

## mV/V & SMART TORQUE TRANSDUCERS





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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 34258.

## 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 (TST, TTT, T-Box XL, etc.) and should be ignored for other applications. Torque transducers can be supplied as Static, Rotary, Flange Mounted Transducer (FMT) or Annular, with the rotary transducers and a range of annular transducers having the option of an integral quadrature angle encoder.

## Transducer Leads Available

Transducer	Lead Part Number	
	Norbar Display (TST, TTT, T-Box XL etc.)	Non-Norbar Display (No Connector at Display End)
Static or Annular (6 way AB05 connector)	60217.200	60225.200
Rotary (10 way AB05 connector)	60216.200	60224.200
FMT	Fitted to transducer	Not applicable
Torque & Angle Annular (10 way push-pull connector)	60308.200	60307.200
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 metres. If transducer leads are required of a non-standard length (to the nearest metre), the new suffix must be added to the part number when ordering.

**NOTE:** For Harsh Environment (HE) transducers and the TTL-HE display instrument, contact Norbar for information on Transducer Leads.



## 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
	60 / 150 / 400	Vertical	3 x M8	No	Through	Ø 90mm PCD	25
	1500	Vertical	3 x M12	No	Through	Ø 150mm PCD	85

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

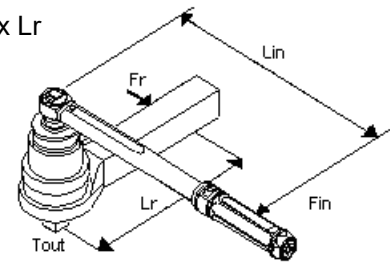
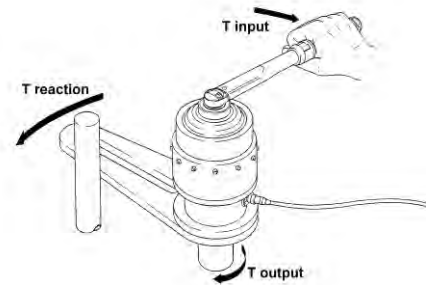
This can be shown as:  $T_{\text{output}} = T_{\text{reaction}} + T_{\text{input}}$

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 ( $T_{\text{output}}$ ) is equal to the measured torque ( $T_{\text{reaction}}$ ).**



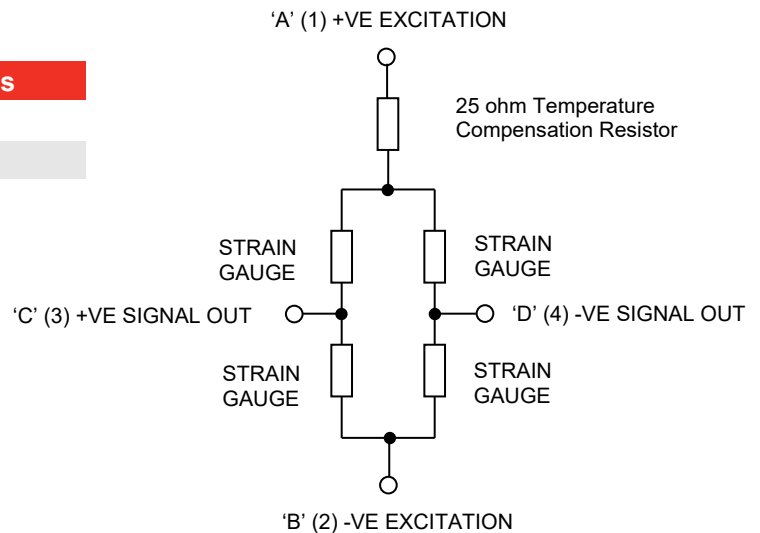
## INTERFACING TRANSDUCER WITH NON NORBAR EQUIPMENT

### Torque Transducer Wiring Diagram

#### Nominal Resistance Between Terminals

A & B  $375 \pm 6$  ohms

C & D  $350 \pm 2$  ohms



**NOTE: ROTARY transducers do not have the 25 ohm Temperature Compensation Resistor fitted, so their A & B resistance is  $350 \pm 2$  ohms.**

**NOTE: The differential voltage output for STATIC and ROTARY transducers goes positive for clockwise torques, and negative for anti-clockwise torques. Annular transducers go positive for anti-clockwise and negative for clockwise torques as they are designed to measure reaction torque.**

**NOTE: Some transducers have eight 175 ohm gauges, rather than four 350 ohm gauges, but will still resistively conform to the above diagram.**

## 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 (5)	Digital 0 volts
F (6)	Digital 5 volts
G (7)	Angle Signal channel A
H (8)	Angle Signal channel B
J (9)	SCLK (Serial Clock)
K (10)	SDA (Serial Data)

Pin Connections (6 Way)	
A (1)	+VE EXCITATION
B (2)	-VE EXCITATION
C (3)	+VE SIGNAL OUT
D (4)	-VE SIGNAL OUT
E (5)	SCLK (Serial Clock)
F (6)	SDA (Serial Data)

**NOTE:** For Annular Transducers, C(3) = -ve, and D(4) = +ve signal out when measuring clockwise torque.

**NOTE:** Numbers in brackets are for transducers with push-pull style connectors. 10 Way push-pull connectors are fitted to FMT and Torque & Angle Annular transducers. 6 Way push-pull connectors are fitted to Harsh Environment (HE) 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 (10 WAY PUSH-PULL) CONNECTOR.



**WARNING:** ONLY CONNECT TO PINS E, F, G & H ON THE 10 WAY AB05, OR PINS 5, 6, 7 & 8 ON THE 10 WAY PUSH-PULL 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·in as standard.
Maximum Bridge Excitation	5 Volts D.C.
Zero setting tolerance	Better than $\pm 1\%$ Full Scale Deflection (F.S.D.)
Operating Temperature Range	-10°C - +50°C.
Storage Temperature Range	-20°C - +70°C.
Temperature Co-efficient	$< \pm 0.01\%/^{\circ}\text{C}$ of F.S.D. on zero. $< \pm 0.005\%/^{\circ}\text{C}$ of Reading on span (Rotary transducers $< \pm 0.03\%/^{\circ}\text{C}$ )
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
50743.LOG	100,000 lbf·ft	110 %
50625.IND or .LOG	250 lbf·ft	110 %
50663.IND or .LOG	6000 N·m	110 %
50667.IND or .LOG	1500 N·m	110 %
50668.IND or .LOG	2000 N·m	110 %
50781.IND or .LOG	50,000 N·m	110 %
QXXXX.IND or .LOG	-	Please contact Norbar

**NOTE:** If using an FMT 2 N·m (50671.XXX or 50677.XXX) with a Series 1 TST or TTT (43198 – 43201) or a Pro-Log Display Instrument (40330), please contact Norbar.

### Specific Details for Rotary Transducers Part Numbers 50708.XXX(X) to 50724.XXX(X)

Drive (inches)	Rotary Capacity			Angle Output (p.p.r.) (2 Channel Quadrature)	Maximum Speed (r.p.m.)	
	N·m	lbf·ft	lbf·in		*Continuous	*Intermittent
¼ Hex	5	-	50	208	5000	11,000
¼ Hex	20	-	-	208	5000	11,000
¼ Square	20	15	-	208	5000	11,000
⅜ Square	75	50	-	256	5000	11,000
½ Square	200	150	-	384	2500	7600
¾ Square	250	200	-	512	2000	5000
¾ Square	500	300	-	512	2000	5000
1 Square	1500	1000	-	640	1000	4400

Angle power requirements +5V DC (40mA<sub>max</sub>)

\*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.**

### Specific Details for Torque & Angle Annular Transducers

Part Number	Drive (inches)	Transducer Capacity N·m	Angle Output (2 Channel Quadrature)
50820.INDA or .LOGA	¾ Square	1000	288 Pulses per revolution (ppr)
50821.INDA or .LOGA	1 Square	1500	288 Pulses per revolution (ppr)
50822.INDA or .LOGA	1 Square	3500	288 Pulses per revolution (ppr)
50834.INDA or .LOGA	1.5 Square	5000	400 Pulses per revolution (ppr)
50824.INDA or .LOGA	1.5 Square	10000	400 Pulses per revolution (ppr)
50825.INDA or .LOGA	2.5 Square	20000	520 Pulses per revolution (ppr)
50826.INDA or .LOGA	2.5 Square	35000	800 Pulses per revolution (ppr)
50827.INDA or .LOGA	2.5 Square	50000	800 Pulses per revolution (ppr)
50828.INDA or .LOGA	3.5 Square	100000	800 Pulses per revolution (ppr)
50831.INDA or .LOGA	6 Square	300000	1440 Pulses per revolution (ppr)

Angle power requirements +5V DC (75mA<sub>max</sub>)



NOTES

# NOTES

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