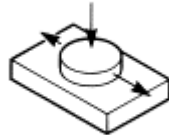


TE 104 FOUR STATION LONG STROKE RECIPROCATING RIG



Description:

The test rig is based on a twin crank reciprocating assembly driven by a variable speed motor. Two test enclosures are mounted on top of the crank case with communicating gas ports.

Each test enclosure provides locations for two test specimen pairs, providing a total of four test stations. Two fixed specimens are mounted on either side of each reciprocating rod in spherical seat self-aligning specimen holders. The fixed specimens are loaded against each moving specimen surface, with the load on opposing fixed specimens equal, such that no net normal load is applied to the reciprocating rod.

An electrical heater is embedded in each reciprocating to allow independent heating of the two moving specimens. Electrical brushes are provided for transmission of power to the heaters.

Each fixed specimen is carried on flexure mounted articulated arms. One fixed specimen arm is restrained in the direction of the friction force by a piezo force transducer to allow friction to be measured on that particular test station.

Guidance and sealing of the reciprocating rods is by means of linear seals and a linear plain bearings.

Non-reciprocating components are sealed with neoprene seals, allowing the rig to operate under conditions of slight over-pressure.

Movement of the fixed specimen relative to the moving specimen is monitored by means of capacitance displacement gauges to indicate wear.

Access to the test chambers for fitting and removal of test specimens is by means of removable access plates.

Load is applied by means of two pneumatic cylinders connected in parallel to the output of a pneumatic servo control valve. A pincer assembly results in equal and opposite force being applied to each specimen contact.

A force transducer is fitted to one of the pneumatic cylinders to provide load force feedback to the servo control system.

In addition to frictional heating, the moving specimens may be heated by means of cartridge heaters embedded in each reciprocating rod. Heaters are controlled by means of software PID controllers with PWM outputs via solid state relays. Feedback is provided by non-contact infra red sensors targeted on the moving specimen carriers.

The relative displacement of each fixed specimen arm, with reference its corresponding moving specimen rod, is measured by a capacitance proximity measuring system. Output from the device is in the form of a DC voltage proportional to displacement.

The probe is mounted approximately 0.5 mm away from a reference surface. The capacitance of the gap is converted to a dc voltage by a charge amplifier. A reduction in gap implies an increase in wear, hence an increasingly negative output of the system implies increasing wear amount. The output from the transducer gives 1 V for 100 mm with a resolution of 0.2 mm. The variations in the gap due to wear, thermal expansion, mechanical deflection of the specimens, entrainment of debris, or a combination of these, are picked up by the system. It is thus advised that measurements should be made under conditions of steady state running.

Instrumentation:

Control and Data Acquisition:

The TE 104 has PC based sequence programmable control and data acquisition. This is provided by an integrated Serial Link Interface Module and [COMPEND 2000](#) software running on a host PC, operating under Windows. Data is stored to hard disc in standard spread sheet compatible file formats (.csv or .tsv).

Tests are defined by a sequence of steps, each step containing set-point, data recording rates and alarm level information. Set-points may be adjusted by step change or ramp. The test sequence is followed unless interrupted by the operator or an alarm. Set-points may also be adjusted manually using on screen toggles.

Technical Specifications:

Contact Configurations:	Area Contact
Minimum Load:	20 N
Maximum Load:	200 N
Frequency/Stroke:	25 mm at 20 Hz 50 mm at 16 Hz 70 mm at 12 Hz 100 mm at 10 Hz
Maximum Temperature:	200 C
Maximum Frequency:	20 Hz
Motor:	2.2 kW @ 1500
Drive:	Variable frequency flux vector
Interface:	SLIM 2000 Serial Link Interface Module
Software:	COMPEND 2000
Controlled Parameters:	Speed Master Load Specimen Temperature 1 Specimen Temperature 2 Test Duration
Measured Parameters:	Speed Master Load Specimen Temperature 1 Specimen Temperature 2 Wear Displacement 1 Wear Displacement 2 Wear Displacement 3 Wear Displacement 4 RMS Friction Force 1 Relative Humidity Test Duration

Services:

Electricity:	220/240 V, single phase, 50 Hz, 5 kW 110/120 V, single phase, 50 Hz, 3.2 kW
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Order As:

TE 104 Four Station Long Stroke Reciprocating Rig