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PART NUMBERS COVERED BY THIS MANUAL

| Part Number | Description |
|-------------|--|
| XXXXX.IND | Transducer calibrated in mV/V. |
| XXXXX.INDA | Transducer calibrated in mV/V with integral angle encoder. |
| XXXXX.LOG | Transducer calibrated with a display instrument in units of calibration. A mV/V figure is also supplied. |
| XXXXX.LOGA | Transducer with integral angle encoder calibrated with a display instrument in units of calibration. A mV/V figure is also supplied. |

NOTE: For mV/V Transducers with an .ETS suffix, see Operators Manual 34147.

DISPOSAL



This symbol on the product indicates that it must not be disposed of in the general waste.

Please dispose of according to your local recycling laws and regulations.



INTRODUCTION

Transducers covered by this manual are all four-wire bridge, millivolt per volt (mV/V), 'SMART' transducers. The 'SMART' facility allows automatic set up of the Norbar display instrument (Pro-Log, TST, TTT, T-Box, etc) and should be ignored for other applications. Torque transducers can be supplied as Static, Rotary, Static Torque Block (STB), Flange Mount Transducer (FMT) or Annular, with the rotary transducers having the option of an integral quadrature angle encoder.

Transducer Leads Available

| Transducer | Lead Part Number | |
|--|--|--|
| | Norbar Display (Pro-Log, TST, TTT, T-Box etc.) | No Connector at Display (For Non-Norbar Equipment) |
| Static or Annular (6 way AB05 connector) | 60217.200 | 60225.200 |
| Rotary (10 way AB05 connector) | 60216.200 | 60224.200 |
| FMT or STB | Fitted to transducer | Not applicable |
| No Connector (for non-Norbar transducer) | 60223.200 | Not applicable |

NOTE: A suffix after the part number indicates the length of the lead in cm, thus XXXXX.200 = 2 meters. If transducer leads are required of a non-standard length (to the nearest meter), the new suffix must be added to the part number when ordering.



Fixing Bolt Torque

| Type | Capacity (N·m) | Orientation | Bolt Size | Bolts Supplied | Transducer Hole | Fixing Spacing | Torque (N·m) |
|------|----------------|-------------|-----------|----------------|-----------------|----------------|--------------|
| FMT | 2 / 10 / 25 | Vertical | 3 x M5 | No | Through | Ø 64mm PCD | 5 |
| | 150 / 400 | Vertical | 3 x M8 | No | Through | Ø 90mm PCD | 25 |
| | 1500 | Vertical | 3 x M12 | No | Through | Ø 150mm PCD | 85 |
| STB | 1000 / 3000 | Horizontal | 2 x M10 | Yes | Through | 85mm | 50 |
| | | Vertical | 4 x M8 | No | M8 tapped | 90mm x 56.2mm | 42 |

| PT / HT | 1 & 2 | 5 & 6 | 7 | 7 SD | 9 | 11 | 12 | 13 & 14 | 17 & 18 |
|--------------|-------|----------|-----|------------|----------|-----|-----|---------|---------|
| Bolt size | 2BA | 1/4" BSF | M10 | 1/2" BSW | 3/8" BSF | M10 | M12 | M16 | M20 |
| Torque (N·m) | 9 | 19 | 83 | Hand tight | 75 | 83 | 150 | 310 | 400 |

Annular Transducers Fitted to Handtorque Gearboxes

WARNING: WHEN THE HANDTORQUE INPUT IS LOADED BY THE OPERATOR, THE OPERATOR IS TAKING PART OF THE REACTION TORQUE.

The output torque (T_{output}) is made up of the reaction torque (T_{reaction}) measured on the annular transducer and the operator input torque (T_{input}).

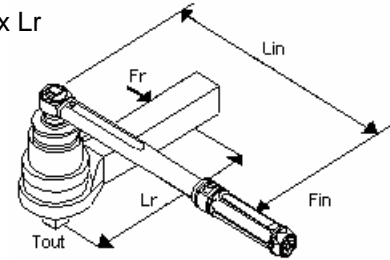
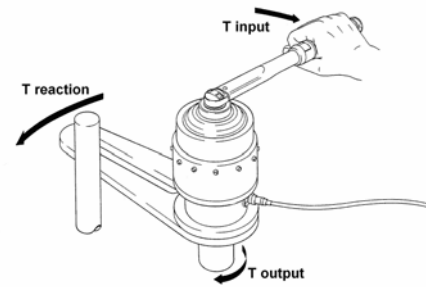
This can be shown as: $T_{\text{output}} = T_{\text{reaction}} + T_{\text{input}}$

Where:

$T_{\text{reaction}} = \text{Measured torque} = \text{Reaction force} \times \text{reaction length} = F_r \times L_r$

$T_{\text{input}} = \text{Input torque} = \text{Input force} \times \text{Length of input} = F_{\text{in}} \times L_{\text{in}}$

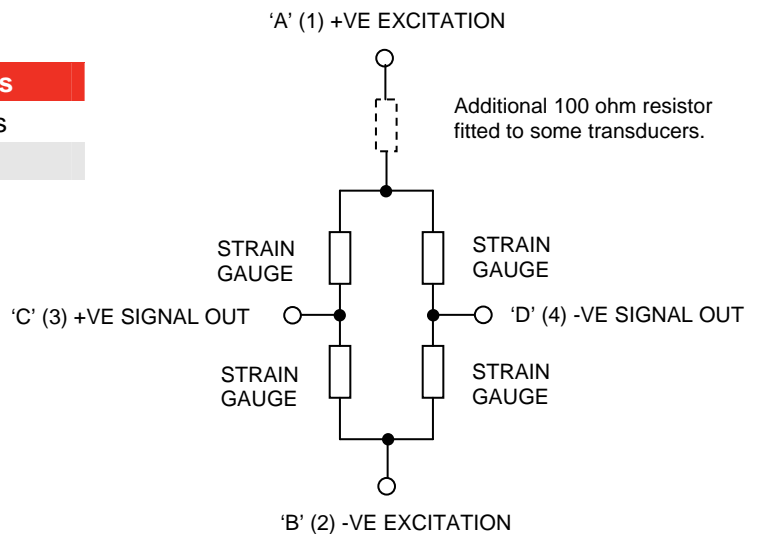
NOTE: If using an Anti Wind-up Ratchet on the Handtorque, when the input torque is released the value of "T input" is zero; so the output torque (T_{output}) is equal to the measured torque (T_{reaction}).



INTERFACING TRANSDUCER WITH NON NORBAR EQUIPMENT

Torque Transducer Wiring Diagram

| Nominal Resistance Between Terminals | |
|--------------------------------------|----------------------------------|
| A & B | 350 ± 2 or 450 ± 22 Ohms |
| C & D | 350 ± 2 Ohms |



NOTE: The differential voltage output for STATIC and ROTARY transducers goes positive for clockwise torques, and negative for anti-clockwise torques.

NOTE: Annular transducers have eight 175 ohm gauges but will still resistively conform to the above diagram. The differential voltage output of an Annular goes positive for anti-clockwise torque as it has been designed to measure reaction torque.

Pin Connections

| Pin Connections (10 Way) | |
|--------------------------|------------------------|
| A (1) | +VE EXCITATION |
| B (2) | -VE EXCITATION |
| C (3) | +VE SIGNAL OUT |
| D (4) | -VE SIGNAL OUT |
| E | Digital 0 volts |
| F | Digital 5 volts |
| G | Angle Signal channel A |
| H | Angle Signal channel B |
| J (9) | SCLK (Serial Clock) |
| K (10) | SDA (Serial Data) |

| Pin Connections (6 Way) | |
|-------------------------|---------------------|
| A | +VE EXCITATION |
| B | -VE EXCITATION |
| C | +VE SIGNAL OUT |
| D | -VE SIGNAL OUT |
| E | SCLK (Serial Clock) |
| F | SDA (Serial Data) |

NOTE: For Annular Transducers, C = -ve, and D = +ve signal out when measuring clockwise torque.

NOTE: Numbers in brackets are for LEMO style connectors fitted to the STB and FMT transducers.

WARNING! DO NOT CONNECT PINS E OR F ON THE 6 WAY (AB05) CONNECTOR, PINS J OR K ON THE 10 WAY (AB05) CONNECTOR OR PINS 9 & 10 ON THE (LEMO) CONNECTOR.

WARNING! ONLY CONNECT TO PINS E, F, G & H ON THE 10 WAY (AB05) CONNECTOR IF THE ANGLE ENCODER OPTION IS FITTED AND REQUIRED TO BE USED.

Excite the transducer with an accurate, stable and low noise power supply. We recommend the power supply output is short circuit protected.

Electromagnetic compatibility (EMC) is the responsibility of the system designer. To improve EMC Norbar recommends the transducer cable is screened, kept to a minimum length and away from high voltage cables.

MAINTENANCE

To maintain accuracy it is recommended that the transducer is recalibrated at least once per year.

SPECIFICATION

General

| | |
|-----------------------------|--|
| Accuracy | See calibration certificate supplied with transducer. |
| Calibration units | N-m, lbf-ft or lbf-ins as standard. |
| Maximum Bridge Excitation | 10 Volts D.C. |
| Zero setting tolerance | Better than $\pm 1\%$ F.S.D. |
| Operating Temperature Range | -10°C - +50°C. |
| Storage Temperature Range | -20°C - +70°C. |
| Temperature Co-efficient | < $\pm 0.01\%/^{\circ}\text{C}$. Full Scale Defection on zero. < $\pm 0.03\%/^{\circ}\text{C}$. Full Scale Defection on span. |
| Maximum working torsion | 120% of rated capacity (except for transducers listed overleaf). |
| Absolute maximum torsion | 150% of rated capacity (except for transducers listed overleaf). |

| Part Number | Capacity | Absolute Maximum Torsion |
|-------------------|------------|--------------------------|
| 50684.IND or .LOG | 3000 N·m | 100 % |
| 50615.IND or .LOG | 5 lbf·ft | 110 % |
| 50618.IND or .LOG | 10 lbf·ft | |
| 50622.IND or .LOG | 50 lbf·ft | |
| 50625.IND or .LOG | 250 lbf·ft | |
| 50663.IND or .LOG | 6000 N·m | |
| 50667.IND or .LOG | 1500 N·m | |
| 50668.IND or .LOG | 2000 N·m | |
| 50604.IND or .LOG | 50,000 N·m | |
| 50605.IND or .LOG | 50,000 N·m | |

NOTE: If using an FMT 2 N·m (50671.XXX or 50677.XXX) with a Series 1 TST or TTT (43498 – 43201) for a Pro-Log Display Instrument, please contact Norbar.

Specific Details for Rotary Transducers (Part Numbers 50708.XXX(X) and above)

| Drive (inches) | Rotary Capacity | | | Angle Output (2 Channel Quadrature) | Maximum Speed (r.p.m.) | |
|-------------------|-----------------|--------|-------------|---|------------------------|---------------|
| | N·m | lbf·ft | lbf·in s | | *Continuous | *Intermittent |
| 1/4 Hex | 5 | - | 50 | 180 Pulses per revolution (ppr) [0.5° resolution is possible with 4 times decoding of the 2 channel quadrature output] | 5000 | 11,000 |
| 1/4Hex | 20 | 15 | - | | 5000 | 11,000 |
| 1/4 Square | 20 | 15 | - | | 5000 | 11,000 |
| 3/8 Square | 75 | 50 | - | | 5000 | 11,000 |
| 1/2 Square | 200 | 150 | - | | 2500 | 7600 |
| 3/4 Square | 250 | 200 | - | | 2000 | 5000 |
| 3/4 Square | 500 | 300 | - | | 2000 | 5000 |
| 1 Square | 1500 | 1000 | - | | 1000 | 4400 |

Angle power requirements +5V DC (40mA_{max})

*Continuous is defined as 100% usage at the given speed in either direction and intermittent as 10% usage of the total time at the given speed.

WARNING: THE ROTARY TRANSDUCERS ARE NOT DESIGNED FOR USE WITH IMPACT TYPE TOOLS.

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