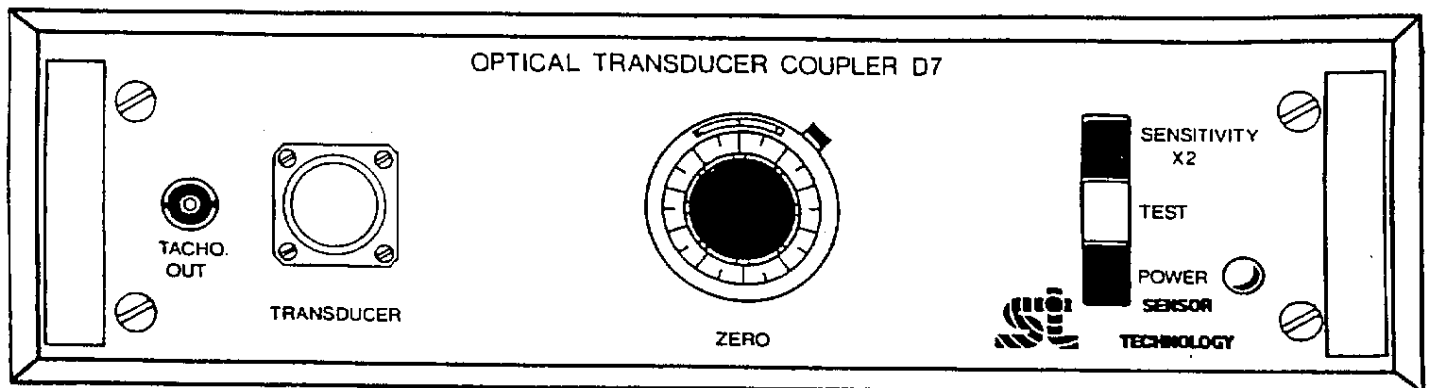


# D7 Optical rotary torque transducer coupler



# HANDBOOK

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# DORT Optical rotary torque transducers

STL 1a  
Issue 2

with R.P.M. pick-off option

## D7 Optical rotary torque transducer coupler

### DORT Optical Rotary Torque Transducer.

The DORT Optical Rotary Torque provides an ideal means for precise measurement of rotary and static torque. Standard ranges cover 0-10mNm to 0-5000Nm in six frame sizes. Comparable ranges in Metric and Imperial calibration are standard (see table). An unusual and extensively developed measurement principle is used, in which the intensity of light beams is modulated by the applied torque. Light intensity is measured by means of photovoltaic detectors, and the electrical output is used to provide precise indication of the torque transmitted by the shaft.

The use of this technique results in a transducer having fast mechanical and electrical response low inertia and complete freedom from brushes or complex electronics. The absence of brush gear allows high speed operation up to 30,000 R.P.M. continuous rating on the smaller sizes (see table). For higher speeds special bearings can be specified: sealed bearings are also available. The torque shaft is of low compliance - torsional deflection being approx.  $1/2^\circ$  on the smaller sizes, and approx.  $1/4^\circ$  on the larger units at full scale deflection. The bulbs providing the light source are substantially under-rated to ensure long life and high stability, the light intensity being automatically controlled by a monitor cell within the transducer body.

### R.P.M. Pick-off Option.

An optical R.P.M. pick-off is optional on all transducers in the range, giving R.P.M. indication on the D6A/B Module if required. External dimensions of the transducer are not affected.

### Cable Amplifier Option

The D7 Coupler is supplied with a standard 2 metre transducer lead. However, some applications require longer lead lengths. Up to 20 metres a standard or heavy duty extension lead of the required length may be used. Between 20 metres and a maximum of 120 metres a cable amplifier will be required. This is an inline amplifier box fitted as near as possible to the transducer and coupled direct to it. An extension lead of the required length can then be used. Longer lengths on application.

**Accuracy.**  $\pm 1\%$  of full scale deflection. 0.5% to order.

**Resolution.** 0.1% of f.s.d.

**Linearity.** Within 0.5% span.

**Hysteresis.** 0.5% of f.s.d.

**Repeatability.** Within 0.25% span.

**Bandwidth.** External Display - Better than 1 millisecc. 0-100%.  
Transducer Output - Better than 100 microsec. 0-100%.

**Overload Capacity.** 100% min.

**Temperature Coefficient.** Better than 0.1% per  $^\circ\text{C}$ .

**Operating Temperature Range** 0 to  $50^\circ\text{C}$  standard. Other ranges consult factory.

**Bearings.** Deep groove shielded standard, high speed or sealed to order.

**IP65 Sealing.** The transducers can be supplied with sealing to IP65. Specify on order.

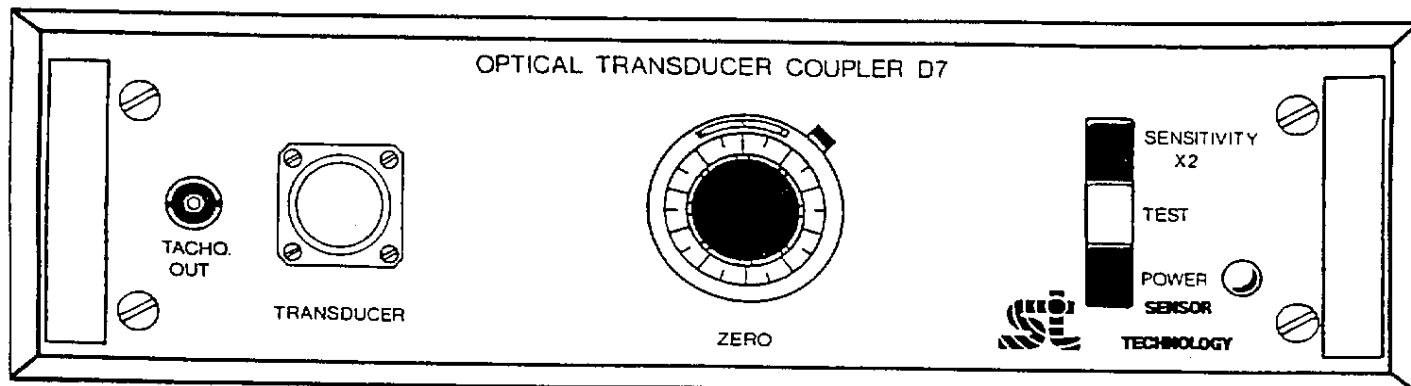
**Input Power.** Supplied by D3A/B via D7 Coupler Module.

**Polarity** of output signal is in accordance with direction of applied torque.

### D7 Optical Rotary Torque Transducer Coupler.

Optical transducers are interfaced with the D3A/B Transducer Display Module by means of the D7 Optical Transducer Coupler Module. This unit regulates power from the D3A/B into a variety of special supplies required by the transducer, and matches its signal output to the D3A/B and D6A/B if used. Also incorporated are special lamp stabilising circuits, and provision for exact zero setting by means of a multi-turn potentiometer. A particular feature is the 'x2' button, which provides, if required, twice the sensitivity (or half the rated torque) for full scale deflection displayed on the D3A/B.

The D7 Module serves the entire range of optical Transducers. With its use, all transducers in the optical series are completely interchangeable.



1 Introduction

The D7 optical transducer coupler is usually used to interface a DORT optical rotary torque transducer to a D3A/B Transducer Display module. The mains version derives its power from either 115 or 230v mains and supplies power to the transducer. The signal from the transducer may be passed through the D7 into the D3A/B where it is processed and displayed (Section on D3A/B refers), or the signal may be taken from the "Torque Output" socket on the rear of the D7. When a rotary speed sensor is incorporated in the transducer, the rotational speed signal is available on the "Tacho Out" socket for connection to the D6A/B Tachometer, or external use.

Note that any D7 is compatible with any D3A/B or D6A/B and any optical transducer is compatible with any D7.

2. General Specification

Power requirements:	230 or 115v	+15%	50-60 Hz
Weight:	2.2 kg		5.6 lbs
Length:	29.2 cms		11.5 ins
Width:	24.1 cms		9.5 ins
Height:	7.62 cms		3.0 ins

3. Description of Controls

3.1 Power Push Button and Power Indicator Lamp

This button switches on and off the power to the D7. Pressing the switch once switches the power on, and the adjacent red lamp will then light up. Pressing again switches the power off.

### 3.2 Transducer Socket

The lead from the DORT transducer is connected to the D7 at this socket. Ensure that the locking ring on the lead is fully turned home when connecting the transducer. The socket supplies power to, and returns the torque and rotational speed data from, the transducer.

### 3.3 Zero Control

This multi turn potentiometer is used to zero the torque signal output of the transducer (when no load is applied to it) when necessary and provides a means of compensation for temperature drift. A dial lock is incorporated to prevent accidental movement of the control while measurements are being made.

### 3.4 Test Push Button

This control is for checking the integrity of the transducer and display electronics. When the D3A/B (if in use) and the D7 are switched on, and the transducer has been connected and its output zeroed as described, pressing this button will cause the output to read 100%(±1%), either externally or on the D3A/B, indicating that the system is functioning correctly.

### 3.5 Sensitivity X2

Pressing this button doubles the magnitude of the transducer signal before it is fed to the D3A/B or the "Torque Output" socket, enabling small variations in transducer output to be examined more easily.

### 3.6 Tacho Out Socket

This socket is connected to the rotary speed sensor of the transducer (if fitted) and is either for connection to the "Tacho in" socket of a D6A/B Tachometer, or to some other external display. The output is a 60 pulses per revolution through zero crossing sine wave.

The following section refers to the back panel of the instrument.

### 3.7 Mains Input Connector, Voltage Selector, and Fuse.

This socket is for connection to the external AC mains supply by means of the 3 pin plug and lead supplied with the instrument. It incorporates mains voltage selection, and a spare fuse for the alternative voltage setting. To set to the required voltage, ensure that the correct value is displayed the right way up on the connector, and that the correct fuse is fitted for the appropriate voltage rating.

### 3.8 Torque Output Socket

Gives +1v for full scale torque clockwise and -1v for full scale torque anti-clockwise.

### 3.9 Tacho Out Socket

This socket is identical to the front panel "Tacho out" socket described in 3.6 above, and may be used instead of it, or as well as it.

#### 4. Operating Instructions

Connect the input mains connector. Connect the transducer lead plug to the front panel "Transducer" socket of the D7. Connect the "Torque Output" socket on the D7 to the "Transducer Output" connector on the rear of the D3A/B (if in use). Switch on the D3A/B and D7 and allow five minutes for the equipment to reach thermal equilibrium. Unlock the zero control on the D7 front panel and adjust this control until the output reads precisely zero. Re-lock the zero control. If D6A/B is being used, connect one of the "Tacho Out" sockets of the D7 to the "Tacho In" socket on the D6A/B, and switch D6A/B on. Press the "Test" button of the D7 and check that the output displayed on the D3A/B or other external display reads 100%(±1%). Release the "Test" button. The equipment is now ready for use.

Important Note. The D3A/B Transducer Display is also designed for use with D Range Strain Gauge torque and load transducers. When using the D7 and DORT Optical transducers always ensure that any such transducer is disconnected from the "Transducer" socket of the D3A/B. Similarly when it is required to use a strain gauge transducer with the D3A/B, ensure that the D7 is switched off and the "Torque Output/Transducer Input" connector between the D3A/B and the D7 is disconnected.