

Engine Test Bed

TH-3128

This Engine Test Bed is a self-contained compact unit designed for easy installation and bench mounting. The test set is supplied with, as standard, a diesel engine which is a single cylinder, four stroke; spark ignited and air-cooled. This is a typical small engine commonly used in various industrial and domestic applications throughout the world. The engine and dynamometer are carried on a solid steel base plate resiliently mounted within a steel framework. Included within the framework are the fuel system, which incorporates a fuel tanks and valves, and the air induction system. The instrumentation and control panel are mounted on the front frame.

Two additional engines, a small capacity four-stroke petrol engine and a higher capacity four-stroke diesel engine, are supplied and they are easily interchangeable with the standard engine to enable characteristics comparisons on different types of engine. These two alternative engines are both air-cooled single cylinder engine type. The engines are supplied with proper adaptors for measuring of temperature at exhaust and lubrication oil tank.



Experiments

- Engine performance curve at full and partial load
- Engine efficiency and fuel consumption variation with speed and load
- Determination of the following engine parameters at different speed:
 - Engine torque
 - Brake power
 - Volumetric fuel consumption
 - Specific fuel consumption
 - Air flow rate
 - Air-to-fuel ratio
 - Volumetric efficiency
 - Brake mean effective pressure (BMEP)
- PV Diagram (optional)

Specification

Dynamometer

The main function is to provide the drive or brake power necessary to study the selected driving or driven machine. This power is generated by a water-cooled asynchronous motor with a frequency converter. The asynchronous motor operates as a generator or a motor, as required. As a generator, it acts as a brake on the engines, in this case engine diverts the energy.

Test Stand

This test stand measures the power output of internal combustion engines delivering up to 2.2kW. The complete test stand consists of three main elements: The assembly for mounting of the engine and as a control unit, the dynamometer as a load unit and a choice of engine.

The main function of test stand is to mount the engine, supply it with fuel and air and record and display relevant measurement data. The engine is mounted on a vibration-insulated base plate and connected by way of an elastic claw coupling.

The Engines

There are different types of engine for this Engine Test Bed equipment, which may be easily interchanged each other to enable the characteristics of different engine types to be compared:

Technical Data

Eddy current dynamometer

Rated Generation Power: 10kW
 Rated braking torque: 50 Nm
 Rated maximum speed: 13000 RPM
 Measuring accuracy
 Torque: +0.2~0.3% Fs
 Speed: +1rpm
 Coolant : Water Cooled
 Coolant type: Tap Water
 Elastic Claw couple

Eddy current dynamometer controller

Controller type: Active mode control
 Mode of controls: Constant speed, constant torque & constant power
 Controller display: Digital LCD panel
 Controller setting: programmable PID
 Output current: 5A
 Protection: Engine stall, over load and water

Air inlet pipe

Pipe ID : 54.8 mm
 Airflow meter range : 0~10 m/s
 Air temperature range: 0~100°C
 Air consumption: 20~350L/min

Fuel Tanks

Number of fuel tank: 2
 Capacity : 5 Litre each
 Fuel temperature range : -100~400°C
 Fuel consumption: 0~60cm³/min
 Weighing balance : 10kg, graduation:0.1gm
 (Stopwatch for fuel consumption measurement)

Engines

Single Cylinder Four-Stroke Gasoline Engine (Spark Ignited)

Model: TH-3128-1

Displacement: 273 cc (approx)
 Maximum output: 5.5kW/4000 rpm
 Maximum torque: 13.7Nm/2800 rpm
 Fuel : Unleaded Gasoline
 Compression Ratio: 6.3:1
 Cooling system: Forced air cooling
 Lubrication: Splashing type
 Lubricant: Automotive lubricating oil (API/SE or higher grade, SAE/10W-30)
 Carburetor: Horizontal draft, float type

Single Cylinder Four-Stroke Diesel Engine (Compression Ignited)

Model: TH-3128-2

Displacement: 347 cc (approx)
 Compression Ratio: 21.5:1
 Maximum output: 5kW/ 3000 rpm
 Injection system: Direct injection
 Fuel: Automotive Diesel Fuel
 Cooling system: forced air cooling
 Lubricant: Automotive lubricating oil (SAE #30)

Single Cylinder Four-Stroke Gasoline Engine with Variable Compression (Spark Ignited) (optional)

Model: TH-3128-3

Displacement: 273 cc (approx)
 Maximum output: 5.5kW/ 4000 rpm
 Maximum torque: 13.7Nm/ 2800 rpm
 Fuel : Unleaded Gasoline
 Compression Ratio: 10:1, 8.5:1, 5.5:1, 4:1, (Original 6.3:1)
 Ignition timing adjustable in 11 stages 10° after TDC to 40° before TCD
 Cooling system: Forced air cooling
 Spark Plug: NGKBP-6HS (Recommended)
 Lubrication: Splashing type
 Lubricant: Automotive lubricating oil (API/SE or higher grade, SAE/10W-30)
 Carburetor: Horizontal draft, float type

Single Cylinder Two-Stroke Gasoline Engine (Spark Ignited) (optional)

Model: TH-3128-4

Displacement: 80 cc (approx)
 Maximum output: 2kW/ 6000 rpm
 Fuel : Unleaded Gasoline
 Compression Ratio: 6:1
 Cooling system: Forced air cooling
 Ignition system: CDI
 Lubrication: Splashing type
 Lubricant: Motor cycle synthetic two stroke oil

Accessories (optional)

If PV is Selected: Transducers for Engine Cycle Analyzer with Cylinder Head Pressure Transducer and Crank Angle Encoder

Electronic Engine Indicating System (optional)

Model: TH-3128-5

Measuring amplifier: amplification factor 10mbar/mV
 TDC sensor trigger distance: 1mm
 230V, 50Hz, 1 phase
 230V, 60Hz, 1 phase

Pressure Transducer for Engine (optional)

Model: TH-3128-6

Measuring range: 0~300bar

Maximum allowable pressure: 0~350bar

Sensitivate: -30pC/bar

High natural frequency: $\geq 65\text{kHz}$

Operating temperature: -40~400°C

Crank Angler Encoder (TDC sensor) (optional)

Model: TH-3128-7

Suitable for start measurement

Speed range: 0~5000RPM

Crank angle signal: 0~360°

Graduation: 1°

Exhaust Gas Analyzing Unit (optional)

Model: TH-3128-8

Working temperature: 5~45°C

Measuring ranges

CO: 0~20% vol.

Co2: 0~25% vol.

O2: 0~25% vol.

HC: 0~5000ppm vol.

Lambda: Petrol 0~17.64; Diesel 0~18.72

Accuracy classes 1 and 0

230V, 50Hz, 1 phase

230V, 60Hz, 1 phase

Exhaust Gas calorimeter (optional)

Model: TH-3128-9

Calorimeter

Insulated, stainless steel

Finned pipe heat exchanger

Heat exchange area on exhaust gas side: 1.169m²

Heat exchange area on water side: 0.164m²

Measuring ranges

Exhaust gas temperature: 2x -100~400°C

Water temperature: 2x -100~400°C

Flow rate: 4~36LPM

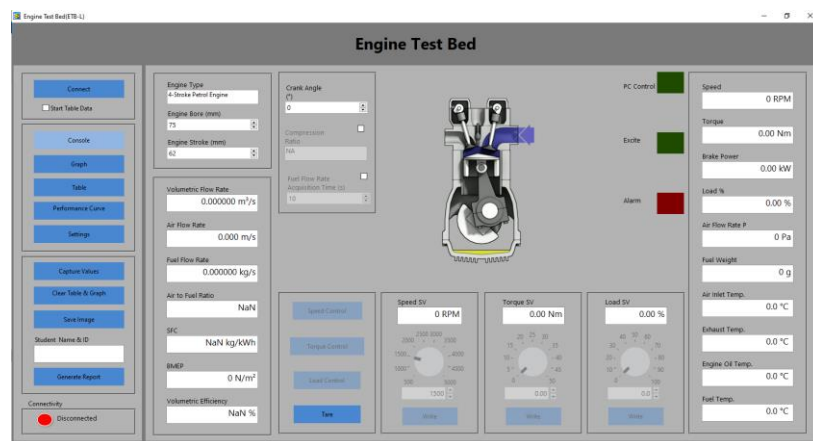
Indicator System (optional)

Digital storage oscilloscope for analog output
(for Non-DAQ PV system)

Or Software for DAQ and digital output

Software TH-3128SW (optional)

DAQ software specially designed in National Instrument™, LABVIEW™ environment to measure and calculate the results of apparatus. The software is optional and while using software a set of electronic sensors are included. Software can be run with any Windows™ environment.



Scope of Delivery

1 experimental unit

1 instructional manual