For

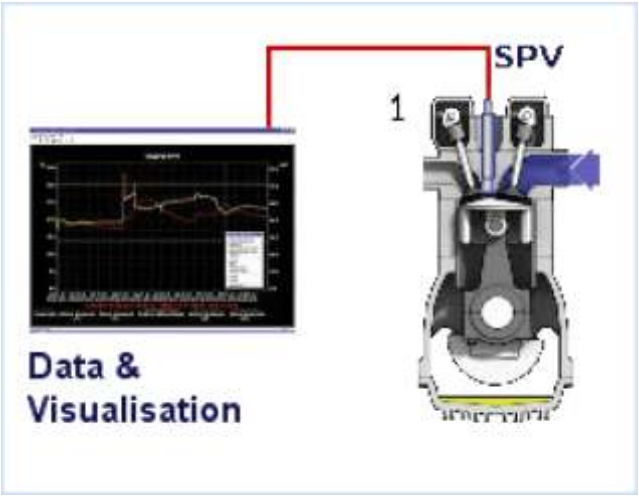
Order Code - 32719 : Single Cylinder Petrol and Diesel Engine Test Bed W/O DAQ
Order Code - 32719D : Diesel Engine W/O DAQ
Order Code - 32719P : Petrol Engine W/O DAQ
Order Code - 32720 : Single Cylinder Petrol and Diesel Engine Test Bed With DAQ
Order Code - 32720D : Diesel Engine with DAQ
Order Code - 32720P : Petrol Engine with DAQ

Features

- Designed for comprehensive analysis of performance of different automobile engines.
- Digital Instruments for measurement of parameters like fuel consumption, air flow, temperature and RPM etc.
- Demonstration of performance of Petrol & Diesel; Engines at different throttle settings & Loads.
- Optional dedicated 'Diesel Engine' or 'Petrol Engine' trainers available.
- Optional High Speed Data Acquisition system for performance monitoring.

Single Cylinder Petrol and/or Diesel Engine Test Bed Order Code : 32719-32720 designed to felicitate testing of different automobile engines. The test bed is complete with eddy current dynamometer and measuring instruments for measuring key engine parameters required for performance analysis of an engine. The test bed can be used for testing of both petrol & diesel engines of passenger cars, rated up to 80 kW.

The test bed consists of a water cooled eddy current dynamometer fixed on a heavy-duty steel frame. The test bed is designed in such a way that the engine to be tested can be quickly coupled to the dynamometer with minimum effort. The test bed is equipped with dynamometer control panel with necessary safety instruments. The Engines can be used for performance tests for different loads and speeds under various throttle opening conditions. The eddy current dynamometer provides a variable load on the engine, allowing the characteristic power and torque curves to be reproduced in the laboratory. The system comes complete with extensive instrumentation, including rpm measurement, torque (from which power can be calculated), plus various temperatures, Fuel Consumption, Air Consumption. Different optional accessories are available to integrate with the Engine Test Bed for comprehensive engine performance analysis. These include the exhaust gas



Note: Specifications are subject to change.

Tesca Technologies Pvt. Ltd.
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calorimeter (For Heat Balance Sheet), advance Data Acquisition System & P-V Diagram module for computerized testing.

Specifications

- Hydraulic Dynamometer: Capacity @ 10KW, Water Cooled (Optional) Eddy Current Dynamometer:
- Water Cooled Eddy Current Dynamometer
- Maximum Power: 10BHP @1500 rpm to 3000rpm
- Maximum RPM 1500 to 8000rpm
- Dynamometer Controller

Engines: Single Cylinder Four Stroke Petrol Engine

- Air Cooled, Spark ignited, recoil start
- Power Output: 8.7 kW (13 HP)
- Maximum Torque: 20Nm @ 2500 rpm
- Displacement: 589 cm3
- Bore: 100 mm
- Stroke: 75 mm
- Compression Ratio: 8.2:1
- Engine mounted on frame

Single Cylinder Four Stroke Diesel Engine

- Air Cooled, compression ignition
- Output: 6HP @ 3600rpm
- Torque: 25 Nm @ 1500 rpm
- Displacement: 665 cm3
- Bore: 87.5 mm
- Stroke: 110 mm

Note: Other Single Cylinder Engines can be supplied on request.

Calorimeter

Water Flow-rate Transmitter

- Wheel type
- Range: 0-2000 LPH
- Output: 4-20mA

Load cell

- Strain gauge type
- 'S' type
- Range: 0 to 150 kg
- Output: 3 mV/V
- Operating mode: Compression/Tension
- Threading: M10

Load cell transmitter

- Range: 0 to 250 Nm
- Output: 4 to 20 mA

Differential Pressure Transmitter

- Range: 0 to 255mmWC
- Output: 0 to 10v DC

Air velocity Transmitter

- Range: 0 to 10m/s
- Output: 0 to 10V DC

Level Sensor

- Range: 0 to 420mm
- Output: 4 to 20mA
- Temperature Sensors:
- Type: Resistive Type
- Model: Pt100

'Sci-Cal' DAQ software which stores all data and formulae for calculations, as well as record on excel sheets the accurate data as well as readings for the purpose of calculations.

DAQ device

- Analog Channels: 16 nos
- Digital Channels: 45 nos
- Air Box with Orifice plates for Air flow measurement.
- Coupling: Either Engines can be coupled at a time to the Hydraulic Dynamometer or Eddy
- Current Dynamometer
- Fuel Tank: Two separate tanks, each for Petrol & Diesel.
- Propeller shaft with protective covering.
- Measuring Instruments, (Optional) Sensors & Transmitters –
- Engine Digital RPM Meter or Optional Sensor & RPM transmitter
- Calorimeter (Optional)
- Water Flow rate Analogue or Optional Sensor based transmitter
- Optional Pressure Transmitter Sensor (P-Theta & P-V arrangement)
- Optional Encoder (P-Theta & P-V arrangement)
- Fuel Level Meter or Optional Sensors
- Optional Fuel Cell transmitters
- Temperature Indicator or Optional Sensors
- Optional Torque Sensor
- Load Cell
- Optional Load Cell transmitter
- Air Flow Measurement Meter or Optional Sensors & Transmitters
- Optional 'Data Acquisition Software with necessay Sensors
- Optional Data Interface Modules: a) Fast ADC b) Slow ADC
- Data Communication
- RS485 to USB Converter
- CD/DVD containing:
- DAQ Software

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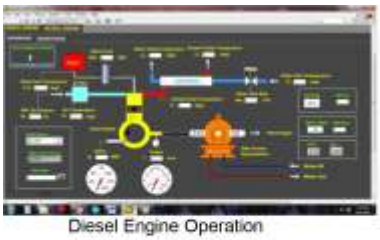
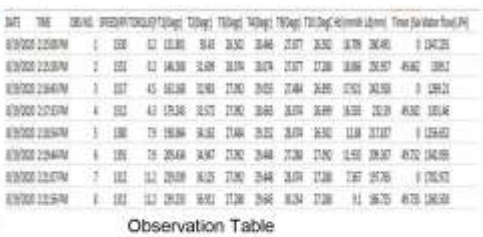
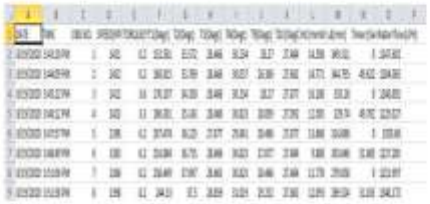
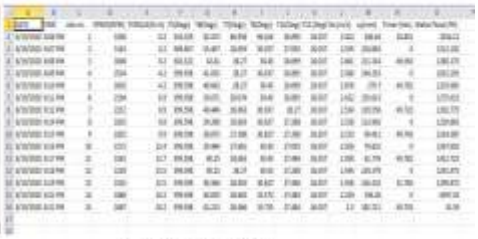

Diesel Engine Operation


Observation Table


Friction Power: (By William Line Method)


Petrol Engine Operation


Observation Table

Accessories

- Battery for starting the engines (Optional)
- Set of Anti Vibration Pads(Optional)
- Optional Auxiliary cooling unit for engine
- Exhaust Gas Calorimeter (Optional)
- Cooling Water Flow Transmitter
- Pipe In pipe type heat exchanger
- Thermocouples for water & gas temperature.
- DAQ based Software (Optional)
- Signal Converters
- P-V Diagram Module (Optional)
- Engine cylinder pressure
- Crank angle Encoder

Experiments

- Investigate Engine Performance at different Throttle Settings & Load conditions.
- Calculation of Mechanical Efficiency & Plot brake power versus mechanical efficiency.
- Measurement & Calculation of Volumetric efficiency.
- Measurement & Calculation of specific fuel consumption
- Measurement & Calculation of brake thermal efficiency
- Determining air / fuel ratios
- Heat Balance Test (With Optional Exhaust Gas Calorimeter)
- Study of P- q & P – V Diagram for Engine (With optional P-V Module & Data Acquisition System).

Auto Sci-Cal® Engine Cycle Analyzer Module AMECA (Optional)

Features

- Significantly enhances practical investigations, demonstrations and studies of internal combustion engines
- For use with Smaller capacity Engine Test Sets and Regenerative Engine Test Set and engines
- Factory fitted with suitable cylinder head transducers and crank angle encoders
- Includes powerful Windows based software specially designed for educational use
- Automatic calculation and real-time display of p-q plots and p-V plots and other important parameters
- Useful snap-shot, replay and animation functions
- Accurate, clear animations of crank, piston, inlet and exhaust valve positions help students visualise the engine cycle
- Ideal for student experiments, laboratory demonstrations or project work, Engine Cycle Analyzer enables students to investigate a variety of engine performance characteristics.

Students can export data for further analysis tesca AutoSci-Cal Engine Cycle Analyzer Module AMECA is a module with hardware and software to measure

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internal combustion engine cylinder pressure and crank angle.
Tesca AutoSci-Cal Engine Cycle Analyzer Module AMECA is a versatile module consisting of both hardware and software specially designed for educational use. It enables students to investigate the relationship between crank angle or volume and the cylinder pressure in an internal combustion engine. The equipment is primarily for use with engine test sets and engines but it can also be used with other engines fitted with compatible cylinder head transducers and crank angle encoders.
The equipment consists of a hardware unit with connectors and leads, plus Windows based data acquisition and analysis software. The hardware consists of a microprocessor-based signal conditioning unit with highspeed PC interface, housed in a rugged, protective enclosure. It accepts and conditions signals from the Cylinder Head Pressure Transducer and Crank Angle Encoder, pre-mounted on the engines. The cylinder pressure input includes a precision charge amplifier with a digital calibration. Crank angle position, the signal from the Crank Angle Encoder is also used to determine engine speed.
The output from the hardware unit connects to a computer (computer not included) running the Engine Cycle Analyser software. The hardware unit includes LED indicators to show the processor readiness, encoder top dead-centre position and PC communication status.
The software provides real-time display of pressure versus crank angle (p-q) and pressure versus volume (p-V) plots.
It performs calculations on the data to accurately display indicated mean effective pressure (IMEP) and indicated power for comparison with brake mean effective pressure (BMEP), and brake power to determine the mechanical efficiency of the test engine.
The software has useful snap-shot, replay and animation functions to help students visualise and better understand the engine cycle. The snap-shot and replay allow students to capture several engine cycles and study them using an animation showing the relative position of the crank, piston, inlet and exhaust valves. The software also allows students to create and recall engine configuration files for convenient entry of test engine data needed for calculations such as crank radius and engine swept volume. Data can also be exported to other software for further analysis.

Experiment Possibilities

Module AMESA allows investigations into a variety of internal combustion engine characteristics, including:

- The thermodynamic cycle of an internal combustion engine
- Calculation of indicated mean effective pressure and indicated power
- Comparison of indicated mean effective pressure and brake mean effective pressure
- Mechanical efficiency of the test engine
- Further work using exported data such as combustion analysis

Extra Ancillaries (fitted on engines)

- Cylinder Head Pressure Transducer
- Crank Angle Encoder

Recommended computer hardware:

- Intel® Pentium® 4 or equivalent processor operating at 2 GHz
- 512 MB of RAM
- SVGA monitor with 16-bit colour, 1024 x 768 resolution
- CD-Rom drive
- USB 1.1 or 2 port
- 500 MB of hard disc space
- Two-button mouse

Operating system:

- • Microsoft® Windows XP, Vista, Windows 7 and 8

Standard Features

- Supplied with comprehensive user guide
- Made in accordance with the latest European Union Directives

Requirements:

- Electrical supply:
- Single-phase a.c. 90 to 240 V, 50/60 Hz

Operating Conditions

- Operating environment: Well ventilated laboratory
- Storage temperature range: –25°C to +55°C (when packed for transport)
- Operating temperature range: +5°C to +40°C
- Operating relative humidity range: 80% at temperatures < 31°C decreasing linearly to 50% at 40°C

Required Services

- Electric Supply 230V 50Hz. With proper earthing.
- Tap Water supply & drainage.
- Water circulation at ambient temperature or cooling tower @ 100LPH
- Exhaust chimney
- Concrete foundation.

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