



Single cylinder, Four stroke, VCR, Multi-fuel with Open ECU for Petrol mode



## Description

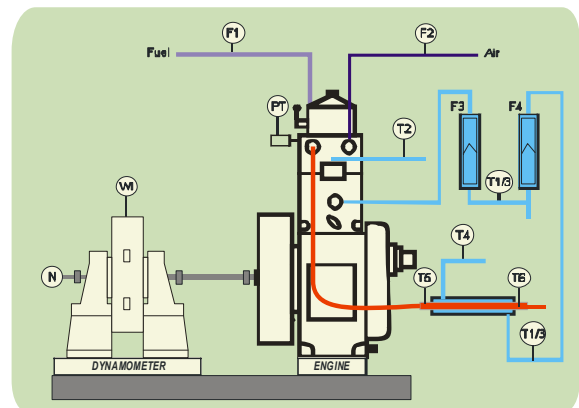
The setup consists of single cylinder, four stroke, VCR (Variable Compression Ratio) Research engine connected to eddy current dynamometer. It is provided with necessary instruments for combustion pressure, crank-angle, airflow, fuel flow, temperatures and load measurements. These signals are interfaced to computer through high speed data acquisition device. The set up has stand-alone panel box consisting of air box, twin fuel tank, manometer, fuel measuring unit, transmitters for air and fuel flow measurements, process indicator and piezo powering unit. Rotameters are provided for cooling water and calorimeter water flow measurement.

In petrol mode engine works with programmable Open ECU, Throttle position sensor (TPS), fuel pump, ignition coil, fuel spray nozzle, trigger sensor etc. The setup enables study of VCR engine performance for both Diesel and Petrol mode and study of ECU programming.

Engine performance study includes brake power, indicated power, frictional power, BMEP, IMEP, brake thermal efficiency, indicated thermal efficiency, Mechanical efficiency, volumetric efficiency, specific fuel consumption, Air fuel ratio, heat balance and combustion analysis.

## Features

- Changing CR without stopping the engine
- Study of Open ECU
- Performance optimization with ECU programming
- Diesel and Petrol operation
- Diesel injection point advancement
- Electric starting arrangement
- P $\theta$ -PV plots, IP, IMEP, FP indication
- Combustion analysis



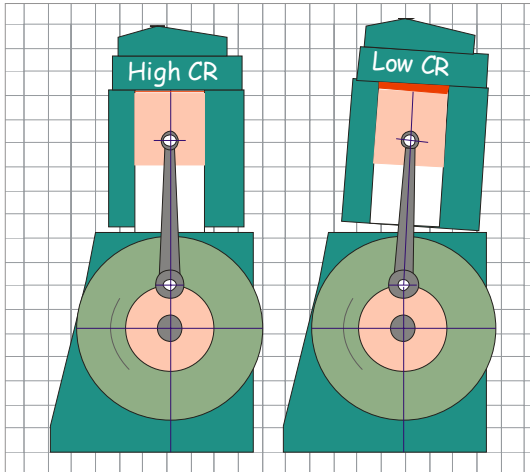
## Instrumentation

Product is supplied with best quality instruments. The components like Open ECU (PE USA), Combustion pressure sensor (PCB Piezotronics, USA), Crankangle sensor(Kubler, Germany), Fuel flow transmitter(Yokogawa, Japan), Pressure transmitter(Wika, Germany), High speed data acquisition device (National instruments, USA) are of MNC grades.

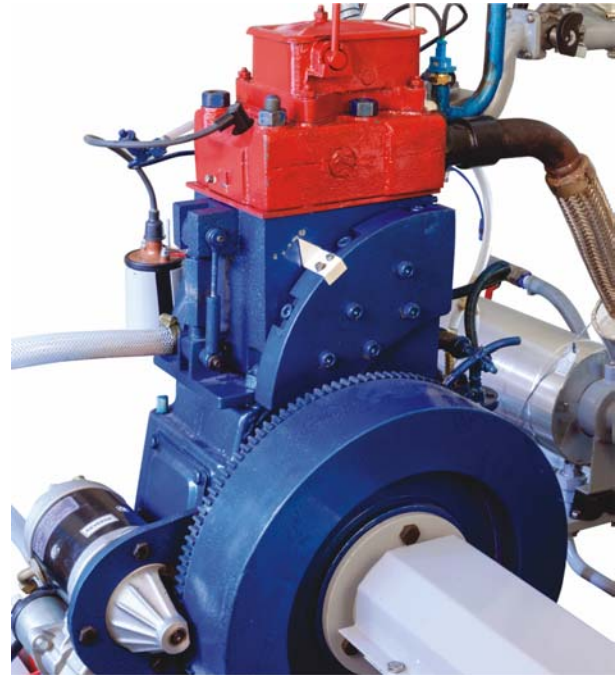


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## VCR Principle



Single cylinder four stroke, water cooled, Kirloskar engine modified to VCR Diesel and VCR Petrol. The compression ratio can be changed without stopping the engine and without altering the combustion chamber geometry by specially designed tilting cylinder block arrangement.



## Petrol mode

Throttle position sensor and fuel injector



Trigger wheel with trigger sensor



PE3 series ECU



Specifications subject to change without notice

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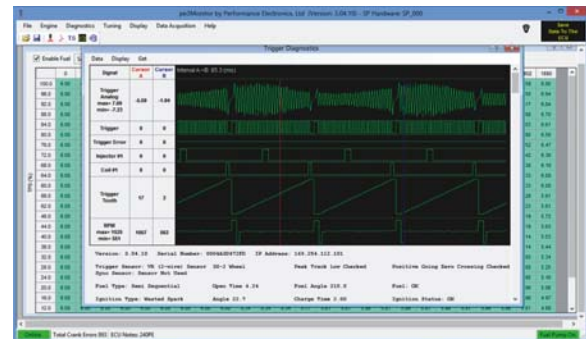
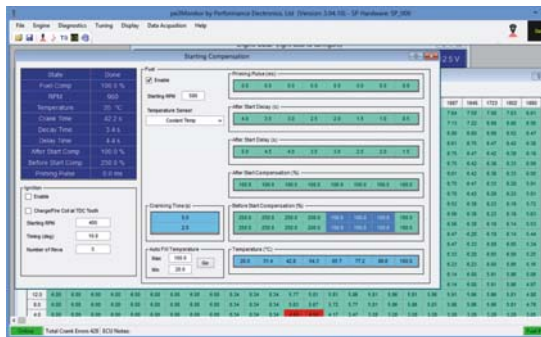
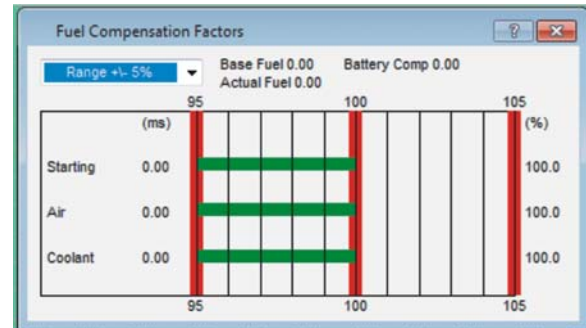
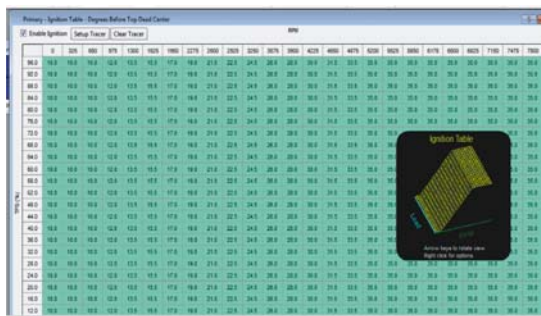
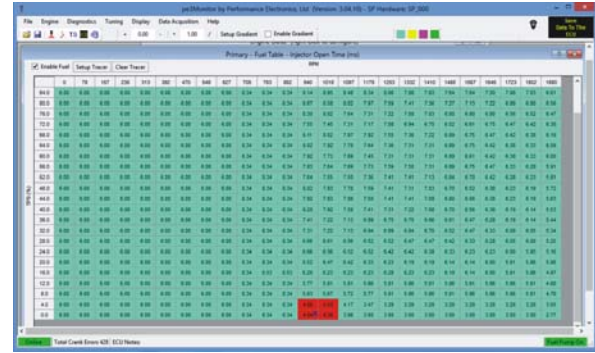
# Research Engine Test Setup (Computerised)...Code 240PE



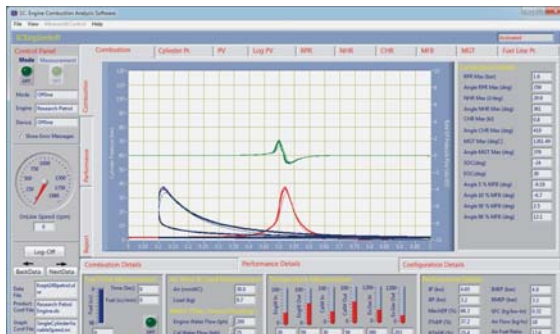
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## Open ECU

- Fuel Control with fuel table
- Barometric Pressure, Acceleration, Deceleration, Battery, Air Temp, Coolant Temp and Starting compensations
- Adjustable injection timing control
- Adjustable ignition control
- Built in igniters
- Advanced diagnostic features
- Advanced tuning software
- Ethernet connection



## Software



EngineSoft is Labview based software package developed by Apex Innovations Pvt. Ltd. for engine performance monitoring system. EngineSoft can serve most of the engine testing application needs including monitoring, reporting, data entry, data logging. The software evaluates power, efficiencies, fuel consumption and heat release. Various graphs are obtained at different operating condition. While on line testing of the engine in RUN mode necessary signals are scanned, stored and presented in graph. Stored data file is accessed to view the data graphical and tabular formats. The data in excel format can be used for further analysis.



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## Specifications

Product	Research Engine test setup 1 cylinder, 4 stroke, Multifuel, VCR, Code 240
Engine	Make Kirloskar, Single cylinder, 4 stroke, water cooled, stroke 110 mm, bore 87.5 mm, 661 cc. Diesel mode: 3.5 KW@ 1500 rpm, CR range 12-18. Injection variation:0-25° BTDC Petrol mode: 4.5 KW@ 1500 rpm, Speed range 1200-1800 rpm, CR range 6-10,
VCR arrangement	CR change is accomplished with special features as below <ul style="list-style-type: none"> <li>• The compression ratio can be changed without stopping the engine.</li> <li>• Without changing the combustion chamber geometry and cylinder head.</li> <li>• It is furnished with specially designed tilting cylinder block mechanism.</li> </ul>
Dynamometer	Type eddy current, water cooled with loading unit
Propeller shaft	Make Hindustan Hardy with universal joints
Air box	M S fabricated with orifice meter and manometer
Fuel tank	Capacity 15 lit, Type: Duel compartment with fuel metering pipe of glass
Calorimeter	Type Pipe in pipe
EGR	Water cooled, SS, Range 0-15% (Diesel mode)
ECU	Make PE USA, Model PE3, full build, potted enclosure. Includes peMonitor & peViewer software
Piezo sensor	Make PCB USA, Combustion & Diesel line : Range 350Bar with low noise cable
Crank angle sensor	Make Kubler Germany, Resolution 1 Deg, Speed 5500 RPM with TDC pulse
Data acquisition device	Make NI Instrument USA, NI USB-6210, 16-bit, 250KS/s
Temperature sensor	Make Radix, Type RTD, PT100 and Thermocouple, Type K
Temperature transmitter	Make ABUSTEK USA, Type two wire, Input RTD PT100, Range 0–100 Deg C, Output 4–20 mA and Type two wire, Input Thermocouple
Load sensor	Make VPG Sensotronics, Load cell, type strain gauge, range 0-50 Kg
Fuel flow transmitter	Make Yokogawa Japan, DP transmitter, Range 0-500 mmWC
Air flow transmitter	Make Wika Germany, Pressure transmitter, Range (-) 250 mmWC
Software	“Enginesoft” Engine performance analysis software
Rotameter	Make Eureka, Engine cooling 40-400 LPH; Calorimeter 25-250 LPH
Pump	Make Kirloskar, Type Monoblock
Overall dimensions	W 2000 x D 2500 x H 1500 mm

## Our other products

- Computerised VCR (Variable compression ratio) engine setup with eddy current dynamometer.
- Computerised 1 cylinder, 4 stroke, Diesel with eddy current dynamometer.
- Computerised 2 cylinder, 4 stroke, CRDI Diesel with eddy current / Hydraulic dynamometer.
- Computerised 4 cylinder, 4 stroke, CRDI Diesel with eddy current dynamometer.
- 4 cylinder, 4 stroke, CRDI Diesel with eddy current dynamometer.
- Computerised 1 cylinder, 4 stroke, Petrol with eddy current dynamometer.
- 3 cylinder, 4 stroke, Petrol with eddy current dynamometer.
- Computerised 3 cylinder, 4 stroke, Petrol with eddy current dynamometer.



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