

# HubScan

Hub mounted dynamometer



2WD and 4 WD



Consistent with all kind of differentials



Vehicle versatility



10 Installation < 10 min



Movable



Engine power measurement with power loss calculation



No pit, no strapping



Full featured and powerful SW



High precision due to hub measurement

# Hubscan – designed for you

Thanks to advancement of technology, the world of engine preparation becomes more and more competitive. From the first inertial dynamometer to the most technical today's industry benches Rotronics has always succeeded to adapt and has developed innovative products to answer to the needs of our customers in the best way possible.

Today, facing the requests of several customers, Rotronics has developed a new solution : HUBSCAN, a dynamometer, connected to the hub with the same benefits as our chassis dynamometer.



## ROTRONICS KNOW HOW

For over 25 years, Rotronics has designed and manufactured engine test bed and rolling road dynamometers for engine performance tuning, motorsport, education and industrial R&D. From the outset the company has always used innovative technology to meet the expectations of its customers, and today it offers effective and unparalleled solutions in many areas of expertise. Rotronics has applied all his know how towards designing the Hubscan, creating a unique and productive solution.



## A COMPLETE PRODUCT MANAGEMENT

Both family business and high technology industry, Rotronics is a team of engineers and technicians who have an advanced technical expertise dedicated to design, development and manufacturing of our products. Everything is made in house in our factory for the most powerful and successful products.



## CUSTOMER SUPPORT

Whether you need information about the operation of the dynamometer, advice on specific measurement or want to contact our After Sales Service, our experienced technicians are at your disposal. All the people you speak to have taken part in the design and production of Hubscan, and they are always available to answer your questions.

# HubScan technology



## A POWER MEASUREMENT

Directly coupled to the hub, the bench is able to make power and torque measurement for 2 and 4-wheel drive vehicles. Hubscan addresses different kind of tests from engine power measurement, ECU mapping as well as road cycle simulations or specific trials.

Driven by high performance electronic cards, the load applied to each axle is calculated 100 times a second. As a consequence, we are able to detect the smallest change of behaviour of the vehicle. This rate, linked to a very low inertia enables an extremely short reaction time. This kind of test bench allows to monitor the tightest evolution linked to ECU mapping for example.

Due to its very low inertia, the versatility of the bench is exceptional : the bench can be used in the same way for a private car, a quad and a dragster. More over any kind of motorization is supported, the bench reacts the same way for electrical, hybrid, petrol or diesel engine.



Very fast control



Extraordinary versatility

## BRAKING SYSTEM

Each pod features an on-board Eddy Current Brake with high torque and power. All these systems are driven by electronic assistance developed on our own. According to vehicle parameters (weight, drag force, friction, slope), we can control the road load simulation by applying the wheel force that the vehicle has to produce to move in the real life. Therefore, the behaviour of the car is the same than on the road, and enables the customer to have a 100 % representative test. As a consequence, ECU mapping becomes more robust and more credible.



Many advantages with eddy current brakes : braking force, transient capabilities, lifetime, endurance, maintenance reduced to the minimum. Other technologies like hydraulic braking, pneumatic device have not such positive aspects.

We are able to calculate a wheel force with torque and RPM sensors. When the vehicle allows it, with a loss power measurement, we manage to determine power and torque produced by the engine.



Real testing conditions



Typical engine behaviour



Power loss measurement

# ROAD LOAD SIMULATION TESTING AND ENGINE SPEED CONTROLLED TESTING

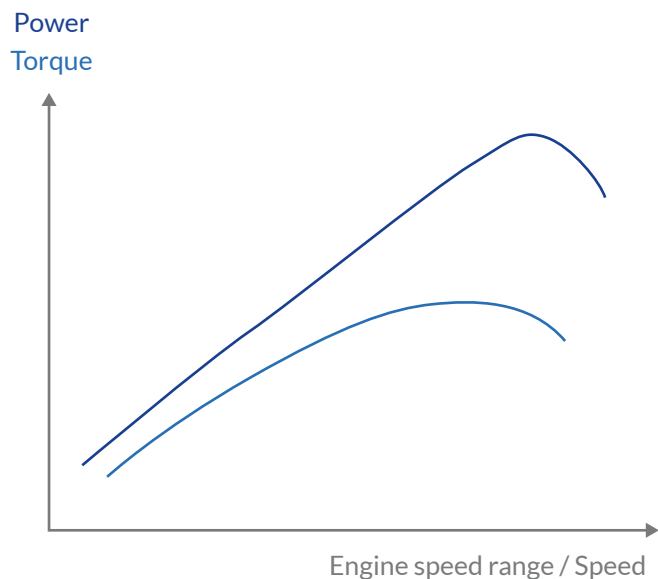
For engine power measurement, two ways of testing are proposed through the software.

## 1/ Road load simulation testing

One application of this way of testing is to measure the maximum power of the vehicle. Once testing parameters entered (weight of the vehicle and aerodynamic coefficient), a first step of measurement is realized to reach the maximum engine RPM defined by the user. If it is possible, the bench makes a power loss measurement. Computing the difference between wheel force and power loss measurement, we determine the engine performance at the flywheel. Another possibility is to check gear changes : it is possible to validate that the vehicle is not facing difficulties when down or up shifting.



Maximum power measurement and maximum torque measurement on all the engine speed range

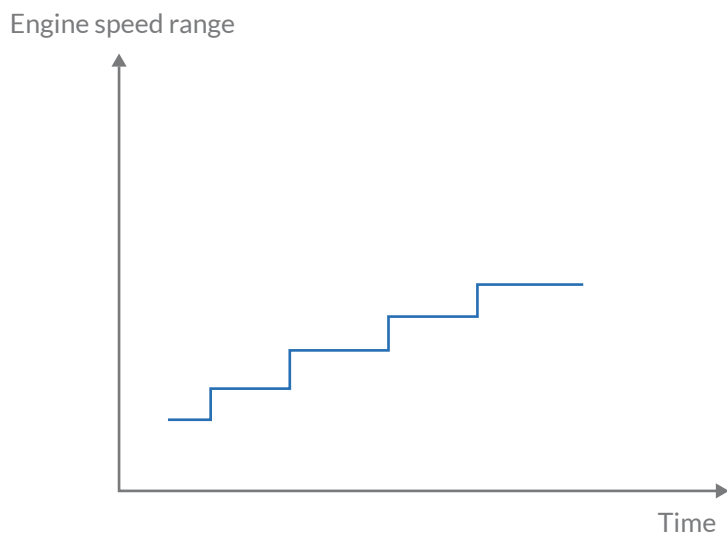
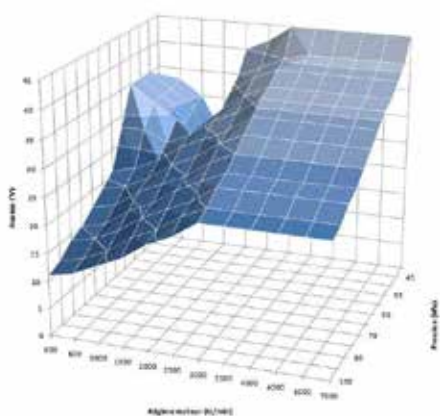


## 2/ Step by step measurement

Most of the customers use their dyno to perform ECU mapping on all the engine speed range. Controlling the load applied to the motor through the eddy current brake, we can maintain the engine speed to the setpoint (whatever is the accelerator position) and with a press on the remote control, increase or decrease this value (step defined by the customer) : for example, you can decide to use this way of working from 1200 to 4000 RPM with a step of 250 RPM. This very reliable sorting method boosts your results and reduces discrepancies of your maps. Please note that with our software, you can check the gain / loss you get in real time, dyno measuring the wheel force.



Setpoint power measurement



# Easy to use

## MOVABLE

We have designed this dyno for our customers who have not enough space in their garage or people who can't dig a pit in their workshop to use a chassis dyno : with Hubscan, you don't need to have dedicated space for power measurement any more. There is no anchorage between the dyno and the ground. Pods are equipped with strong mechanical resistance wheels that prevent them from turning apart during a test and make them movable. You can drop hubscan in your garage whenever you want : the only thing you need is a flat floor.



No anchorage and mounted on wheels, it's an easier way to work, no space dedicated to the bench and cost of commissioning reduced to minimum. Each pod is designed with handles to be able to move it the simplest way as possible. Three wheels equipped the hub, one is directionnal that helps the customer to align both car and dyno axles. To enable the dyno to manage natural vehicle camber, there is a shock absorber inside the dyno. It is also limiting the vibration level. Lifter hooks in the pod are available if you want to move your dyno to another place with a van or on a pallet.



Off-ground use



Movable

## CONNECTION DIRECTLY TO THE HUB

To use a dyno, you just have to lift the vehicle, remove the wheels and connect the pods to the hub. It can be achieved with a jack or a scissor lift.

To make this connection, we deliver on demand coupling system to adapt the pod to each kind of vehicle. This mechanical part is dedicated to link the hub of the car (which has different number of holes, determined bolt pattern for the fixture) and our dynamometer. Once this device identified, it's possible to connect every kind of vehicle to the system. Setting up the coupling system and connect it to the hub is only a few minutes long and testing can begin. You don't have to strap the car indeed : no matter the trial you want to make (driving cycle, maximum power measurement, usw), the car will stay completely static all test long.



Quick to use



No strapping

## VEHICLE VERSATILITY



Thanks to its design, HubScan has a very large range of application and is more versatile than chassis dyno. With its very low inertia, it can be used with low power cars like mini electrical car or stronger vehicles like rally raid cars or dragsters, for which chassis dyno could be a problem due to type of tyres. In the same way, there is no problem of wheelbase adjustment or track width limitation. Pods are mechanically independant, the synchronization between pods is electric and it becomes possible to use it for non-standard vehicles.

# Modularity and efficiency

## DYNO - VEHICLE CONNECTION OPTIMISED

Because our bench is connected directly to the hub, uncertainty of measurement due to wheels is not a problem. No matter the use, the type of tyre, if they are slick or not, these inputs are not a concern. More over, because the bench is coupled to the hub, slipping doesn't exist !

Test bench becomes compatible with rally raid, ice race, hill climb race or drift cars, kind of vehicles hard or impossible to be tested on a chassis dynamometer.



## X2 ESSENTIAL / X4 ESSENTIAL

One word to define Hubscan : Modularity. In fact, many configurations to test anything you want are possible.

Our test bench can evolve over time : it's completely possible to start with a 2WD today and upgrade to 4WD later.

Whatever configuration is envisaged, X2 or X4, it's still possible to make a power loss measurement (when the vehicle allows it). Using the clutch or the neutral position, we determine the loss between the vehicle and our bench, making us able to calculate the engine power at the flywheel based on a wheel force.



**x2**



**x4**

Upgradable to X4

## SIMPLE AND REPRESENTATIVE TESTS



Whether it is to manually optimise mapping points, measure the performance of a vehicle under actual conditions, plot value curves for specifications (power, torque, temperatures, air/fuel ratio...) or to perform rolling tests, HUBSCAN offers simple procedures tailored to your technical requirements.



## HIGH TECHNOLOGY SENSORS

Hubscan uses accurate sensors : 360 measurement points for each wheel revolution for the speed sensors and a 0.02% error factor for the force sensor that measures braking torque. Combined with fully digital data acquisition and brake control, the unit represents an extremely precise and stable measuring device : less than 0.1 % overall error !

This technology ensures optimal measurement quality regardless of the vehicle speed and the accuracy of the results is independant from the power level.



## ACCURATE AND REPEATABLE TESTS

Thanks to the connection directly to the hub, you get unbeatable repeatability whereas with a chassis dyno, you will have all the uncertainties due to the tyres. It may indeed slip on the bench, may add loss due to the heat or the contact with the roller or even explode.

As a consequence, measurement will be more accurate and more repeatable: you don't have to mind with these uncontrolled parameters that distort results of the trials.







# Advanced Features

## MANAGEMENT OF STANDARD DIFFERENTIAL / SELF-LOCKING DIFFERENTIAL

The software in its default version is in standard made for vehicles with differential : the electronic of the bench makes the two wheels running at the same speed, independantly of load.  
The user can switch the soft to self locking differential mode : the eddy current brake setpoint is the same on left and rear wheel and the differential works as in the case of running road.



## WEATHER STATION

Regardless of the measurement technology, engine power is dependent of weather conditions. Related to atmospheric conditions, the engine is delivering more or less power. To correct this natural behaviour we measure the following parameters : air temperature, hygrometry and atmospheric pressure and we apply the standardized correction factors.



## OBD ACQUISITION

To make the dyno easier to use, Rotronics has developed an OBD sensor. This device has to be plugged into the car's diagnostic port. Then the software is able to calculate the ratio between the engine RPM and the hubscan RPM. The connection with the bench is ready via Bluetooth. In its basic version, the system makes the acquisition of engine speed but also engine temperature for monitoring.

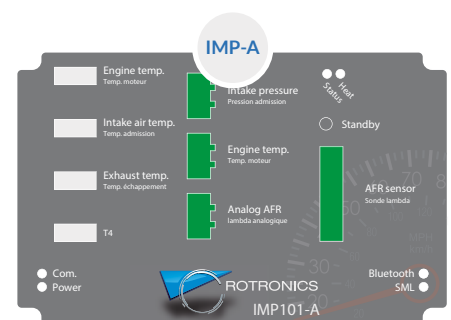


More sophisticated versions allow the customer, without installing extra sensor, to collect valuable datas like the following ones : engine RPM, throttle position, air intake flow, pressure and temperature of intake air flow and coolant temperature.

## IMP-A

To be able to realize a professional mapping, taking into account all the parameters of the engine, Rotronics proposes the IMP (Multi Peripherals Interface) that collects different informations. First of all, this device includes weather station and OBD acquisition as described above. In its « A »Version (IMP-A), atmospheric pressure, engine temperature, coolant temperature, throttle position, air intake flow are collected. These acquisitions are done through OBD or real analog inputs (TCK or voltage). Of course, exhaust manifold temperature can also be monitored to avoid engine failures.

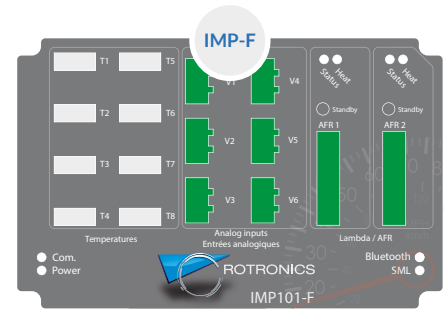
IMP-A is also measuring a critical factor : air fuel ratio or richness. It comes with large bandwidth probe. A mechanical support to install on exhaust is also provided.



# Industrial applications

## IMP-F

It is possible to upgrade IMP-A to IMP-F. This enhanced component is featuring 8-K thermocouples, 6 analog inputs and 2 wide bandwidth lambda (including probes). Of course, it's also including weather station for power correction. To use it, Kronos Lite must be installed on the computer.



## KRONOS LITE

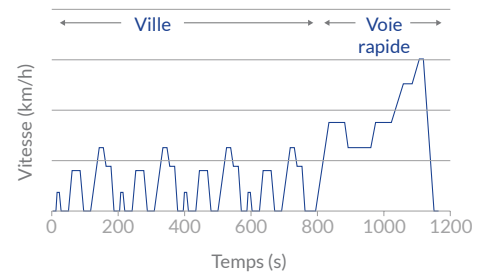
Kronos Lite software, compare to standard Hubscan, allows tailor made setup. We can modify for you displays, add alarms thresholds, scale your analog inputs, design special reports or even write some specific procedures.

Rotronics customer service team is modifying the setup according to your specifications. You take advantage of a dedicated application with the same reliability than a factory setting without the needs of a specific training.



## DRIVING CYCLE

We have added a new function to our software : driving cycle realization is now possible ! Through Kronos Lite, you can now make the vehicle follow a cycle like EUDC or NEDC. As an industrial, with emissions bench, you can imagine to prepare a certification trial on our dyno. As a competitor, you can imagine to run on the bench like you ran during your last race and as a consequence, track any mistake in the mapping.



## X2 FOLLOWER / ASYNCHRONOUS MACHINE

As explained, our system has a high modularity. You can add what we call « following pods ». These devices are mechanically the same as the previous ones. The only difference is that they are equipped with asynchronous machines instead of eddy current brakes. The interest of these machines is for two wheel drive cars : to realize a complete synchronization between front and rear axle, you have to drive the non-motorized wheels at the same speed as the motorized axle. With these following pods, you are in complete running road conditions : electronic assistance such as ESP, supervising that the 4 wheels are at the same RPM, doesn't trig anymore.

Under request we can tailor made product with 4 asynchronous machines. This system allows for example to control independently the torque on each hub. Feel free to contact us for more information.



## RADIO REMOTE

All the operations necessary for performing tests can be controlled by the user from the driver's seat. A wired remote control provides this function. As an option, a radio remote control (wireless) avoid cable for more comfort. Both devices have an emergency stop button standardised.



## CALIBRATION

The unit can be entirely calibrated by the user following simply and quick calibration procedures that are integrated into the software ensuring accurate and repeatable readings. The operation lasts no longer than 10 minutes.



## OPTIMAL COOLING

Cooling the vehicle during the test is essential for safety of equipments and for credibility of results. Powerful fans (from 32 000 to 45 000 m<sup>3</sup>/h) perform this function and ensure a stable vehicle temperature, thus guaranteeing consistent readings. The fans are streamlined to perfectly distribute the airflow where it's needed to remove the heat. To have the best portability as possible, a 220 V / 16 000 m<sup>3</sup>/h is available as an option.



## EXHAUST GAS EXTRACTION

HubScan offers a large range of powerful extractors for exhaust gases, adjustable in height and equipped with a stainless steel collection scoop to ensure that the gas temperature is lowered by dilution. The extractor can thus be placed very close to the exhaust pipe and make efficient use of its airflow. Simple and dual outputs versions are available. High temperatures hoses (different than standard garage equipment) are delivered with the extractor.



## ADAPTATORS SYSTEM AND FIXING SYSTEMS

One set of coupling is supplied as standard with Hubscan. However, to have the best adaptability as possible, we offer as an option additional tailor made coupling systems. Most of connection devices are for 4, 5 or 6 holes rims with standard but, we can design on demand, specific ones.



# Technical specifications

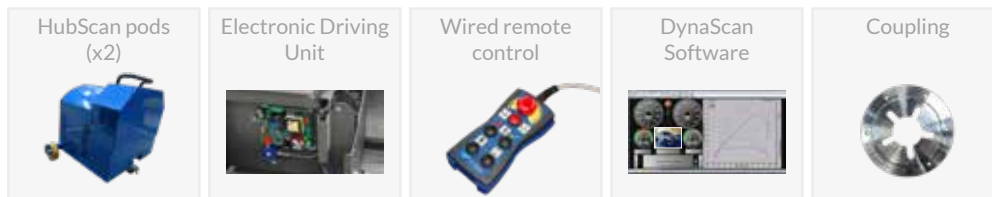
	<b>HubScan</b> 
Electrical Supply (per axle)	220 V / 32 A (*)
Maximum transient power (per axle)	700 Ch
Constant capability (per axle)	300 Ch
Max speed	3000 tr/min - 300 km/h (**)
Maximum allowable load (per axle)	1000 kg / pod
Size of each pod	50 cm x 90 cm x 90 cm
Mass of each pod	400 Kg
Coupling	4, 5 or 6 holes in standard - permissible center distance : from 80 mm to 120 mm
Screw specification	M12 x 1,25 / 1,50 or M15 x 1,25 / 1,50



(\*) Except FAN

(\*\*) For a 19-inch wheel vehicle

## Standard :



## Options :



All our bench are fully mounted and tested with vehicles in our factory. All calibrations are performed before delivery.

**Warranty :** 1 year parts and manpower. Factory return.

**Free Remote assistance during the warranty :** Remote control and emailing.

### Computer minimal specifications :

Desktop running Windows 8 or 10. LCD screen. 2 ethernet network boards.

Rotronics can deliver the computer as an option.



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