



## **P8190**

### **VARIABLE COMPRESSION, SINGLE CYLINDER ENGINE TEST FACILITY**

#### **EXPERIMENTAL CAPABILITIES**

- ◆ Full and part load performance
- ◆ Volumetric efficiency
- ◆ Fuel consumption mixture loops
- ◆ Air/Fuel ratio
- ◆ Frictional power losses
- ◆ Heat balance and energy studies
- ◆ Data acquisition (with optional P8181)

#### **DESCRIPTION**

A self-contained advanced engine test facility for industrial single-cylinder engines having an instrumentation and control system purpose designed for engine performance, economy and energy balance measurements.

The test facility is intended for installation within the client's acoustic test cell equipped with appropriate services for power, fuel, ventilation air, exhaust silencing/ dispersion and necessary mechanical lifting aids. Cussons can, if necessary, advise on the requirements for these services and can provide a complete facility design and procurement service at the client's request.

#### **1. TEST STAND BASE**

##### **a) DESCRIPTION**

Two main components form the basis of the test bed:

- A welded steel base-plate complete with D.C.

dynamometer, drive coupling and safety guard, mat type anti-vibration mountings, exhaust silencer, flexible pipe and provision for engine mountings.

- A services framework, which is positioned over the test bed, carrying all instrumentation including transducers, fuel system with flow measurement and airflow measurement system.

##### **b) DYNAMOMETER**

The dynamometer used is a trunnion mounted swinging field DC electrical machine capable of absorbing a maximum load of 10 kW at a speed of 4000 rpm. A strain gauge load cell system is incorporated with mechanical overload protection and suitable calibration equipment is also provided. A toothed wheel and magnetic pick-up is used for speed measurement and feedback to the control system.

The dynamometer is capable of either motoring or absorbing power and is also used as a method for starting the engine.

##### **c) FUEL SUPPLY**

The fuel supply system can draw fuel from a small sample supply tank housed on the test set or from the client's bulk store system. Fuel flow measurement is by graduated burette.

##### **d) AIR FLOW**

Airflow measurement is via a capacity damping tank and interchangeable orifice plates designed to cover the engine ranges supplied.

## e) INSTRUMENTATION

The following instrumentation and sensors will be supplied:

- I) Engine manifold pressure -1 to +150 kPa gauge  
Engine oil pressure 0 to 1000 kPa gauge  
Air flow differential pressure 0 to 750 Pa differential
- II) Speed sensor inductive pickup
- III) Load sensor strain gauge load cell
- IV) Temperature inputs - Type K thermocouple inputs of which the following are fixed:
  - Air inlet
  - Exhaust manifold
  - Fuel

## 2. LOCAL CONTROL PANEL

The test bed is arranged for manual control of the engine and dynamometer with a key switch for engine starting, manual throttle control and interlocked selection of dynamometer operating mode. Gauges provide analogue/digital speed and torque readouts, power on button, key start switch and an emergency stop button.

## 3. DYNAMOMETER CONTROLLER ENCLOSURE

The dynamometer control system is a microprocessor controlled fully regenerative thyristor drive allowing the dynamometer to run as either a motor or a generator at constant speed.

## 4. ENGINE SPECIFICATION

The test bed has been designed to accept the following engines whose power ranges fall within the operating envelope of the dynamometer.

**P8191** 4 Stroke Variable Compression Air Cooled S. I. Engine.

Comprising a 392cc single cylinder engine with a max. power output of 7.5 kW at 3600 rpm and a max. torque of 23 Nm at 2500

rpm.

The compression ratio can be varied from 5.5:1 to 10:1 via a graduated piston system, the engine design allows the compression ratio to be varied while running.

**P8193** 4 Stroke Variable Compression Air Cooled C.I. Engine.

Petter AC1 comprising a 392cc single cylinder engine with a max. power output of 5 kW at 3600 rpm and a max. torque of 15.6 Nm at 2650 rpm.

The compression ratio can be varied from 14:1 to 20:1 via a graduated rod inserted into the combustion chamber. The engine design does allow for the compression ratio to be varied while running.

## 5. OPTIONAL ACCESSORIES

**P8181** Data acquisition facility including data logger, software and PC.

**The data acquisition package includes fuel flow meter range 0.06 to 6 liter per hour and pressure transducer. Duplex thermocouple are also supplied.**

## 6. SERVICES

Electrical supply : 380/415V, 50/60Hz, 3 phase - rated 40 amps

Exhaust: 1.5in BSP bore pipe.