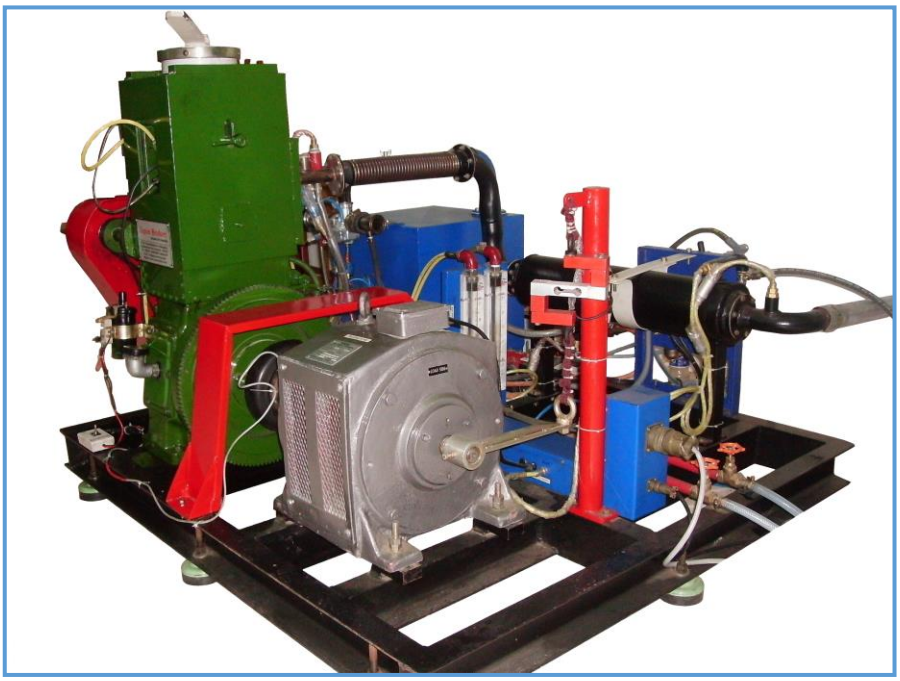
Computerized Variable Compression Ratio Petrol Engine Test Rig with GDI Open ECU and EGR (Product Code: CVCR01-OECU)



Features

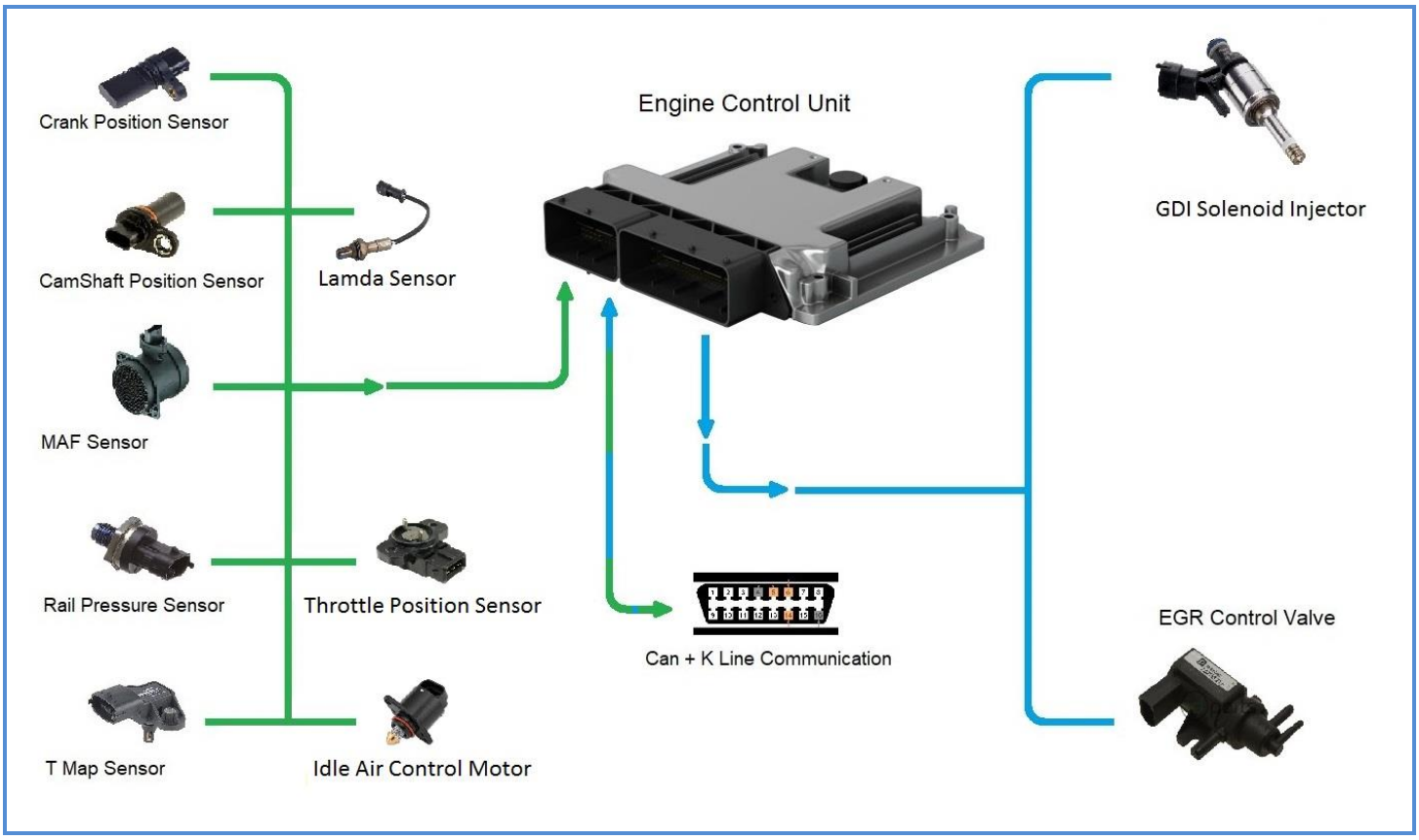
- GDI Open ECU- Engine performance enhancement for Petrol and alternative fuels
- Engine performance and combustion studies
- High Quality instrumentation
- Calculates BP, IP, FP, sfc, bsfc, BTE , Volumetric η & mechanical η
- PV and P-θ diagrams
- Mass Fraction Burnt
- Estimated End of Combustion Angle (EEOC)
- Calculates Gross IMEP
- Calculates Maximum Heat Release Rate
- Calculates Start of Combustion
- Calculates Combustion Duration and many more parameters

Product Description

The engine is mounted on Sturdy base frame. The base frame is fabricated with mild steel “C” channel. The engine and the dynamometer are coupled using standard tyre coupling. The air tank is fitted with a differential pressure sensor for measuring the Actual volume of air drawn into the cylinder. The thermocouple and necessary signal conditioner for the measurement of temperature at various points in the calorimeter are suitably provided. Liquid Level Sensor is used to measure the fuel flow consumption of the engine. Rota meter is used to measure the water flow of the engine and exhaust gas calorimeter. The load of the engine is measured using a load cell. The panel is fabricated with suitable SWG CR sheet and as per IS standard; the front portion of the panel is provided with provision for mounting computer, Printer, UPS and all instrumentations and signal conditioner related components. Power and control wiring are suitably marked using ferule for easy troubleshooting. The panel is finished with powder coating.

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GDI Open ECU with EGR



Components of GDI Open ECU with EGR

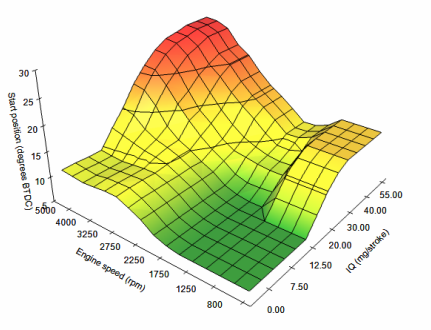
- Crankshaft position sensor (Measures crankshaft position)
- Camshaft position sensor - (Measures camshaft position)
- MAF Sensor - (Measures mass air flow)
- Rail pressure sensor - (Measures common rail pressure)
- T Map sensor - (Measures manifold temperature and pressure)
- Engine Control Unit - (To Measure sensors and control series of actuators on an internal combustion engine and ensure excellent engine performance)
- Petrol solenoid injector – (For fuel injection)
- EGR Valve - (Re-circulates controlled flow of exhaust gas into the intake)
- Can + K line - (For calibration and Troubleshoot)

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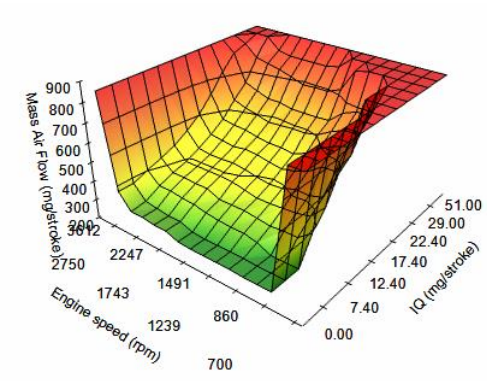
GDI Open ECU with EGR Functionality (Tunable Maps)

- Set idle Speed - (The user can set the required idle speed of the engine)
- Closed loop control for idling - (ECU controls the injection until engine idle)
- Start injection angle for homogeneous operation-(The user can set the start of injection angle as desired)
- End injection angle for stratified operation-(The user can set the end of injection angle)
- Start angle for spark ignition-(The user can set the spark timing)
- Injection Duration - (The user can set the Injection duration in terms of crank angle as desired)
- Open loop rail pressure - (This is an special feature in which an user can set the Injection Pressure in terms Bar, variable from 10 to 180 bar)
- EGR - (The user can set the EGR flow as desired)
- Calibration charts are provided for Injection Quantity at various pressure

MG/ST RPM	0.00	5.00	7.50	10.00	12.50	15.00	20.00	25.00	30.00	35.00	40.00	45.00	55.00	60.00
5000	13.5°	13.5°	13.5°	13.5°	16.1°	18.2°	21.0°	23.7°	25.8°	27.1°	27.6°	28.1°	28.1°	28.1°
4500	13.1°	13.1°	13.1°	13.1°	15.1°	17.5°	20.5°	23.4°	25.5°	26.8°	27.3°	27.9°	27.9°	27.9°
4000	12.4°	12.4°	12.4°	12.4°	13.8°	15.4°	18.1°	21.0°	23.1°	25.0°	25.9°	27.0°	27.0°	27.0°
3500	11.4°	11.4°	11.4°	11.4°	12.6°	13.7°	15.1°	18.4°	19.9°	21.8°	23.0°	24.1°	24.1°	24.1°
3250	11.0°	11.0°	11.0°	11.0°	11.8°	12.8°	13.3°	15.9°	16.9°	19.0°	21.1°	22.5°	22.5°	22.5°
3000	10.4°	10.4°	10.4°	10.4°	10.9°	11.7°	11.6°	13.8°	15.1°	16.3°	18.6°	19.8°	19.8°	19.8°
2750	10.0°	10.0°	10.0°	10.0°	10.0°	10.0°	10.0°	12.0°	12.7°	14.0°	16.5°	17.6°	17.6°	17.6°
2500	10.0°	10.0°	10.0°	10.0°	10.0°	10.0°	10.0°	10.5°	11.2°	12.2°	14.7°	15.9°	15.9°	15.9°
2250	10.0°	10.0°	10.0°	10.0°	10.0°	10.0°	10.0°	10.0°	10.8°	11.1°	12.5°	14.0°	14.0°	14.0°
2000	10.0°	10.0°	10.0°	10.0°	10.0°	10.0°	10.0°	10.0°	10.0°	10.4°	10.9°	12.0°	12.0°	12.0°
1750	10.0°	10.0°	10.0°	10.0°	10.0°	10.0°	10.0°	10.0°	10.0°	10.1°	10.8°	12.1°	12.1°	12.1°
1500	10.0°	10.0°	10.0°	10.0°	10.0°	10.0°	10.0°	10.0°	10.0°	10.1°	11.5°	13.0°	13.0°	13.0°
1250	12.0°	12.0°	12.0°	12.0°	12.0°	12.0°	12.0°	12.0°	12.0°	12.0°	12.0°	12.0°	12.0°	12.0°
1000	12.0°	12.0°	12.0°	12.0°	12.0°	12.0°	12.0°	12.0°	12.0°	12.0°	12.0°	12.0°	12.0°	12.0°
800	12.0°	12.0°	12.0°	12.0°	12.0°	12.0°	12.0°	12.0°	12.0°	12.0°	12.0°	12.0°	12.0°	12.0°



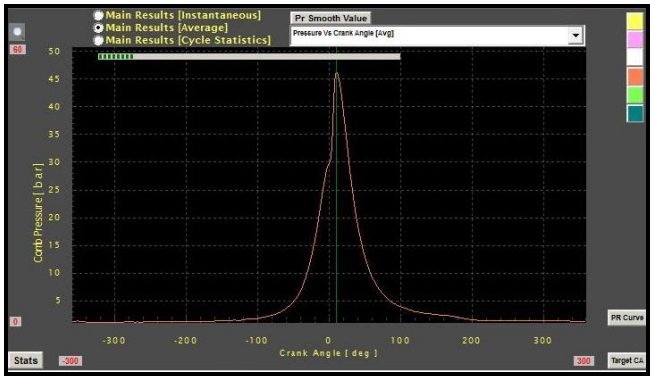
MG/ST RPM	0.00	3.00	7.40	10.00	12.40	15.00	17.40	20.00	22.40	25.00	29.00	33.00	51.00
3612	850.00	850.00	850.00	850.00	850.00	850.00	850.00	850.00	850.00	850.00	850.00	850.00	850.00
3423	365.00	365.00	395.00	420.00	450.00	495.00	550.00	630.00	720.00	795.00	820.00	850.00	850.00
2750	285.00	295.00	335.00	365.00	385.00	420.00	460.00	510.00	585.00	650.00	760.00	850.00	850.00
2499	285.00	285.00	335.00	365.00	385.00	410.00	450.00	500.00	560.00	625.00	745.00	790.00	850.00
2247	275.00	275.00	325.00	360.00	385.00	410.00	440.00	495.00	545.00	600.00	730.00	775.00	850.00
1995	275.00	275.00	320.00	360.00	385.00	415.00	450.00	480.00	525.00	600.00	710.00	775.00	850.00
1743	250.00	250.00	305.00	330.00	380.00	405.00	445.00	470.00	530.00	585.00	685.00	775.00	850.00
1596	245.00	245.00	295.00	330.00	365.00	390.00	430.00	470.00	535.00	585.00	690.00	775.00	850.00
1491	245.00	245.00	290.00	330.00	350.00	380.00	420.00	460.00	535.00	585.00	690.00	790.00	850.00
1386	245.00	245.00	290.00	320.00	350.00	385.00	435.00	490.00	550.00	590.00	720.00	850.00	850.00
1239	245.00	245.00	275.00	310.00	355.00	410.00	460.00	540.00	590.00	650.00	835.00	850.00	850.00
924	240.00	240.00	240.00	315.00	360.00	405.00	510.00	575.00	620.00	680.00	850.00	850.00	850.00
860	240.00	240.00	240.00	315.00	375.00	425.00	515.00	600.00	620.00	680.00	850.00	850.00	850.00
750	240.00	240.00	240.00	370.00	450.00	574.00	622.00	850.00	850.00	850.00	850.00	850.00	850.00
700	850.00	850.00	850.00	850.00	850.00	850.00	850.00	850.00	850.00	850.00	850.00	850.00	850.00
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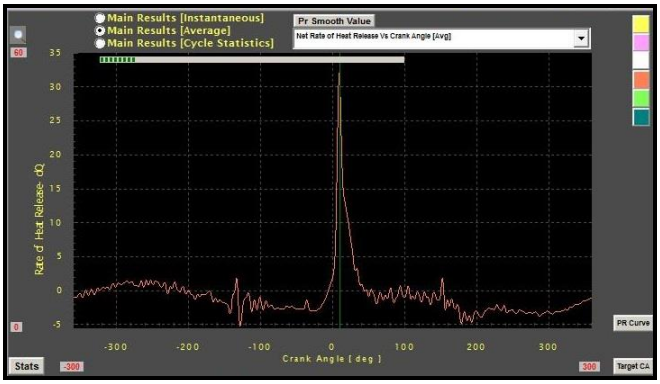


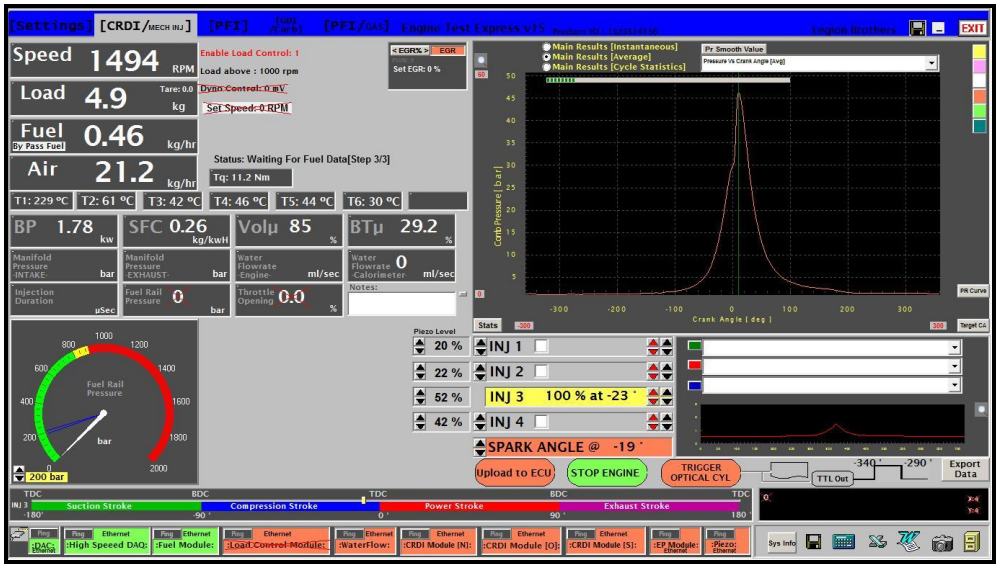
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Software (Engine Test Express)

Windows based powerful software for real time data measurement, auto zoom graphs, analog and digital display of data in the computer, store indefinite no of graphs for analysis. Facilities to export data to Microsoft excel. The data acquisition software is developed by legion brothers.







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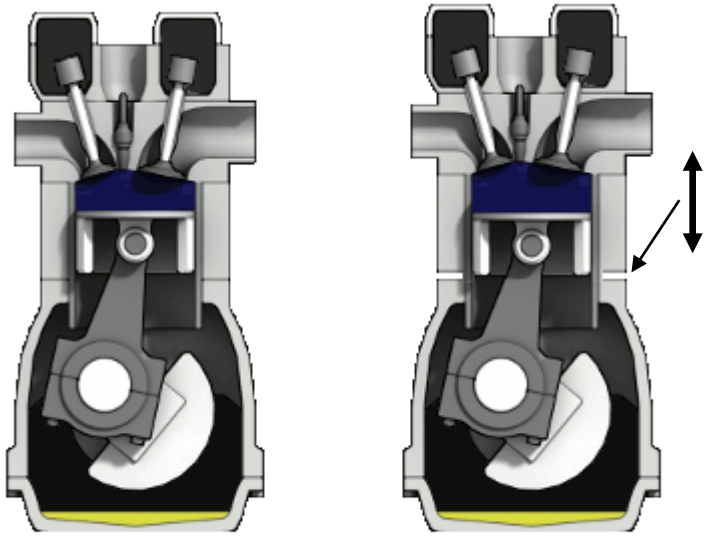
Product / Component Specification

Product	Computerized Variable Compression Ratio Petrol Engine Test Rig with GDI open ECU and EGR
Product code	CVCR01-OECU
Engine	Make : Legion Brothers Compression Ratio : 3.5:1 to 10:1 No of cylinder : One Cooling : water Speed : 1500-1750 Rpm Power : 5HP Starting : Electric Start
Dynamometer	Type : Eddy Current Cooling : Air cooled Capacity : 5HP
Coupling	Tyre Coupling
Calorimeter	Single shell and tube-Mild Steel
Air tank	500mm cubic-Mild steel
Panel	Mild steel powder coated with provision for mounting computer, ups, printer and instrumentation
Base frame	C channel-Mild steel
Combustion pressure sensor	Piezo-electric 0-100 bar
Crank angle encoder	360 ppr, 1 Deg resolution with TDC pulse
Air measurement	DP sensor with inline transmitter
Fuel measurement	Optical liquid level sensor constant volume, fully automatic
Dynamometer load	Strain gauge load cell with inline transmitter
Temperature	“k” type with inline signal transmitter
Water flow	Rota meter-Acrylic
Daq	200 Ks/s
Software	Engine test express for engine combustion analysis and performance software
GDI Open ECU with EGR	
ECU processor	Infineon
Crankshaft position	Crank trigger wheel
Camshaft position	Cam trigger wheel
Crank position sensor	Variable reluctance sensor
Cam position sensor	Hall effect sensor
T-map	NTC
Mass air flow	Hot wire type
Software	Engine control system
High pump	Bosch CP-1

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Open ECU Capabilities	• Set idle Speed - (The user can set the required idle speed of the engine) • Closed loop control for idling - (ECU controls the injection until engine idle) • Start injection angle for homogeneous operation-(The user can set the start of injection angle as desired) • End injection angle for stratified operation-(The user can set the end of injection angle) • Start angle for spark ignition-(The user can set the spark timing) • Injection Duration - (The user can set the Injection duration in terms of crank angle as desired) • Open loop rail pressure - (This is an special feature in which an user can set the Injection Pressure in terms Bar, variable from 10 to 180 bar) • EGR - (The user can set the EGR flow as desired) • Calibration charts are provided for Injection Quantity at various pressure

Variable Compression Ratio Mechanism



Higher CR Lower CR

Features

- Easy change of compression ratio
- Compression ratio variable from 5:1 to 20:1
- SI and CI mode operation without changing engine head
- Vertical 90 Deg lift ensures no mechanical stress in the connecting rod and piston
- Valve timing unchanged during change in compression ratio

The desired compression ratio can be achieved by vertically lifting the engine head and bore together, resulting in increased clearance volume. The variable compression ratio is achieved without change in combustion chamber geometry. Operate on both SI and CI mode without changing the engine head.

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