APPENDIX - 2

TECHNICAL SPECIFICATION OF SCHENCK EDDYCURRENT DYNAMOMETER

Type : W 230
Power : 230 kw (max.)
Torque : 750 Nm (max.)
Max. Speed : 7500 rpm
Rotor dia : 475 mm
Shaft dia : 50 mm

Principle of operation

A toothed rotor (connected to engine output shaft) rotates in the magnetic field of a coil wound in the direction of rotation and generates eddy currents in the surface of the cooling chambers, the magnetic fields of which impede rotation.

Since the dynamometer housing is cradle-mounted and supported on a force measuring unit via a lever arm, the brake down torque can be measured, and displayed as a force related to the lever arm. For determination of performance, speed must be measured additionally. A toothed disc at the shaft end of the dynamometer produces pulses in a speed transducer which are converted into a speed dependent voltage. This voltage is used for speed indication and speed control. The eddy-current dynamometer is active in both directions of rotation.
**Control System**

Type: Series 2000 D/W

Control unit components are:

1. Digital indicator
2. Selection of indication
3. Selection of mode of operation
4. Pre-selection of command value
5. Control unit
6. Presetting of limiting values and monitoring
7. Main switch

Front panel display contains:

1. 7 segment fluorescent indications.
2. 13 keys with signal lamps
3. One precision potentiometer
4. Six control lights
5. One tumbler switch

**Indicating systems**

i. There is five-digit 7 segment indicator for the actual speed value 1/min.

ii. Five-digit 7 segment indicator with sign for the indication of
   - command values
   - actual values
   - mal function signals
iii. There are keys with two different modes of function (i) storing and (ii) Not storing. With storing key the selected function remains also after releasing. The signal lamps of the key continuous lighting also after releasing the key. Not storing means the function - lasts only during the time of pressing the key.

iv. Functions under storing:
   a. Actual value of torque
   b. Power indication
   c. Position control of engine (i.e) the operation at constant throttle angle.
   d. Dynamometer speed control
   e. Dynamometer torque control
   f. Linear and squared curve control

v. Functions under not storing:
   a. n-max (max. speed)
   b. Calibration of zero torque
   c. Command value of the speed
   d. Command value of the torque
   e. Command value of position (i.e the throttle angle position).

Self Testing and Operation of the system

The control system performs self-testing after switching the main switch. If there is any malfunction there will be a clear indication from the red signal lamp.
After the self testing the control unit takes over the parameter for speed range, power range, mode of operation M(n), cycle of indication and speed values n-min. and starter release respectively which were internally set by DTP switches. Then the control unit starts its function and goes to switching on condition.

**Mode of Operation Selection**

After switching-on the control unit this is automatically in the following mode of operation:

- specimen is position-controlled
- dynamometer is speed controlled "n"

At the stand still condition of the specimen the following mode changes can be accomplished:

a. Dynamometer torque controlled

b. Dynamometer speed controlled

c. Dynamometer either torque (or) speed controlled

d. Speed controlled specimen will be speed torque controlled if dynamometer is in speed control.

e. Position controlled specimen will be speed controlled if dynamometer is in the torque control.
Possible Malfunction signals and its significance

<table>
<thead>
<tr>
<th>Code on Indicator</th>
<th>Character of Malfunction</th>
</tr>
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<tbody>
<tr>
<td>111 111</td>
<td>Water circuit disturbed</td>
</tr>
<tr>
<td>222 222</td>
<td>Temperature in the power supply section too high</td>
</tr>
<tr>
<td>333 333</td>
<td>Emergency - off was actuated</td>
</tr>
<tr>
<td>444 444</td>
<td>Instance - stop was actuated</td>
</tr>
<tr>
<td>555 555</td>
<td>n-max exceeded</td>
</tr>
<tr>
<td>666 666</td>
<td>Pre-load calibration range exceeded</td>
</tr>
<tr>
<td>777 777</td>
<td>Error in torque processor</td>
</tr>
<tr>
<td>888 888</td>
<td>Error in absolute value circuit</td>
</tr>
<tr>
<td>999 999</td>
<td>Error in speed processor</td>
</tr>
</tbody>
</table>

Power Supply

Capacity : 50 VA (max)
Primary voltage : 220 V, +10% - 15% -50/60 Hz
Secondary voltages :
  + 15 V 1A :
  + 22 V 90 mA :
  - 22 V 90 mA : Stabilized short - circuit - proof
  + 15 V 150 mA :
  - 15 V 150 mA :
  + 30 V 80 mA :
  - 10 V 20 mA :
  + 24 V 100 mA :
  3.9 V 150 mA : No stabilised