advantages creates a stabile measuring environment, similar to a "close loop" system as the lambda probe is designed for.

The block is a part of your proffesional tools. Poor maintenance of the block / lambda probe, will cause wrong measurements / readings.

Read these instructions thoroughly before use!

History and development

The block is developed and tested by Mathias Stevnhoved Mogensen and Henning Larsen from 2013 to 2015.

The purpose of the block is to have a professional tool, to help solve the problems that can occur in modern combustion engines. Especially in combination with changes / upgrading parts in the engine and engine management system.

The idea by developing the block, was to create a cheaper alternative to gas meters, by placing a lambda probe in a stable environment to achieve precise readings and to keep costs down. And extending the lifetime for the probe, lifetime have to be 50+ hours under the test.

Tests have been performed by the following methods:

Test Form :	4/5 gas meter	Lambda probe	in-exhaust probe
• StepTest	Super Great	Good	Good
• Sweep Test	Bad	Super Great	Medium
• Ramp Test	Okay (Only at low acc)	Good	Medium
• Road Load	Good	Great	Great
• Track simulation	Bad	Super Great	Good
• Emissions test	Super Great	Bad	Bad

All tests has been done on a Mustang EC997a dynamometer with a Factory highspeed 5 gas meter. Datalogging was done using Sportdevices SP5 DAQ. Data-analysis was done with Sportdevices Dynosport V3.8.23.1 and newer versions and also with DynoMasterPro DynoFront 3D V2.41 All tests performed by Henning Larsen.



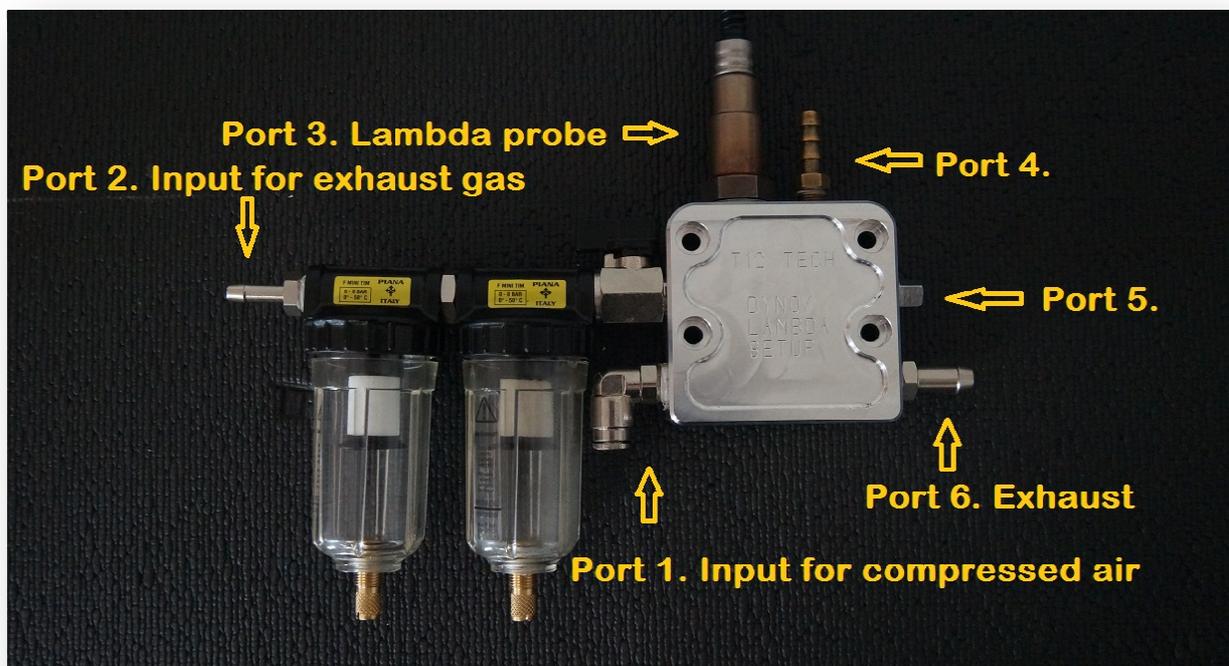
Dynamometer used for tests is Mustang EC997a "low inertia" type with eddy current brake.

Recommended setup.

for maximum utilization of the product, it is recommended to install the following parts:

- Water-separator, pressure-regulator and magnet-valve (Port 1 - ¼" BSP pipe thread)
- Water-separator (Port 2 - ¼" BSP pipe thread)
- Lambda probe (Port 3 – M18X1.5 thread - standard for Bosch LSU series)
- Temperature probe (Port 4 – M10X1.00 thread)
- Vakuum manometer 0-0.1 bar (Port 5 - ¼" BSP pipe thread)

The magnet-valve will keep the pressurized-air use to a minimum and also help keeping a stabile temperature in the block. Sportdevices SP4 and SP5 contains functions to controls this, in the software.



IMPORTANT!! DO NOT fit anything else than the supplied hose fitting in port 6!

The fitting is an important part of the vacuum function in the block. The block and parts within are designed to keep a certain vacuum, based on the dimensions of this hose fitting. Do not fit a hose or anything else to the hose fitting.

Gas pipe and hose.

Exhaust gas will have to be directed to the intake port, either by placing a gas pipe / hose in the bikes exhaust muffler or via a cooling pipe / heat resistant hose attached to the gas outlets on the exhaust header pipes. (The original lambda probe threads can be used for this, with the correct adapter.)

It is recommended to use "High-temperature silicone rubber tubing – soft" in the following size – 1/4" ID / 1/2" OD, or similar. To have sufficient cooling in the hose, it is recommend to use a hose of about 3000mm length.

If connection directly to the head pipes, it is recommended to use an adapter from the header pipe thread to 1/4" copper tubing. It would be best to fit a cooling pipe or similar between the copper pipe and the hose, to prevent the hose from overheating / melting. The copper tubing can get very hot! Most motorcycles are fitted with additional threads in the header pipes (besides the lambda probes) These threads are designed to take readings from. On Aprilia and Ducati, it is mostly 1/8" BSP pipe thread. On Japanese motorcycles, it is usually metric fine pitch threads (Some Suzukis has M12X1.25 thread)

Most lambda probes are either M18x1.5 or M12x1.25 thread. If the motorcycles lambda probes has been removed, these threads can be used to connect the pipe / hose from the lambda block.



Recommended probes.

The block is tested with:

- Bosch LSU 4.0
- Bosch LSU 4.2
- Bosch LSU 4.9 (Best option and most stable)



To achieve an optimal temperature in the lambda probe, you should carefully read the manual for the controller you will be using. A too low temperature will affect the readings.

The block can also be used on Diesel engines, if using the Bosch LSU 4.9D.

Other probes with M18x1.5 thread and same length as the Bosch LSU series, will also work in the block, but they haven't been tested at this point in time.

Important! It is very important to use a power supply of sufficient size. The probe will normally be heated by the exhaust gasses, but this factor is reduced greatly as the probe is removed from the exhaust system. It is recommended to use a power supply with 50% greater effect than what originally recommended for the controller.

Air pressure requirements.

To achieve a constant vacuum and a stable gas flow, it is recommended to use an air compressor with a minimum pressure of 6 bar and a tank with a volume of over 100 liters.

Air consumption in the block at 4 bars of pressure, is about 200-250 liters per minute. The air consumption is greatly reduced by using the recommended parts (magnet-valve and such)

Important! Oil lubrication in the pressurized air is not allowed! Oil and water inside the block can cause changes in the gas flow.

Remember that adding additional blocks to the setup, will also mean a greater air consumption. If using two or more blocks, it is recommended that air pressure, water-seperator, pressure regulator and magnet-valve (Port 1.) is changed to 1/2" and divided subsequently.

Utilization.

It is of the utmost importance, that his manual is carefully followed, to achieve a longer lifetime of the probes and to get accurate readings.

Adjustment of the vacuum:

To achieve uniform test conditions, it is important to have a constant and stable pressure on the blocks vacuum pump (Port 1.)

- 1. Install gas-pipe and hose to water seperator Port 2.
- 2. Install pressurized air to Port 1. (Recommended Max 4 bar)
- 3. Adjust air pressure (Port 1.) until vacuum manometer (Port 5.) shows 0.05-0.08 bars vacuum.

Be aware that vacuum can change between the different dyno runs, if the filter is dirty or if there is condensation in the hose. The manometer should carefully be watched during the entire dyno setup, this procedure should be followed and adjusted before every dyno run. To much vacuum will cause wrong readings by the probe.

Pre heating of probe and block.

Probe and block should be pre heated to recommended working temperature. Bosch LSU 4.9 will transfer far less heat to the block, compared to the LSU 4.0 and 4.2 version.

Pre heating time depends on the probe/block surrounding temperature. Recommended time before first dyno run is 5-10 minutes.

Measuring under DynoRuns:

Sweep Test: To get the most accurate measuring results, it is recommended not to activate the air pressure / vacuum, until 5-10 seconds before each dyno run. As soon as the dyno run has ended, it has to be turned off again (Best to do when braking). This procedure is important to follow, to keep a stable temperature in the block and should be repeated in the same way in the following dyno runs.

Ramp test: Same procedure as Sweep test.

Quick Step Test: Same procedure as Sweep test.

Step test: If using cooling time between each step, it is advised to deactivate the block when cooling.

RoadLoad test: This test can cause problems with cooling of the block. Temperature log is needed and cooling factor will have to be deducted to achieve the correct measurement.

Important! Do not activate the block and insert the gas-pipe into the exhaust, until the engine is up to operating temperature. A cold engine will develop a lot of condensation, which can harm the lambda probe. Also be aware that engines that has been poorly adjusted (outside the

probes working area), may also develop a lot of condensation and unburned fuel, which are likely to reach the probe. It is very important, that the gas that reaches the probe is dry, in order not to damage the probe.

All forms for air-adding systems on the motorcycle, will have to be deactivated. Extra air in the exhaust system will cause wrong measurements.

Delay time:

Delay time from the combustion chamber to the probe, is depending on the following factors:

- Engine RPM
- Throttle position
- Combustion temperature
- Exhaust volume
- Pressure waves in the exhaust.
- Gas-pipe and hose length

To avoid these problems, the block is designed to keep a constant gasflow no matter the above listed factors. It is therefore very important to keep the recommended vacuum. (0.05 – 0.08 bar vacuum in Port 5)

Because the block keeps a constant gas flow, you will get a very precise log pattern, which makes calculation of the delay / RPM very easy, as the delay is almost linear from idle until Rev. limiter. The block can equalize pressure up to +200 millibar in the exhaust system.

To achieve correct datalogging, it is recommended to log RPM and TPS (live from the engine) To get an easy readable difference in the lambda log, it is very important to open / close the throttle in a swift on /off movement. A slow opening / closing of the throttle can cause a blurred lambda log result, that can be hard to read. Delay time will, under normal working conditions, be 0.5-1 second. Calculation is necessary for each dyno run.

Placement of the block:

It is very important that the block is fitted in a horizontal position with the lambda probe in a vertical position. This position is important in order to avoid condensation around the lambda probe. The block should also be placed in low position, as condensation will occur in the hose (Port 2). Condensation / water caught in the hose can change the vacuum, if placing the block too high, the condensation will be harder to drain. Do not try to change the vacuum to solve this problem. Too much vacuum will affect the measuring results and change the delay time.

Mount the block somewhere, where the exhaust gas from the exhaust and the cooling air from the dynamometer does not affect it. Large amounts of exhaust gas near the lambda probe, can cause wrong readings.

The block is designed with two "fronts", so it can be fitted as you wish (right/left). The 4 mounting holes is designed to fit normal M6 Umbraco bolts. (cylindrical heads)



Maintenance:

All filters should be changed / cleaned at fixed intervals. A good indicator, is that the vacuum will rise when the filters are dirty. Always note what the air pressure is, compared to the vacuum.

The probe should be removed and cleaned daily. The block should be cleaned with compressed air.

After-cooling of the probe is recommended, to extend the probes lifetime.

After-cooling is done by following these steps:

- Remove the gas-pipe / hose
- Empty the water separator for condensation water
- Remove the filter in the water separator
- Activate the block / vacuum pump and let it run for 3-5 minutes
- The probe has to be activated

This procedure should be carried out after work / shutdown of the dyno / lambda probe. Following this procedure, any condensation / unburnt fuel in the system, that can affect future readings, will evaporate.

Important! Do NOT clean the probe using compressed air. Do not clean the inside of the block with WD40 or similar oil based products. These products can leave an oil film, which can affect future readings.

Contents of the box:

When you receive your Lambda Block, the package will include:

- One Lambda Block, from T12Tech.com
- One spring
- One connectors
- One end cap
- One copper Washer
- One Injector pipe



Important! Other parts like water separator, pressure gauge etc. Recommended to buy, in your local hardware store.

Disclaimer and warranty.

The block comes with a 2 year warranty, covering fabrication errors, in case such errors can be proved to have been there from new. To keep the warranty, the block should be used and maintained, as written in this manual. Warranty and sales conditions as per applicable EU law.

Phone support is offered up to 30 days after delivery of the product.

- Support phone number: 0034 672 511 990
- Language: Danish or English.
- Phone hours: 09.00 - 18.00 (Spanish time)

Important! The support covers – Setup and general use of the block. The support does not cover – hardware and software setups, that are not delivered by Sportdevices.

For Sportdevices users, full software support is possible. Also covering fuelling and carburettor setup (only motorcycles – all makes and models) Support for car setups can not be offered because of limited experience in that area.

The block is exclusive sold by:

- T12Tech.com
- DynoMasterPro
- SportDevice.com

Seller is not responsible for damage done to the lambda probe or any other parts used in combination with the product. Seller is not responsible for consequential damages or loss by using the product. The use of this product is entirely the users own responsibility. The product is simply a tool. Damage done to motorcycle or user of the product is not covered by warranty.