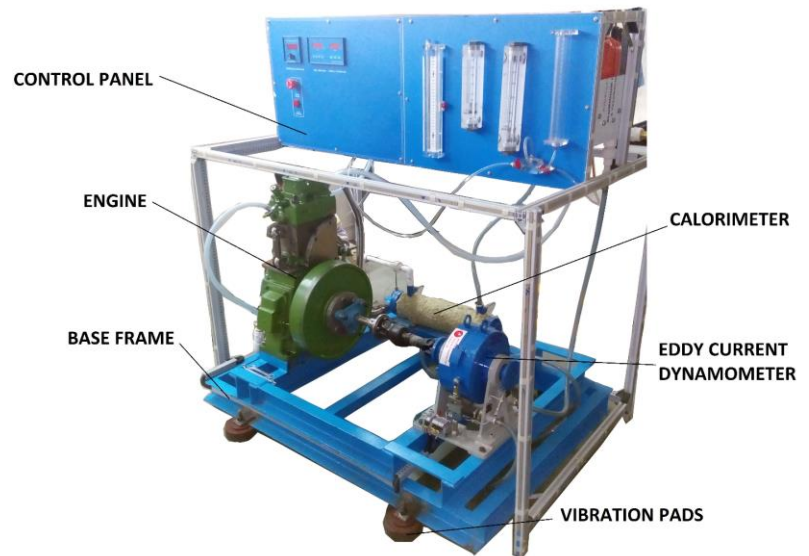


Automotive Single Cylinder Diesel Engine with Variable Compression Ratio



Model AM 216D



The air-cooled single-cylinder four-stroke diesel engine is identical in design to the four-cylinder engine. A modified cylinder head permits additional experiments with various combustion chamber inserts. To adjust the mixture composition, the carburetor was modified.

Sci-tech Air-cooled Single-cylinder Four-stroke Diesel with Variable Compression Ratio Engine Test Bed AM 216D is fitted with a special device to adjust the ignition timing - from advanced to retarded.

The engine includes a sensor to measure the exhaust gas temperature. The sensor, ignition cut-off and fuel supply are connected to the AM501 test stand.

SYSTEM DESCRIPTION

Components of System:

1. **Base stand** – It is made up of Mild steel structure as per the system configuration on which all components are mounted. "C-channels of 50x100 mm and Angles of 50x50 mm have been used. This is painted specially with powder coating
2. **Aluminum structure** – It is made up of extruded aluminum section of having cross-section 30x30 mm. A panel is mounted on the aluminum structure.
3. **Engine** – Engine is mounted on the base frame which is coupled to the eddy current dynamometer. This engine has the following specifications:



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No. of cylinders	1
No. of Strokes	4
Type of cooling	Water cooled
Fuel used	Diesel
Power	5 Hp / 3.7 KW
RPM	1500
Cubic Capacity	0.481 ltr
Bore diameter	87.5 mm
Stroke length	80 mm

4. **U Tube Manometer-** This trainer consists of a U-tube manometer made up of acrylic. It has 2 tubes, both being short at their bottom to measure suction pressure of engine for air. Manometer used in this setup has range of 0-300 mm. Scale provided with it makes it easy to take reading.

Specifications:

Range: 0-300 mm

No. of tubes: 2 tubes

Material: Acrylic



5. **Fuel Meter** –It is made up of acrylic and mounted on the main Panel on the right hand side. It is used to measure the fuel consumed by engine in particular time interval. It has got range of 0 to 230 ml. It is connected to the manifold through a mini ball valve which is used to control the flow

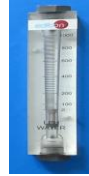


Specifications

Range: 0-230 ml

Material: Acrylic covered by metallic shield

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6. **Rotameter**– It is made up of acrylic block which is used to measure flow rate of water through calorimeter.

Specifications:

Range: 0-1000 LPH

Material: Acrylic

Pipe size inlet and outlet: 12.5 x12.5 mm

7. **Rotameter** : This Rotameter is use for measure the water supply in engine jacket

Specification:

Range: 0 to 3000 LPH

Material: Acrylic

Size:25.4x25.4 mm

8. **Calorimeter** –It is mounted on the base frame and powder coated. It is a shell and tube type heat exchanger in which exhaust gas exchanges heat with water. It is to measure heat of exhaust gas. Temperature sensors are mounted on it to measure the temperatures of the exhaust gas.

Specifications:

Type of Heat exchanger: Shell and Tube

Hot Fluid: Exhaust gases

Cold Fluid: Water

Pipe Size inlet and outlet: 19mm



9. **Load Cell Unit:** Load cells are differential type transducers which give the readings according to their displacement. They made of anodized aluminum having a shape of

English alphabet "S". The output generated by the load cell can be directly read from the load indicator. The load cell arrangement is done as shown in the photo. Tension type of the load cell is used for measuring the load given to the dynamometer. The load cell indicator is given on the control panel with the zero setting buttons such that we can adjust zero for measuring the load given to the dynamometer.

Specifications:

Capacity: 150 Kg
Accuracy: 0.01 Kg
Button: Set zero and span with converter
Type: Compression and tension (S type)



10. **Temperature Sensors and Indicator** – They are 3 wire temperature sensors with 3 inch stainless steel probe and 1 m cable length. They are used to measure the temperature and connected to the temperature indicator which shows the reading in unit °C

Specifications:

Element Type: Platinum
Diameter: ¼ inch
Resistance at 0° C: 100 ohms
Fitting Material: Stainless Steel



11. **Rpm Sensor and Indicator**- It is a inductive proximity sensor which is used to measure the rotation per minute of the shaft. It is robust in construction and detects the rotation of the screw mounted on the shaft. Output of RPM sensor is given to RPM indicator which shows the angular speed of the shaft in RPM.

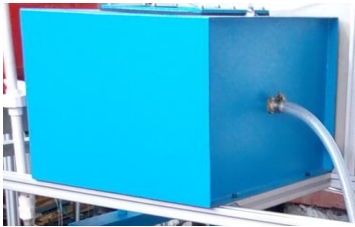
Specifications:

Type: Inductive proximity (PNP type)
Range: Auto ranging (4 to 9999 RPM)
Accuracy: 0.05%

Sensor supply: 12 VDC, 30 mA
Operating temperature: 0 to 50 °c
Humidity: 95% RH



12. **Air tank** – It is made of mild steel and powder coated. An orifice is provided on one side and the other side is connected to engine air suction through a flexible hose. It is mounted on the aluminum structure. A pressure tapping is provided on it to measure the mass flow of the air sucked by engine



Air Tank

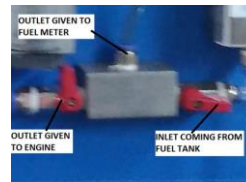
13. **Manifold** - It is made of acrylic block with 1 inlet and 2 outlet. It takes fuel from its inlet from fuel tank and gives it to fuel meter from its outlet. Ball valves are provided for that reason.

Specifications:

No of ports: 3

Size of fitting: ¼ inch

Material: Stainless steel



- 14.



Eddy current dynamometer:

A dynamometer, or “dyno” for short, is a machine used to measure torque and rotational speed (rpm) from which power produced by an engine or any other rotating prime mover can be calculated.

Dynamometers are used for measurement of brake power. To measure brake power, the engine torque and angular speed have to be measured.

The rotor is driven by the engine under test by .mechanical,

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hydraulic or electromagnetic means. The rotor is coupled to the stator. For each revolution of the shaft, rotor covers the distance $2 \times R \times F$ against coupling force F .

Work done = $2 \times R \times F$

15. **Vibration Pads** – These are anti-vibration mountings which are round in shape. These are fitted to the base frame with nut bolting.
16. **Piping:** Piping is done in UPVC and flexible hose. The ball valves are provided to control the flow rate.



Note:

- 1) **Specifications of Engines can be provided as per customer requirements.**
- 2) **Computer interface & DAQ software can be offered against specific requirements.**

Specifications, Photos and design subject to changes without any notice