

P7305/P7310

PORT FLOW RIG

APPLICATIONS

- ◆ Swirl and tumble studies
- ◆ Flow testing of reciprocating piston engine cylinder head inlet ports
- ◆ Exhaust port studies

FEATURES

- ◆ Wide range of cylinder bore sizes can be studied
- ◆ Closed loop control to allow:-
 - constant blower motor speed or
 - automatic control of differential pressure across the port

DESCRIPTION

Cussons P7305 and P73 10 Port Flow Rigs are designed to enable the flow testing of reciprocating piston engine cylinder head ports. These units may be easily configured to provide either a suction flow downwards through an inlet port to simulate the operation of a naturally aspirated engine, or by interchanging two pipes and attaching a flexible tube to the cylinder head intake manifold, to provide a pressure flow downwards through the inlet port to simulate a supercharged or turbocharged engine. The P7305 Port Flow Rig is intended for use with light duty port models with a nominal free air capacity of 50 litres/second, whilst the P7310 unit is more appropriate for heavy duty port models with a nominal free air capacity of 200 litres/second. Either unit may be used with port models or with engine cylinder heads.

Cussons P7305 and P7310 Port Flow Rigs each consist of a fabricated steel frame bench mounted on casters, which house the major components. A variable speed centrifugal fan/blower unit, attached to a base plate on the bottom level of the frame, is used for blowing or drawing air through the cylinder head port model.

A Cussons P7300 Impulse Swirl Meter and a Cussons P7302 Swirl Meter Display Unit are used for measuring the impulse swirl and a Cussons Laminar Flow Meter and a Cussons P7028 Air Mass Flow Computer are used to measure the port flow rate induced into the cylinder.

Honeycomb sections are incorporated at the exit from the laminar flow meter and at the fan inlet to prevent any fan induced rotation affecting the flow measurement.

A strain-gauged differential pressure transducer is used in conjunction with an electronic three term PID controller and a solid state AC inverter module, to control either the motor speed or to automatically provide a constant differential pressure across the test port. The control mode is switch selectable from the front panel.

The P7305 unit is intended for use with light duty engines whilst the P7310 unit is fitted with a larger capacity fan and a larger capacity Laminar Flow Meter and is intended for both light and heavy duty use.

The frame is fitted with a 10 mm thick carbon steel working surface into which the Swirl Meter transducer is mounted.

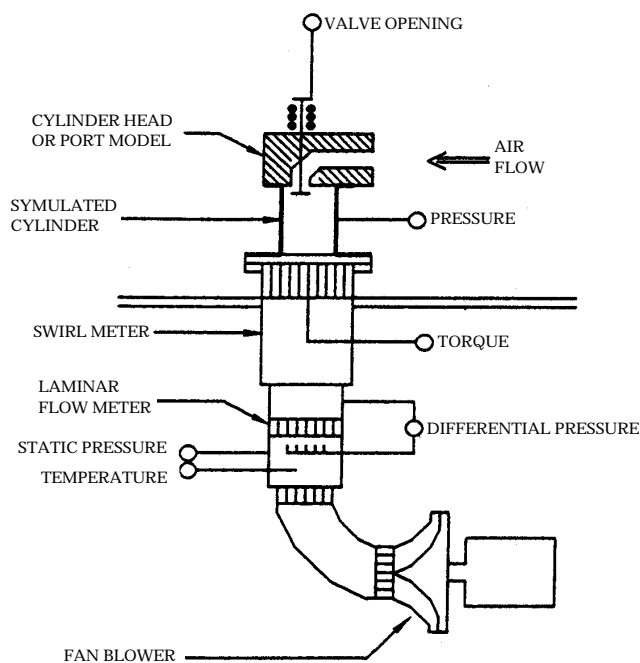
An angled section of the frame provides for mounting two 3U high, 19" wide electronic rack enclosures. In the left hand side is mounted the P7028 Air Mass Flow Computer and in the right hand side is a composite rack housing the P7302 Swirl Meter Display Unit on the left with space for a second P7302 on the right hand side for use when measuring tumble. The centre panel of the right hand rack houses the differential pressure transducer for measuring the valve port differential, the blower motor start and stop buttons, the three term PID pressure controller and the mode selector switch for constant speed or constant pressure control. The AC inverter module and mains input are located in the electrical enclosure mounted at the rear of the framework.

The fan/blower and motor are mounted on a base plate at the front bottom of the frame. When used to provide suction through the port and valve model the exit from the fan/blower unit is connected to the exit silencer which is mounted horizontally below the work top with the discharge to the right hand side. The inlet to the fan is connected to the Laminar Flow Meter which is mounted vertically, directly below the Swirl Meter.

Either Port Flow Rig can easily be adapted to measure *TUMBLE* instead of *SWIRL* by mounting the cylinder head or port model with the cylinder centre line horizontal using a 'T' shaped cylinder model and fitting a second Swirl Meter and Display Unit, together with an upper support frame.

SIMULATED CYLINDER

A simulated engine cylinder is required to connect between the Swirl Meter and the cylinder head or port model; this simulated engine cylinder should have a bore equal to that of the engine being studied and a length equal to one and three quarter times the bore. A flange at the lower end should be machined to the dimensions required to mount the simulated cylinder on to the Swirl Meter, at the upper end of the simulated cylinder a second flange simulates the face of the crank case.



SCHEMATIC DIAGRAM

A pressure tapping is required at mid-height for connection of the pressure transducer, the tapping should be fitted with a snubber (air pressure damping device). Within the extent of supply of a Cussons Port Flow Rig a sample simulated cylinder adaptor is provided and this may be manufactured to a specific diameter provided the end user informs Cussons of the required size at the time of placing an order.

SERVICE REQUIREMENTS

Electrical Supply: 380/415V 50Hz 3 phase supply
220/240V 50Hz 1 phase supply

Operation on other voltages to special order

DIMENSIONS

Approx. 110cm length x 105cm height x 78cm width

PRODUCT REFERENCES FOR ORDERING:

P7305 Port Flow Rig for Light Duty port models
(nominal free air capacity of 50 litres/second)

P7310 Port Flow Rig for Heavy Duty port models
(nominal free air capacity of 200 litres/second)