Froment

SIGMA DYNAMOMETERS

Who are Froment?

Froment are world leaders in the design and manufacture of power test equipment. We have been established since 1947, have product on every continent and are accredited to BS EN ISO9001. We are always available to talk to you, sharing our experience on all aspects of power test equipment.

Why use a Dynamometer?

Dynamometers are used to test tractors for torque, power and performance. When these capital investments are purchased a dynamometer allows the operator to make sure they are getting the exact power they paid for.

- Highlights the need for maintenance and service
- Warranty and technical issues
- Enables detailed diagnostics
- True test of engine power
- Find intermittent faults quicker on load
- Save time for technicians diagnostics
- Maintain the performance of modern, sophisticated tractors

Froment SIGMA Dynamometers

SIGMA Series Dynamometers are the market leading tool for ensuring that buyers and users of high capital cost equipment are getting precisely what they paid for - the power to carry out any task at the maximum efficiency and with minimum waste of valuable fuel.

Simply Better

Quiet and smooth in operation, the SIGMA incorporates the latest technology, yet is remarkably simple to use. This simplicity is a feature whether you are operating the unit with its hand-held controls or linking it to a PC.

Wide Speed Range

The torque-arm gearbox gives you flexibility and a very wide speed range for both PTO testing and engine speed work.

One input shaft covers all tractor PTO ranges from 270rpm up to 1250rpm. Alternatively, you can remove the gearbox completely for direct testing in the speed range 450rpm to 2100rpm.

Air Cooled

A self-contained, air cooled unit, the SIGMA Dynamometer requires no cooling water, eliminating the risk of contamination.

The operating temperature is reduced very quickly thanks to the highly efficient internal cooling fan. It is perfectly suited for DPF burn off, where the engine is running at high power for long periods of time.

Low Maintenance

Apart from the input shaft, the rotor of the Burden alternator and the cooling fans, there are practically no moving parts in the whole SIGMA Dynamometer. Reliability is assured with minimal maintenance costs.

Control Flexibility

You have full control of the test with the Hand-Held, with its continuous readout of power, speed, torque or torque reserve.

The robust hand-held has a sealed membrane keypad suitable for use in a dirty, hands-on type environment.

You can run an automatic power-curve test that ensures a repeatable test result, with a full summary of the test displayed on the large, clear readout screen.

You can complete a test in minutes. The simple, but sophisticated design means there's no need to warm up the dynamometer or follow regular calibration procedures.

Using SIGMA DynaTest, you can control the dynamometer directly from your PC using the familiar Windows environment. This provides a full display of all the dynamometer data along with comprehensive reporting and test database.

> "Very reliable and easy to use as well as being the most modern dynamometer on the market".
>
> Johannes Kleeberger, CASE IH

> "We have used Froment dynamometers for the last 25 years. These dynamometers are our preferred type as we can run them continuously at near full power where other dynos have a lower rating for continuous running".
>
> Richard Young, JCB Landpower

Better Business for your Service Department

SIGMA dynamometers transform the message your service department gives. All the service work you do is backed up by proven data.

Whether you use it for routine, pre-delivery inspection of new tractors or for diagnostics and fault-finding of used equipment the results are conclusive. This definitive information helps you build strong relationships with your customers because you are providing quality, recognisable support and service. This, in turn, brings repeat business of new and used equipment, along with parts sales, paving the way to long-term success.

Guarantee Engine Performance

The SIGMA Dynamometer can carry out tests on the full range of tractors on the market today, including compact tractors.

You can also test the engine in many combine and forage harvesters. Your customer will be certain that their expectations of engine performance will be met.

Anywhere, Anytime

The fully mobile, trailer-mounted, dynamometer is the most popular configuration. This unit has internal storage space for the standard drive shafts and the Hand-held.

When the lockable doors are closed it's all safe and secure. Cooling water is not required and all you need is access to a standard 13-amp or 16-amp single phase mains supply.

You can run tests in almost any location either on your on site or at your customer's premises.

So you can meet your customer's needs virtually anywhere, at any time - the epitome of good service.

Build it into Workshop Facilities

Alternatively, the statically installed version will allow you to set up a professional test cell in your own workshops.

You can choose the configuration to exactly match your needs and provide that vital professional testing and fault-finding service.

SIGMA Hand-Held

The intelligent SIGMA Hand-Held provides a simple yet effective way of testing. The robust design can endure the harshest of environments and the simple user friendly interface gives the operator confidence when testing.

Control and Display Choices

The clear display on the Hand-Held includes a menu that gives you five different control modes. You can choose which you want remotely while working around the machine, sitting in the cab or in a separate test office.

Memory

Pre-set and then apply a sudden step load change to check for governor response, instability or clutch slippage.

Constant Speed

Set a speed and the SIGMA control system will adjust the load until the required speed is reached, then it will be maintained even as auxiliary loads change. You can measure power at nominal PTO speed, or at rated engine rpm.

Automatic Test

This allows you to run a consistent test across the full power curve. It lets you concentrate on the test and not the test equipment. Accuracy is assured and the whole test is completed in a few minutes, saving time, eliminating operator error and providing reliable, repeatable results. A full summary is displayed on the screen.

Options

The screen can be set to display in any one of four major European languages as standard. Readouts can be in metric or imperial units.

Direct Load

Manually apply and remove load by pressing the '+' or '-' keys. You set the braking force directly for warming up or bedding-in an engine prior to a full performance test.

Constant Power

Simulate working conditions by selecting any power value of your choice that the engine on test can achieve and the SIGMA control system will endeavour to maintain this power irrespective of engine speed.

"Kubota (UK) Limited chose Froment as its preferred diagnostic test equipment supplier, because of its recognised reputation for designing industry leading innovative test solutions."

Robert Fox, Kubota UK

SIGMA DynaTest PC Software

SIGMA DynaTest for Windows™ replaces your dynamometer Hand-held. It provide all the necessary software and cables which are needed to convert your PC into a dynamometer controller.

Use the PC software to:

- Display the dynamometer readings of Power, PTO and Engine Speed, and Torque
- View a summary of the test, including High Idle Speed, Maximum Power, Rated Power, Maximum Torque and Torque Rise
- Fully control your dynamometer. You can run an automatic test, manually select braking force or set constant power or PTO speed
- In automatic test mode, you can set an engine warm-up time of up to 30 minutes, before the test starts
- Save the test results including tractor and customer details, test conditions and your comments, so you can build your own test database
- Build your own customer and tractor registration libraries, to minimise data entry and provide better reporting
- Compare results from previous tests, both graphically and as tabular data. You can view this comparison on-screen, or print it out
- Export test data either as a text file for extended analysis using Excel, for example, or as a *.xml file which can be e-mailed and imported into another SIGMA DynaTest
- Search for previous tests, using the registration number, make, model, customer or test date
- Scroll through all saved tests or just look at tests on a particular model, for example
- Provide tractor engine data: a ratio and loss can be applied to the PTO instrumentation results to produce an engine power report
- Extend and personalise the built-in tractor library so you can add a new tractor model as soon as it is released
- Print comprehensive test reports

Expandable and Flexible

You can extend the tractor library by adding new models as they are released.

In addition you can create your own tractor records, based on the tractor registration, and assign a customer and model.

Test Summary

A comprehensive summary of the test is always displayed on the screen.

This data includes a unique test number, the date and time along with the measured dynamometer test results.

In addition to the dynamometer test results, details of the tractor, customer and the test conditions, such as temperature and fuel consumption data, can be displayed.

Power, Speed and Torque

SIGMA DynaTest continuously displays the power, speed and torque readings from the dynamometer both on meters and on the graph. The graph shows the power and torque characteristics of the engine.

You can customise the units and colours by right-clicking on the meters or graph.

Previous tests can be viewed graphically and compared against each other.

Reports

You can print a full or a summary test report, customised with your own logo.

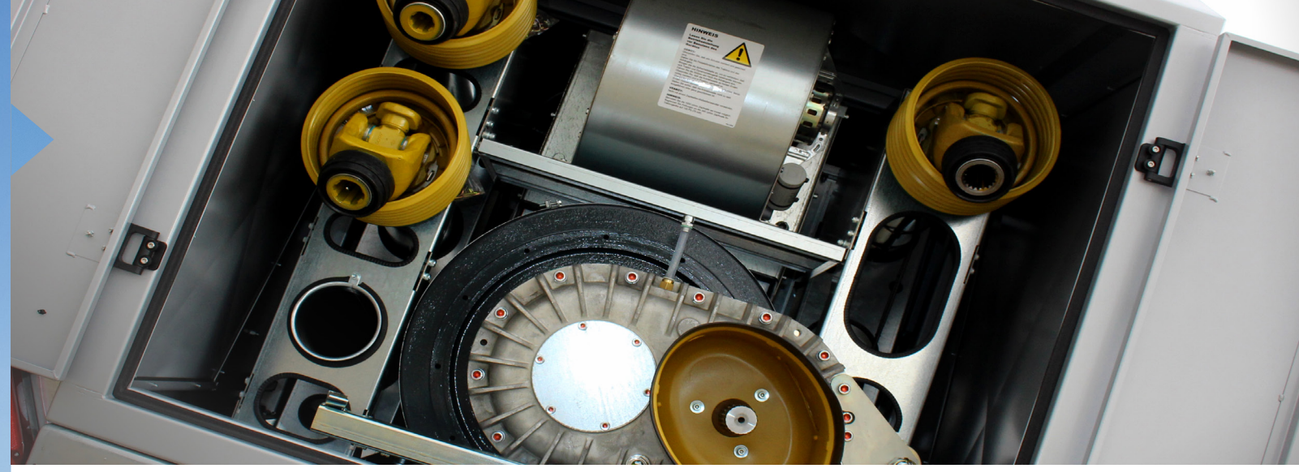
Using a Windows .pdf writer print driver you can save the report in .pdf format for emailing to your customer or tractor manufacturer.

Computer Requirements

To run the SIGMA DynaTest application your PC must be running a Windows™ Professional operating system.

Features and Benefits

- It's a manoeuvrable, self contained, air-cooled unit. No cooling water is required and there's no risk of contamination. The internal cooling fan reduces the operating temperature very quickly with no extended cool down period.
- Quiet and smooth operation.
- Accurate fault finding and diagnostics within routine servicing schedules, pre-delivery inspections and warranty problems.
- No need for the operator to have prior knowledge where maximum power and torque occur in the engines performance curve. Auto mode does the test for you with complete repeatability.
- It only requires a single-phase mains supply at 50Hz, 220-240V. Other voltages or frequencies are available on request.
- Low maintenance and minimal calibration required.
- Low start-up torque means engines from as little as 10 hp or up to 500 hp can be tested (SIGMA 50).
- Three different speed ranges. Tractor power take off speed range 270-1250 rpm. Remove the gearbox for direct drive range of 480-2200 rpm (optional removal tool is available).
- Supplied with all the necessary drive shafts to complement the dynamometer's performance.
- Five different test modes are standard: Automatic, Constant speed, Constant power, Direct load and Memory.
- The intelligent hand-held has power, speed, torque and torque rise displayed on a large LCD screen and the standard 10m lead lets you do the test in the tractor cab if required. Operating and correct testing instructions are accessible by using the built-in help facility.
- Internal software means no additional computer is required to calculate torque, torque rise or to produce performance graphs.
- Inbuilt protection and detection keeps the user informed of dynamometer status.
- Four different languages are accessible in the set-up menu: French, German, Danish and English.
- DynaTest software, operating on Windows™ professional, allows you to use your computer to operate SIGMA and lets you store all of the test data for future reference.
- Available as a static unit for workshop use or trailer-mounted for mobile use. The mobile unit is fully road legal with overrun brakes and lighting.
- Used by leading manufacturers, for the development of new products and the training of service and sales personnel.
- Froment Dynamometers are regarded as the industry standard.



Technical Data

The frame of the dynamometer is constructed from 2mm 'Zintec' steel, folded and welded to form a monocoque construction.

Recessed doors allow easy access to the separate enclosures for control, power connections and maintenance.

A 4 pole 2-bearing brushless alternator complete with fan assisted forced air cooling enables high-torque operation over a wide speed range.

The gearbox is custom made to Froment specification from aluminium and has hardened steel helical gears. The gearbox is easily removed with the optional removal tool to enable engine speed testing.

The discharge duct contains stainless steel strip resistive load elements and the cooling fan. The hot air outlet door has an interlocking feature inhibiting load application and warns the operator if the door is not opened.

A stainless steel mesh screen on the outlet provides protection against access to hazardous parts to IP1X.

All electrical enclosures are to IP54.

Mobile versions are supplied with a twin axle braked four wheel trailer with 4 stud 4.5J x 13 pressed wheels and tubeless 165R13C radial ply tyres with rubber trailing link with rubber trailing link independent suspension that can be towed behind a car or commercial vehicle.

The main chassis is constructed from formed 3mm and 5mm steel and the floor from 1.6mm steel. The whole chassis is hot dipped galvanised after fabrication.

Two prop stand jacks are provided at the rear of the trailer and a jockey wheel on the a-frame where an ISO 50mm ball coupling with hydraulic dampened overrun brake actuator is located and a manual hand brake which has an energy store to operate the auto reversing brakes.

Trailer lighting includes brake, tail, side marker, direction flashing, reversing and fog lights. Reflective triangles incorporated in the rear light combination units.

Static models are fitted to a heavy duty fork pocket fork pocket constructed hot hot dipped galvanised base made from formed 3mm and 5mm steel.

Finish

High quality two-pack industrial acrylic paint system applied to an electro-plated zinc base and low-bake finish.

Standard colour is Aluminium Silver (RAL9006). Other colours are available on request.

Auxiliary Supply

The fans and control circuit are powered from an external 13 or 16 amp single phase 220-240 Volt 50Hz/60Hz supply.

An IEC 60309-2 plug is mounted in the control enclosure with a 10m power cable and UK or Euro plug.

Protection

An emergency stop/disconnect switch gives full isolation of the fan and control supply.

A 220 Volt AC control circuit transformer provides isolation and operator safety.

Stop/start buttons ensure the dynamometer will not automatically restart.

The fan motors are fully protected with fuses and overloads. Thermal detectors are fitted to the alternator and load bank to protect against over heating.
On initial start-up the dynamometer performs a self-test to check all systems and calibration. If a fault is found this is displayed on the Intelligent Hand-held Terminal.

Optional Accessories

DynaTest PC software • Direct drive coupling

Optional PTO Shafts

1 3/8" 6 spline.
1 3/8" 21 spline.
1 3/4" 20 spline.
2 1/4" 22 spline (Sigma 60 only)
1 3/4" 6 spline.

Speed Range and Capacities

SIGMA 50 will test up to 515PS (380kW) and fully torque test a typical modern tractor up to 350PS (260kW). SIGMA 60 will test up to 680PS (500kW) and fully torque test a typical modern tractor up to 500PS(370kW).

Mode	Maximum Power (SIGMA 50)	Maximum Power (SIGMA 60)	Torque (SIGMA 50)	Torque (SIGMA 60)
PTO (270-1250rpm)	515PS(380kW) at 1000rpm	680PS(500kW) at 1000rpm	3170Nm at 800rpm	4150Nm at 800rpm
Direct (480-2200rpm)	515PS(380kW) at 1800rpm	680PS(500kW) at 1800rpm	1790Nm at 1400 rpm	2340Nm at 1400 rpm

Dimensions and Weights

	Mobile 50	Mobile 60	Static 50	Static 60
Weight	1780kg	1980kg	1460kg	1660kg
Height	1729 ± 25mm	1729 ± 5mm	1791 ± 5mm	1791 ± 5mm
Width	1850 ± 25mm	1850 ± 25mm	1350 ± 10mm	1350 ± 10mm
Length	3700 ± 50mm	3700 ± 50mm	2456 ± 10mm	2456 ± 10mm

Testing, Standards and Warranty

Functional operation and load tests are completed on all SIGMA Dynamometers, before despatch, in line with our ISO 9001:2008 procedures. Froment SIGMA Dynamometers comply with international standards and are CE marked to confirm compliance with both the EMC and Low Voltage Directives. The equipment is covered by a 12-month warranty as detailed in our Conditions of Trade.

N J Froment & Co Ltd
Easton-on-the-Hill
Stamford, PE9 3NP, UK
T: +44 (0)1780 480 033
E: froment.sales@ascopower.com
W: www.fromentdynamometers.com