

# powertek™

## Three Cylinder Dynamometer

Each system is based on a three cylinder water cooled engine, mounted on a painted steel frame. The engine assembly includes a radiator, fan and water pump for cooling purposes. An electric starter motor, battery and alternator are also included.

The engine is loaded by the eddy current dynamometer, which is mounted on the same frame as the engine and directly coupled to it. The dynamometer is capable of providing a completely variable load on the engine. The torque produced is measured by a load cell connected to the dynamometer. From the torque measurement and the engine speed the power produced by the engine

can be calculated and displayed on a computer

An operator control box contains the controls required to start the engine and to enable and vary the load. The engine throttle is cable driven with a Vernier control located adjacent to the control box.

The fuel tanks are installed under the frame. The gasoline version has one five gallon aluminum tank. The diesel version has a single tank for diesel fuel. Also located under the frame are enclosures for the electrical and electronics systems.

The complete engine and dynamometer are enclosed underneath a safety

cover which protects the users, while still providing visibility of the components. The cover is safety interlocked with the engine ignition system.

A comprehensive instrumentation package is provided as standard, including fuel flow, cylinder pressure, engine speed, torque, cooling water flow, exhaust back pressure. Multiple thermocouples are provided to measure the temperature of the cooling water, inlet manifold, individual cylinder exhaust gas, oil, engine block, etc.

The system includes software for displaying and logging the data on a Windows™ LabVIEW™ Software with National Instruments Acquisition Cards (computer not supplied). Computer Control allows the engine to be operated from a remote location.



3 Cylinder Gasoline Dynamometer



3 Cylinder Diesel Dynamometer

### Ordering Specification

- A water cooled three cylinder internal combustion engine, complete with all services and instrumentation to allow the engine to be evaluated in a laboratory environment.
- The unit includes a variable load dynamometer, which directly measures the power and torque produced by the engine.
- Combustion pressure indicator to provide calculated indicated horsepower and also allow P/V diagrams
- The engine, dynamometer, fuel tank(s),

battery etc. are all mounted on a self-contained steel frame of painted and welded construction. The frame is designed to be easily moved.

- The basic engine runs on gasoline. As an optional accessory kit, the same engine can also be run on natural gas (NG) or liquid petroleum gas (LPG).
- Model PT-350. The engine is run on diesel fuel. The standard instrumentation package monitors fuel flow, inlet air flow and temperature, exhaust back pressure and temperature, torque, rotational speed, cooling water inlet and outlet

temperature and cooling water flow rate. The parameters are displayed in real time on a (customer supplied) personal computer.

- The LabVIEW™ software supplied includes extensive data logging, analysis and graph plotting facilities, plus full instructions on operating the equipment and performing the investigations.

Designed for  
Educational Investigations  
into Engineering,  
Thermodynamic &  
Environmental Principles

### Features

- GDJ Test Stands use gasoline as the standard fuel with options available for alternative fuels of natural gas and liquid petroleum gas
- The Diesel single cylinder is a diesel fuelled engine with a virtually identical engine block
- LabVIEW™ software for data capture and analysis
- Combustion Pressure for P/V diagrams and calculate indicated horsepower
- Water cooled three cylinder engines
- Variable load dynamometer
- Comprehensive instrumentation
- Easy to install, portable units
- Optional computer control of engine allows students to operate the engine and retrieve data from remote location!

### Educational Capabilities

- Multiple Cylinder Engine Training System, generating characteristic torque, power and fuel consumption curves under different conditions
- Thermodynamic investigations of internal combustion engines, with ability to measure real time cylinder pressures and temperatures
- Environmental investigations of different fuels



## Other Classroom Aids from GDJ, Inc.

### Physics Coaster

A new, innovative teaching tool that will capture your student's imagination and make learning physics, engineering, and mathematics concepts both fun and challenging.

### Flotek Wind Tunnel

Research Grade Wind Tunnels let your students move beyond demonstration, to true application. Three different sizes and many options.

### Crash Tester

Allows students to conduct the same impulse momentum experiments that highway safety experts and automotive design engineers do.

### Engine Dynamometers

Available in Gasoline, Alternative Fuels, Diesel Internal Combustion Engines or Gas Turbine Engine. **Also available in single cylinder internal combustion engine.**

For full details on this and other GDJ Products see us at [www.gdjinc.com](http://www.gdjinc.com)

Shown with protective cover in place.



## Engine Performance Specification

### – Gasoline

No of Cylinders.....	3
Bore x Stroke.....	68mm x 64mm
Displacement.....	697cc
Gross Power (nominal).....	17.5 kW (23.5 hp)
Gross Torque (nominal).....	50 Nm (38.6 ftlbs)
Electric Starter.....	0.8 kW
Alternator.....	40A

### – Diesel

No of Cylinders.....	3
Bore x Stroke.....	68mm x 64mm
Displacement.....	697cc
Gross Power (nominal).....	14.5 kW (19.5 hp)
Gross Torque (nominal).....	44 Nm (32.5 ftlbs)
Electric Starter.....	1.0 kW
Alternator.....	40A

## Instrumentation & Controls

### Instrumentation

- Inlet manifold temperature – One
- Individual cylinder exhaust gas temperature – Three
- Cooling water inlet temperature
- Cooling water outlet temperature
- Cooling water flow
- Oil pressure
- Oil temperature
- Ambient temperature
- Measured torque
- Engine speed
- Gasoline fuel flow rate (Diesel on Diesel Engine)
- Alternative fuel flow rate (Optional on LPG or NG)
- Inlet manifold pressure for estimating the air flow
- Real time cylinder pressure display

Note: Power is calculated from Measured Torque & Engine Speed

### Controls

- Fuel selected – Manual control from control box
- Vernier Control for Precise Movement
- Throttle – Cable controlled
- Choke – Cable controlled
- Exhaust back pressure valve – Manually controlled
- Brake load – On/Off controls at the control box. Braking load then controlled from computer

Note: Two methods of Brake Load control are available via the computer, a manual control which applies a percentage of full load, and a closed loop control which varies the load in order to maintain a pre-set speed. In closed loop control the operator has full access to the PID control parameters.

## Installation Requirements

- The equipment should be installed in a well ventilated area.
- The engine exhaust may be connected to a duct pipe and vented external to the building.
- For exhaust ducts of greater than 20 feet (6m), a fan assisted duct is recommended. (The engine incorporates an adjustable exhaust back pressure valve and sensor to allow variations in installations to be compensated for).

## The following services are required:

- Model PT-300 thru 350 – 220V, 60Hz, single phase electricity supply
- Model PT-320 & 330 – Natural gas supply, between 150mm and 350mm water gauge

## Essential Additional Equipment

- The user must have access to a PC running Windows™ 98/XP.
- It is recommended that the user has access to a barometer for measuring air pressure.

## Shipping Specification

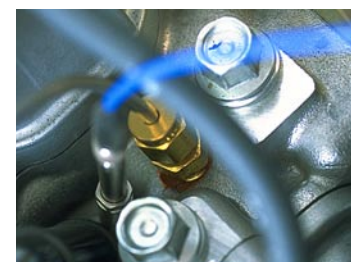
Gross Weight. 1124 lbs (510 kg)

Volume: 99 cubic feet  
(2.9 cubic meter)

## Overall Dimensions

Height	60 inches
Width	55 inches
Depth	32 inches

Combustion Pressure Sensor which allows you generate P/V Diagrams and calculate indicated horsepower



Your Local Rep:



**GDJ INC.**  
7585 Tyler Boulevard  
Mentor, OH 44060  
440/975-0258 • fax 440/918-0407  
sales@gdjinc.com • www.gdjinc.com