Model 751
Torque/Angle & Force/Displacement Instrument
Use With a mV/V Strain Gage Sensor and a Quadrature Encoder

reads, displays, processes and outputs
- shaft torque, angular rotation and torsional stiffness
- force, linear displacement and spring rate
fast, rock solid readings with high noise immunity
- 2000 samples/sec. for torque, or force input
- 0.5 millisecond encoder response with 400kHz bandwidth
6 digit engineering unit display with legends and 0.01% resolution
RS232/RS422/RS485 serial communication
- auto-scaled ±5V and/or ±10V analog outputs
- no pots, batteries, fans, maintenance, or external power supplies

These advanced instruments provide engineering unit display of a mV/V output strain gage sensor and a rotary or linear position encoder. They also compute their ratio and perform 21 functions including limits, tare, hold, and max/min capture. You needn't write code or add hardware to be up-and-running a productive test.

The alphanumeric readout can display measured and computed data, units of measure and test status. During setup, it guides you with English language prompts. There are no manual adjustments. To calibrate, enter the full scale value in engineering units and the instrument provides 0.01% resolution and ±5V and/or ±10V analog outputs at full scale. The keyboard accesses measured data, held data, max/min data, data spread, limit status, and/or I/O status without test disruption. Password protection may be used, if needed.

The mV/V conditioner has the advantages of ac carriers with the operating simplicity of dc. Microprocessors provide true ac null balance without manual adjustments. As a result, the instrument has superior noise immunity, is unaffected by thermal and galvanic voltages and offers high sensitivity. The encoder conditioner accepts quadrature TTL signals. It has an input bandwidth of 400 kHz, software selected data filter and a 48 bit internal counter. The counter may be reset from the keyboard, logic I/O or hard wired. Inputs are protected to 130 Volts. Excitation power is furnished for both the strain gage and position encoder: there is no need for external power supplies.

Select either RS232, RS422, or RS485 serial communications to remotely control instrument modes, settings and measurements. Input actions (28) and output events (30) are controlled by user configurable logic I/O’s – 4 inputs, 6 outputs. These can be combined (OR’d and/or AND’d) to create virtually any imaginable test without the need for special software or hardware. Instruments are shipped with software that allows the user to setup and control all functions from a Windows-based PC. That software also has the ability to display, plot and save real time data.

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Model 751 Specification

Strain Gage Input ........................................... Any 80Ω to 2kΩ transducer, directly wired or transformer coupled. 4, 6, or 7 wire circuits are accommodated.

Transducer Excitation ...................................... 3Vrms, 3030Hz ± 0.01% sine wave. Regulated, and short circuit protected. Sensitivity ......................................................... 0.5 to 5mV/V with 50% overrange; automatically scaled.

Input Impedance ............................................. 100MΩ in parallel with 33pF.

Automatic Null ............................................. In Phase: ±10% of F.S. (with 50% overrange), ±60% of F.S. (with 0% overrange). Quadrature: ±1mV/V.

Auto Calibration ............................................ Dual polarity shunt calibration with provision for CAL resistor feedback.

Spurious Signal Rejection ............................. 60Hz: 120dB common mode, 100dB normal mode. Carrier quadrature: 60dB.

Antialias Filter ............................................. 200kHz, 7 pole Bessel.

Low Pass Filtering ........................................ 4 pole Bessel response digital filter with 11 cutoff frequencies from 0.1 to 200Hz in 1-2-5 steps.

Signal-to-Noise Ratio .................................. 0.02% of F.S., worst case.

Overall Accuracy (at 77°F/25°C) .................. ±0.001% of F.S./10Hz, ±0.02% of F.S./200Hz, 7 pole Bessel.

Temperature Effects ................................... Zero: ±0.001% of F.S./°F (max); Span: ±0.001% of F.S./°F (max).

Position Encoder Input ................................ Serial Communication Port

Serial I/O’s .................................................. The following events drive Logic outputs and internal Matrix signals.

Data Format ............................................... Select from Current, Max, Min, Spread, Held data and Tare value.

Views .......................................................... 2 line by 16 alphanumeric characters, each 0.2" wide by 0.3" high. Backlit LCD with adjustable contrast.

Data Displayed ............................................ Engineering units with 6 digits (1-2-5 format) and 5 character, upper/lower case, user-entered legend/descriptor.

Display Range and Resolution .................... Displays 0 to 999,900 units of measure with legend; resolution is 0.01% of Full Scale.

Data Filtering ............................................ Unfiltered or 4 pole Bessel response low pass digital filter. 10 cutoff frequencies from 0.1 to 100Hz (in 1-2-5 steps).

Limit Checking Rate ................................. 2000Hz (hardware channels), 50Hz (CH3 calculation).

Non-linearity ............................................. ±8.2V @ ±5V F.S. or ±13.5V @ ±10V F.S.

Output Impedance/Minimum Load Resistance ............................................. <1Ω for I/O functions in any combination. The pattern function adds ANDing capabilities.

Input Actions/Channel ............................... Logic inputs, outputs, and internal Matrix signals control following actions. True, Clear, Transducer Excitation 

External I/O Power ..................................... 250mA, short circuit (current limit) and overvoltage (fuse) protected.

Serial Communication Port (selectable as RS232, RS422, or RS485) Supports 32 devices on RS485 port and 1 device on RS232/422.

State Machine Capability ......................... User enabled/disabled. Permits up to eight states and allows Event Driven Testing. See AN7000 for details.

Limit Checking .......................................... Each channel has a HI and LO limit which may be latched or unlatched, absolute or signed, and with or without hysteresis. Select either fa for limit checking.

Limit violations on any or all channels can be set to trigger backlight flashing in any of the display view modes.

Four Logic Inputs ...................................... Each with programmable destination, protected to ±130VDC or 130Vrms.

Eight User-defined Patterns ....................... Patterns of Logic inputs, outputs and Matrix signals drive Logic outputs and internal Matrix signals.

Serial I/O’s ............................................... Use a 9 pin D connector. They are ±15kV ESD protected and float (100k Ω to ground).

Non-Volatile Memory Storage for System Settings ....................... EEPROM, batteries are not used.

Dual Analog Outputs .................................. Each assignable to any of the 3 channels are short circuit (current limit) and overvoltage (fuse) protected.

Output Impedance/Minimum Load Resistance ............................................. 250mA, short circuit (current limit) and overvoltage (fuse) protected.

Power Supply ............................................ 90VAC to 250VAC, 50/60Hz @ 25VA, max. Two 2A/250V fuses, line filter, and rear power switch. Option 12D1 converts from AC line power to 10 to 15VDC operation @ 15 Watts, max. It includes a rear power switch, fuse & filter.

BAUD Rate ............................................. 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200.

Power Consumption .................................. 120Ω Termination Resistors (RS485) .......................... 300 to 38400, Maximum Cable Length: 4000ft (RS422/RS485), 50ft (RS232), 120Ω Termination Resistors (RS485) .......................... User selectable for RxD and TxD.

RS422/485 Transceivers ............................ Slew-rate limited, short circuit protected (current & thermal limits).

RS232 Drivers ......................................... Short circuit protected (current limit).

Seriel I/O’s ............................................... Use a 9 pin D connector. They are ±15kV ESD protected and float (100k Ω to ground) with respect to Earth Ground.

Commode Modes, Control of all modes, settings, and measurements.

Non-Volatile Memory Storage for System Settings ....................... EEPROM, batteries are not used.

Dual Analog Outputs .................................. Each assignable to any of the 3 channels are short circuit (current limit) and overvoltage (fuse) protected.

Output Impedance/Minimum Load Resistance ............................................. 250mA, short circuit (current limit) and overvoltage (fuse) protected.

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Notes:
1. The ratio expressed in decimals (dB), of full scale (F.S.) signal to noise spread. Measurements are made for a 1 minute interval using a 100Ω source impedance.
2. Both excitation voltages can be used simultaneously with the following restrictions:
   a. 4.8 x 12V current + 5V current ≤ 700mA
   b. 12V current ≤ 125mA
   c. 5V current ≤ 250mA
3. Specifications are subject to change without notice.