



For

Order Code - 32720 : Combined Engine (Petrol + Diesel)

Order Code - 32721 : Diesel Engine

Order Code - 32722 : Petrol Engine

Order Code - 32723 : Computer Interface

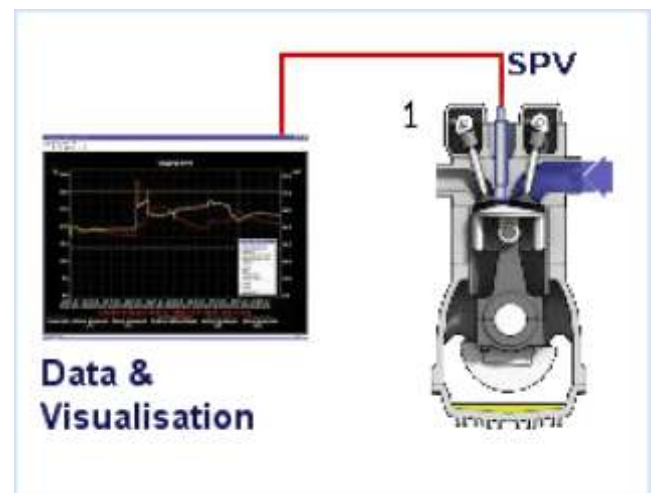
Features

- 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 designed to facilitate 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 calorimeter (For Heat Balance Sheet), advance Data



Note: Specifications are subject to change.

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Acquisition System & P-V Diagram module for computerized testing.



Diesel Engine Operation

DATE	TIME	OBS NO.	SPEED(RPM)	TORQUE(Nm)	T1(Deg)	T2(Deg)	T3(Deg)	T4(Deg)	T5(Deg)	T31(Deg/Cid)	Inlet(L/min)	Timer (Sec)	Water Flow(LPH)	
07/26/2020	2:15:00 PM	1	1530	0.2	131.801	30.43	26.502	28.466	27.877	26.502	18.709	280.491	0	1347.255
07/26/2020	2:15:58 PM	2	1550	0.1	148.500	31.609	28.074	28.074	27.877	27.200	18.866	250.957	48.662	1309.2
07/26/2020	2:16:43 PM	3	1517	4.3	163.188	32.980	27.892	28.055	27.484	26.895	17.921	242.528	0	1289.21
07/26/2020	2:17:39 PM	4	1512	4.3	175.243	33.572	27.892	28.660	28.874	26.899	18.503	232.39	48.502	1381.46
07/26/2020	2:18:54 PM	5	1380	7.9	156.964	34.051	27.484	28.252	28.074	26.502	12.88	217.837	0	1226.632
07/26/2020	2:19:44 PM	6	1390	7.9	205.494	34.947	27.892	28.448	27.288	27.052	11.935	205.937	48.732	1342.895
07/26/2020	2:21:07 PM	7	1312	13.2	229.235	36.125	27.892	28.448	28.874	27.200	7.967	197.703	0	1202.872
07/26/2020	2:21:56 PM	8	1312	13.2	235.233	36.911	27.200	28.645	30.234	27.200	9.1	186.725	48.732	1280.582

Observation Table

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
DATE	TIME	OBS NO.	SPEED(RPM)	TORQUE(Nm)	T1(Deg)	T2(Deg)	T3(Deg)	T4(Deg)	T5(Deg)	T31(Deg/Cid)	Inlet(L/min)	Timer (Sec)	Water Flow(LPH)		
07/26/2020	3:42:20 PM	1	1423	0.2	125.583	33.572	28.466	30.234	30.17	27.484	14.296	348.121	0	1247.902	
07/26/2020	3:44:03 PM	2	1452	0.2	180.823	33.789	28.466	30.037	28.366	27.681	14.772	344.795	48.622	1204.085	
07/26/2020	3:46:12 PM	3	1412	1.6	176.167	34.538	28.466	30.234	30.17	27.877	16.180	335.26	0	1248.492	
07/26/2020	3:48:12 PM	4	1423	3.1	186.301	35.181	28.466	30.033	28.859	27.082	12.365	325.74	48.782	1225.027	
07/26/2020	3:47:57 PM	5	1396	6.2	207.474	36.125	27.877	28.882	28.466	27.677	13.688	314.886	0	1208.66	
07/26/2020	3:48:41 PM	6	1381	6.2	224.884	36.725	28.466	30.033	27.877	27.484	9.888	303.646	31.885	1227.285	
07/26/2020	3:51:06 PM	7	1386	6.2	238.445	37.687	28.882	30.033	28.466	27.484	11.778	279.058	0	1215.917	
07/26/2020	3:51:58 PM	8	1386	6.2	244.31	37.3	28.859	31.029	28.202	27.681	11.693	289.534	11.883	1248.172	

Friction Power: (By William Line Method)



Petrol Engine Operation

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
DATE	TIME	OBS NO.	SPEED(RPM)	TORQUE(Nm)	T1(Deg)	T2(Deg)	T3(Deg)	T4(Deg)	T5(Deg)	T31(Deg/Cid)	Inlet(L/min)	Timer (Sec)	Water Flow(LPH)		
07/26/2020	8:08 PM	1	3036	0.2	140.519	41.673	46.988	46.838	38.893	38.037	3.823	248.84	38.893	2682.32	
07/26/2020	8:09 PM	2	3040	0.2	169.407	41.807	38.859	38.037	27.062	38.037	3.709	234.463	0	1311.001	
07/26/2020	8:09 PM	3	3086	0.2	195.502	42.41	38.17	30.41	38.899	38.037	3.481	211.314	48.548	1386.178	
07/26/2020	8:09 PM	4	2534	4.2	209.598	43.003	38.17	30.41	38.899	38.037	3.268	194.201	0	1303.294	
07/26/2020	8:10 PM	5	2852	4.2	209.598	43.642	38.17	30.41	38.899	38.037	3.676	179.7	48.992	1215.085	
07/26/2020	8:11 PM	6	2294	6.5	209.598	44.071	38.034	30.41	38.899	38.037	3.422	200.813	0	1275.028	
07/26/2020	8:11 PM	7	2212	6.5	209.598	44.446	38.882	38.037	38.17	38.037	3.534	193.526	48.732	1302.779	
07/26/2020	8:14 PM	8	3825	9.8	209.598	44.268	38.882	38.037	37.288	38.037	3.238	131.962	0	1228.885	
07/26/2020	8:14 PM	9	3825	9.8	209.598	44.875	37.288	38.037	37.288	38.037	3.238	146.411	48.782	1314.985	
07/26/2020	8:17 PM	10	3575	10.4	209.598	44.864	37.641	30.41	37.062	38.037	3.026	74.823	0	1247.682	
07/26/2020	8:17 PM	11	2942	12.7	209.598	45.25	38.442	30.41	37.062	38.037	3.988	63.76	48.782	1412.722	
07/26/2020	8:19 PM	12	3020	13.5	209.598	45.25	38.17	30.41	37.062	38.037	3.984	28.179	0	1241.478	
07/26/2020	8:19 PM	13	3525	13.5	209.598	44.446	38.882	38.037	37.062	38.037	3.988	28.179	0	1241.478	
07/26/2020	8:19 PM	14	3886	13.2	209.598	45.829	38.882	38.037	37.062	38.037	3.325	286.36	0	1487.34	
07/26/2020	8:21 PM	15	3887	13.2	209.598	45.211	38.446	38.173	37.644	38.037	3.1	182.712	48.782	1328	

Observation Table

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

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- 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
- 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 necessary Sensors
- Optional Data Interface Modules: a) Fast ADC b) Slow ADC
- Data Communication
- RS485 to USB Converter
- CD/DVD containing:
- DAQ Software

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).

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