CRDI VCR Engine Test Setup (Computerised)...

Code 244

Single cylinder, CRDI with EGR and Open ECU

Description

The setup consists of single cylinder, four stroke, CRDI VCR (Variable Compression Ratio) 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 engine cooling water and calorimeter water flow measurement. CRDI VCR engine works with programmable Open ECU for Diesel injection, fuel injector, common rail with rail pressure sensor and pressure regulating valve, crank position sensor, fuel pump and wiring harness. The setup enables study of CRDI VCR engine performance with programmable ECU at different compression ratios and with different EGR. 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

- Performance optimization with Open ECU
- Tests at different CR and EGR
- Plotting of Torque and Power Curves
- Determination of Specific Fuel Consumption
- Determination of Volumetric Efficiency and Air – Fuel Ratio
- Determination of Mechanical Efficiency
- Determination of the Frictional Power
- Heat Balance Sheet
- Performance Test under different Load
- PO and PV Diagram
- Combustion analysis

Instrumentation

Product is supplied with best quality instruments. The components like Open ECU (Nirai7r Sweden), 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.
Single cylinder, CRDI with EGR and Open ECU

**VCR Principle**

![Diagram illustrating high and low compression ratios](image)

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

**Fuel rail and fuel injector**

![Fuel rail and fuel injector](image)

**Nira i7r ECU**

![Nira i7r ECU](image)

**Crank trigger wheel with trigger sensor**

![Crank trigger wheel with trigger sensor](image)

**Cam trigger wheel with trigger sensor**

![Cam trigger wheel with trigger sensor](image)

Specifications subject to change without notice

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Single cylinder, CRDI with EGR and Open ECU

**Open ECU**
- Closed loop control for idle RPM
- Demand speed control
- Closed loop fuel pressure control
- Start control
- Pilot injection
- Separation control among pilot injection
- Injection timing control
- Engine Performance optimization

**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.
## Specifications

<table>
<thead>
<tr>
<th>Product</th>
<th>CRDI VCR Engine test (Computerised) Code 244</th>
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<tbody>
<tr>
<td>Engine</td>
<td>Make Kirloskar, Single cylinder, 4 stroke, water cooled, stroke 110 mm, bore 87.5 mm, 661 cc. Power 3.5 KW @ 1500 rpm, CR range 12-18.</td>
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| VCR arrangement | CR change is accomplished with special features as below  
- The compression ratio can be changed without stopping the engine.  
- Without changing the combustion chamber geometry and cylinder head.  
- It is furnished with specially designed tilting cylinder block mechanism. |
| Dynamometer | Type eddy current, water cooled with loading unit |
| Propeller shaft | Make Hindustan Hardy, with universal joints |
| ECU | Model Nira i7r (with solenoid injector driver) with programmable ECU software and Calibration cable |
| Common rail | With pressure sensor and pressure regulating valve |
| Calorimeter | Type Pipe in pipe |
| EGR | Water cooled, SS, Range 0-15% |
| Injector | Type Solenoid driven |
| Piezo sensor | Make PCB USA, Combustion: 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 mm WC |
| Fuel tank | Capacity 15 lit, Type: Duel compartment, with fuel metering pipe of glass |
| Calorimeter | Pipe in pipe |
| Air flow transmitter | Make Wika Germany, Pressure transmitter, Range (-) 250 mm WC |
| Air box | M S fabricated with orifice meter and manometer |
| 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 research engine 1 cylinder, 4 stroke, VCR, multi-fuel with open ECU for petrol mode.  
- 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.