


















LEGEND









TORQUE WRENCHES

 Accuracy (%)	 Ratchet	 Digital Display
 Single Scale	 Torque Handle	 IP Rated
 Dual Scale	 Fixed	 Case Included
 Multi Scale	 Declaration of Conformance	 Calibration Certificate
 Adjustment Lock	 Torque & Angle	







MANUAL TORQUE MULTIPLIERS

 Accuracy (%)	 Calibration Certificate	 Anti Wind-up Ratchet
 Adjustable Reaction	 UKAS Certification	 Case Included

POWERED TORQUE MULTIPLIERS

 Accuracy (%)	 2 Speed	 Calibration Certificate
 Dual Scale	 Bi-Directional	 IP Rated
 Multi Scale	 Adjustable Reaction	 19° Air Consumption - litres/sec
 Lifting Attachment	 Torque & Angle	 Case Included








TORQUE MEASUREMENT INSTRUMENTS

 Accuracy (%)	 Digital Display	 Case Included
 Multi Transducers	 Calibration Certificate	 Back-up Data
 Multi Scale	 UKAS Certification	






HYDRAULIC TOOL CALIBRATION FIXTURES

 Accuracy (%)		
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HARSH ENVIRONMENT INSTRUMENTS

 Accuracy (%)	 UKAS Certification	 Case Included
 Multi Transducers	 IP Rated	
 Multi Scale	 Digital Display	

ULTRASONIC MEASUREMENT

 Multi Scale	 Back-up Data	 Case Included
 Digital Display	 Calibration Certificate	

CALIBRATION BEAMS & WEIGHTS

 UKAS Certification	 Case Included	
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CONTENTS

CONTENTS

About Norbar	2
Introduction to Torque	3
ISO 6789:2017	9
Torque Screwdrivers	11
TT Torque Wrenches	11
TTi Tethered Torque Wrenches	12
TTi Non-Magnetic Torque Wrenches	12
NorTorque® Torque Wrenches	13
Slimline™ Torque Wrenches	15
Professional Torque Wrenches Model 5	16
Professional Torque Wrenches	17
Professional 'P' Type Torque Wrenches	21
Professional Torque Wrenches Models 650 - 1500	23
Industrial Torque Wrenches	25
Electrode Torque Wrenches	28
ClickTronic® Torque Wrenches	29
NorTronic® Torque Wrenches	31
Insulated Torque Wrenches	32
Spanner End Fittings	33
HandTorque® Torque Multipliers	38
Powered Torque Tools	50
Lubro Control Units	74
Tool Controllers	75
Torque Measurement	76
Transducers	84
Loaders & Attachments	89
Test Fixtures	93
Hydraulic Tool Calibration Fixtures	95
Harsh Environment HE Range	98
Ultrasonic Measurement	104
Calibration Beams & Weights	106
Spares Kits	109
Service Replacement Policy	109
Calibration Services	113
Global Service	118
Terms & Conditions	119



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ABOUT NORBAR



GLOBAL SERVICE

We are the world's leading specialist in torque control and we are engaged solely in the design, development and production of torque tightening and measuring equipment. Our customers include manufacturers and engineering services in such diverse sectors as aerospace, energy, oil and gas, mining and sub-sea.

There are sales and service branches in Australia, New Zealand, North America, Singapore, China and India. In addition, we have distributors of our torque control products in more than 60 countries around the world.

A FAMILY RUN BUSINESS

The Brodey family has been a part of Norbar since Bill Brodey and his partner Ernest Thornitt incorporated the company in 1943. We are now the third generation of the family to manage the business and are passionate about its every aspect. In 2018 we are proud to celebrate our 75th anniversary. From our humble beginnings in a small workshop in Banbury town centre, Norbar has grown into an international group of companies that leads the field of torque control. However, what has not changed in 75 years is that our product range is still substantially manufactured in Banbury with many suppliers in the surrounding area and we are still dedicated to being the best at what we do. As Bill Brodey's original slogan stated "made in Banbury in accordance with time-honoured tradition".

This year we are also excited to be extending our Professional Torque Wrench range with the additions of Model 15 and 25. These models are not just Professional wrenches with a lower calibrated range but an entirely new and miniaturised version of the larger models. Following the successful launch of the HT3-1000 compact torque multiplier in 2017, this model will be followed in 2018 by 2000 N·m and 3000 N·m versions bringing a complete revamp to the ever popular HT3 family (the older models remaining in production for an overlap period). Early in 2018 we will be launching the highly anticipated automated version of our Torque Wrench Calibrator, designed to facilitate the effortless calibration of torque wrenches to ISO 6789-2:2017.

We continue to invest in the very latest design, manufacturing and quality control technology to achieve the highest level of innovation and precision in the field of torque control and equipment.



The Norbar Directors from left to right: Philip Brodey (Sales & Marketing Director), Catherine Rohll (Commercial Director), Craig Brodey (Director), Neill Brodey (Managing Director)



INTRODUCTION TO TORQUE

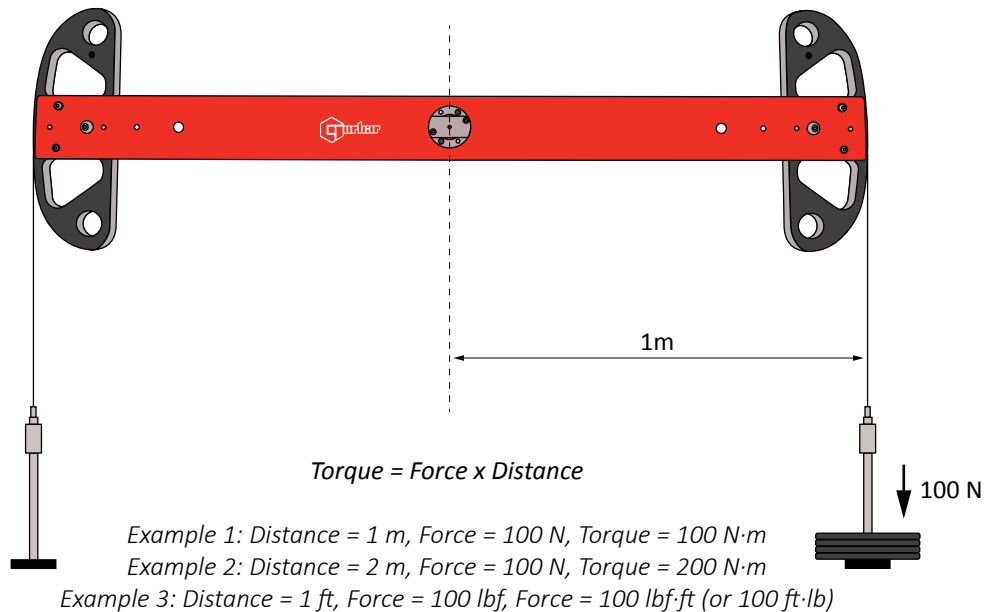
What is Torque?

Torque is any force or system of forces that tends to cause rotation about an axis.

Measurement of Torque

Imagine someone tightening a bolt using a socket attached to a meter (m) long bar. If they apply 10 kg of force (kgf) perpendicular to the bar they will produce a torque of 10 kgf·m at the axis (the centre of the bolt).

However, under the S.I. system of measurement, force is expressed in Newtons (N) rather than kgf. The conversion between kgf and N is x 9.807 so the person is applying 98.07 N·m of torque.



The Importance of Torque Control

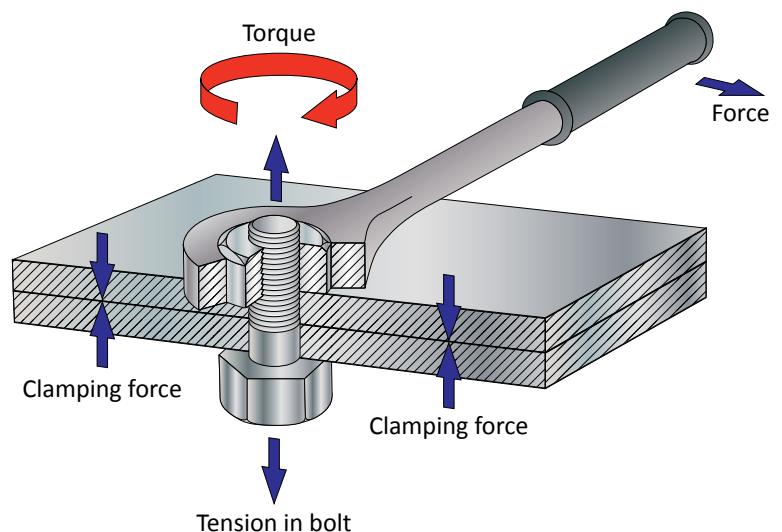
Although many methods exist to join two or more parts together, the ease of assembly and disassembly provided by threaded fasteners make them the ideal choice for many applications.

The object of a threaded fastener is to clamp parts together with a tension greater than the external forces tending to separate them. The bolt then remains under constant stress and is immune from fatigue. However, if the initial tension is too low, varying loads act on the bolt and it will quickly fail. If the initial tension is too high, the tightening process may cause bolt failure. Reliability therefore depends upon correct initial tension. The most practical way of ensuring this is by specifying and controlling the tightening torque.

Bolt Tension

When an assembly is clamped by tightening a nut and bolt, the induced tension causes the bolt to stretch. An equal force acts to compress the parts which are thus clamped.

The proof load of a bolt, normally established by test, is the load which just starts to induce permanent set – also known as the yield point. Typically bolts are tightened to between 75% and 90% of yield.

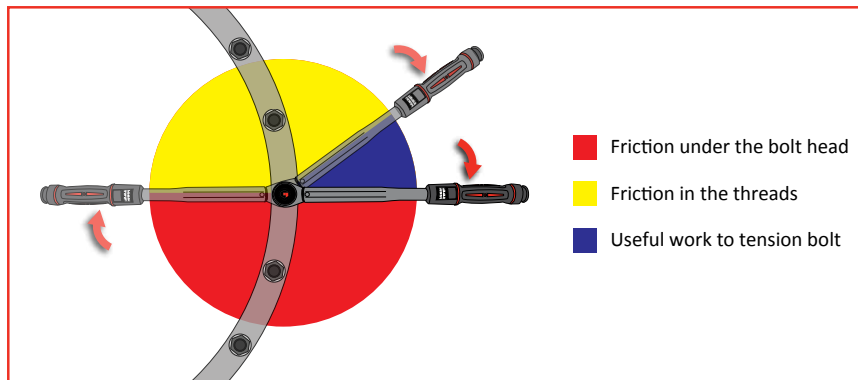




INTRODUCTION TO TORQUE

Friction in the Bolted Joint

When a threaded fastener is tightened, the induced tension results in friction under the head of the bolt and in the threads. It is generally accepted that as much as 50% of the applied torque is expended in overcoming friction between the bolt head and the abutting surface and another 30% to 40% is lost to friction in the threads. As little as 10% of the applied torque results in useful work to tension the bolt.



Given that up to 90% of the applied torque will be lost to friction, it follows that any changes in the coefficient of friction resulting from differences in surface finish, surface condition and lubrication can have a dramatic effect on the torque versus tension relationship. Some general points can be made:

- Most torque tightened joints do not use washers because their use can result in relative motion between the nut and washer or the washer and joint surface during tightening. This has the effect of changing the friction radius and hence affects the torque-tension relationship. Where a larger bearing face is required then flange nuts or bolts can be used. If washers are to be used, hard washers with a good fit to the shank of the bolt give lower and more consistent friction and are generally to be preferred.
- Degreasing fasteners of the film of oil usually present on them as supplied will decrease the tension for a given torque and may result in shear of the fastener before the desired tension is achieved.
- Super lubricants formulated from graphite, molybdenum disulphide and waxes result in minimal friction. Unless allowance is made in the specified tightening torque, the induced tension may be excessive causing the bolt to yield and fail. However, used in a controlled manner, these lubricants serve a useful purpose in reducing the torque to produce the desired tension meaning that a lower capacity tightening tool can be used.
- For reasons of appearance or corrosion resistance, fasteners may be plated. These treatments affect the coefficient of friction and therefore the torque versus tension relationship.
- Friction is often deliberately introduced into the fastener to reduce the possibility of loosening due to vibration. Devices such as lock-nuts must be taken into account when establishing the correct tightening torque.

As a rough guide, the calculated tightening torque should be multiplied by the factor from the table below according to surface treatment and lubrication.

		Surface Condition of Bolt			
		Untreated	Zinc	Cadmium	Phosphate
Surface Condition of Nut	Untreated	1.00	1.00	0.80	0.90
	Zinc	1.15	1.20	1.35	1.15
	Cadmium	0.85	0.90	1.20	1.00
	Phosphate and oil	0.70	0.65	0.70	0.75
	Zinc with wax	0.60	0.55	0.65	0.55



INTRODUCTION TO TORQUE

Tightening to Yield

Bolts tightened to yield provide consistently higher preloads from smaller diameter bolts. The reduced fastener stiffness reduces the fatigue loading to which the bolt is subjected under repeated external load reversals, e.g. cylinder heads and connecting rods.

In theory, a bolt tightened to its yield point will provide the strongest and most fatigue-resistant joint possible, within the physical limitations of the bolt material and manufacturing process.

The downside of this method is the cost of the sophisticated equipment necessary to determine when the bolt goes into yield.

Torque Tension Calculator

For further information and guidance on establishing the correct tightening torque for a fastener, see Norbar's web based calculator, www.norbar.com/Home/Torque-Tension-Calculator

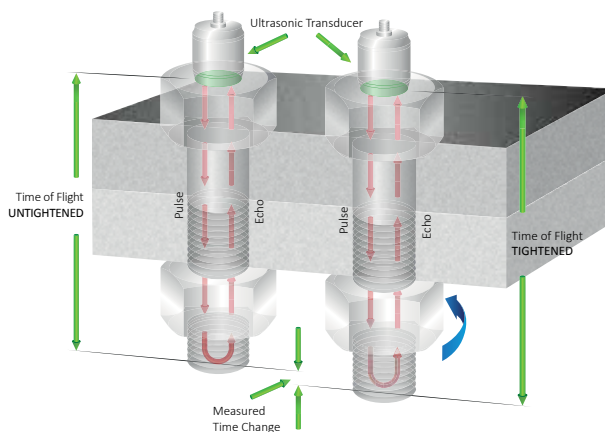


The screenshot shows the Norbar Torque Tension Calculator interface. It features a header with the Norbar logo and two main calculation boxes: 'Calculated Maximum Torque' (N.m.: 0.05, lbf. ft.: 0.04) and 'Calculated Maximum Load' (kN: 0.15, lbf: 34.7). Below these are 'Bolt Properties' with sliders for Bolt Diameter (1.6 mm), Yield Stress (180 Nmm2), Pitch (0.35 mm), Pitch Diameter (1.373 mm), Root Diameter (1.171 mm), and Hex A/F Diameter (3.2 mm). To the right are 'Standard Parameters' (Bolt Type: Metric Coarse, Bolt Dia: 1.6, Grade: 3.6) and 'Friction Coefficients' (Thread: 0.14, Head: 0.14). A disclaimer at the bottom states: 'These torque and load values are for guidance only! Always check with equipment/bolt manufacturer'.

When Torque Doesn't Equal Tight

As we have established, it is the tension in a fastener rather than the torque that is the critical factor. Torque is an indirect means of establishing tension and in a correctly engineered joint and with a controlled tightening process, it is a satisfactory method under the majority of circumstances.

However, in joints that are highly critical due to safety or the cost and implications of machine down-time, a more direct means of establishing tension is needed. Various methods exist including several types of load indicating bolt or washer. However, one of the most versatile methods is to measure the extension of the bolt due to the tightening process using ultrasound and this is exactly what Norbar's USM-3 does. For full details of this instrument see page 105 and Norbar's web site: www.norbar.com.







INTRODUCTION TO TORQUE

Recommended Maximum Torque Values

The information supplied here is intended to be an acceptable guide for normal conditions. For critical applications, further information and research will be necessary. The following basic assumptions have been made:

- Bolts are new, standard finish, uncoated and not lubricated (other than the normal protective oil film)
- The load will be 90% of the bolt yield strength
- The coefficient of friction is 0.14
- The final tightening sequence is achieved smoothly and slowly

If lubrication is to be applied to the nut/bolt, multiply the recommended torque by the appropriate factor shown in the table on page 4. Alternatively, use the Torque/Tension Calculator on the Norbar website (shown on page 5) which enables fastener and friction conditions to be modified with ease.

 M	BOLT GRADE									 mm
	3.6	4.6	5.6	5.8	6.8	8.8	9.8	10.9	12.9	
	Torque in N·m									
M 1.6	0.05	0.07	0.09	0.11	0.14	0.18	0.21	0.26	0.31	3.2
M 2	0.11	0.14	0.18	0.24	0.28	0.38	0.42	0.53	0.63	4
M 2.5	0.22	0.29	0.36	0.48	0.58	0.78	0.87	1.09	1.31	5
M 3	0.38	0.51	0.63	0.84	1.01	1.35	1.52	1.9	2.27	5.5
M 4	0.71	0.95	1.19	1.59	1.91	2.54	2.86	3.57	4.29	7
M 5	1.71	2.28	2.85	3.8	4.56	6.09	6.85	8.56	10.3	8
M 6	2.94	3.92	4.91	6.54	7.85	10.5	11.8	14.7	17.7	10
M 8	7.11	9.48	11.9	15.8	19	25.3	28.4	35.5	42.7	13
M 10	14.3	19.1	23.8	31.8	38.1	50.8	57.2	71.5	85.8	17
M 12	24.4	32.6	40.7	54.3	65.1	86.9	97.9	122	147	19
M 14	39	52	65	86.6	104	139	156	195	234	22
M 16	59.9	79.9	99.8	133	160	213	240	299	359	24
M 18	82.5	110	138	183	220	293	330	413	495	27
M 20	117	156	195	260	312	416	468	585	702	30
M 22	158	211	264	352	422	563	634	792	950	32
M 24	202	270	337	449	539	719	809	1011	1213	36
M 27	298	398	497	663	795	1060	1193	1491	1789	41
M 30	405	540	675	900	1080	1440	1620	2025	2430	46
M 33	550	734	917	1223	1467	1956	2201	2751	3301	50
M 36	708	944	1180	1573	1888	2517	2832	3540	4248	55
M 39	919	1226	1532	2043	2452	3269	3678	4597	5517	60
M 42	1139	1518	1898	2530	3036	4049	4555	5693	6832	65
M 45	1425	1900	2375	3167	3800	5067	5701	7126	8551	70
M 48	1716	2288	2860	3813	4576	6101	6864	8580	10296	75
M 52	2210	2947	3684	4912	5895	7859	8842	11052	13263	80
M 56	2737	3650	4562	6083	7300	9733	10950	13687	16425	85
M 60	3404	4538	5673	7564	9076	12102	13614	17018	20422	90
M 64	4100	5466	6833	9110	10932	14576	16398	20498	24597	95
M 68	4963	6617	8271	11029	13234	17646	19851	24814	29777	100



INTRODUCTION TO TORQUE

Torque Conversion Factors

Units to be converted	S.I. Units		Imperial Units			Metric Units	
	cN·m	N·m	ozf·in	lbf·in	lbf·ft	kgf·cm	kgf·m
1 cN·m =	1	0.01	1.416	0.088	0.007	0.102	0.001
1 N·m =	100	1	141.6	8.851	0.738	10.20	0.102
1 ozf·in =	0.706	0.007	1	0.0625	0.005	0.072	0.0007
1 lbf·in =	11.3	0.113	16	1	0.083	1.152	0.0115
1 lbf·ft =	135.6	1.356	192	12	1	13.83	0.138
1 kgf·cm =	9.807	0.098	13.89	0.868	0.072	1	0.01
1 kgf·m =	980.7	9.807	1389	86.8	7.233	100	1

FORCE

$$\text{lbf} \times 4.45 = \text{N}$$

$$\text{N} \times 0.225 = \text{lbf}$$

FLOW

$$\text{l/s} \times 2.119 = \text{cu·ft/min}$$

$$\text{cu·ft/min} \times 0.472 = \text{l/s}$$

PRESSURE

$$\text{lbf/in}^2 \times 0.069 = \text{bar}$$

$$\text{bar} \times 14.504 = \text{lbf/in}^2$$

POWER

$$\text{hp} \times 0.746 = \text{kW}$$

$$\text{kW} = \frac{\text{N·m} \times \text{rev/min}}{9546}$$

Formulae

Accepted formulae relating torque and tension, based on many tests are:-

For Imperial Sizes

$$M = \frac{P \times D}{60}$$

M = torque lbf·ft
P = bolt tension lbf
D = bolt diameter (ins)

For Metric Sizes

$$M = \frac{P \times D}{5000}$$

M = torque N·m
P = bolt tension Newtons
D = bolt diameter (mm)

These formulae may be used for bolts outside the range of the tables.

Formula for Calculating the Effect of Torque Wrench Extensions

$$M1 = M2 \times L1/L2$$

Where L1 is the normal length and L2 is the extended length, M1 is the set torque and M2 the actual torque applied to the nut.

Example

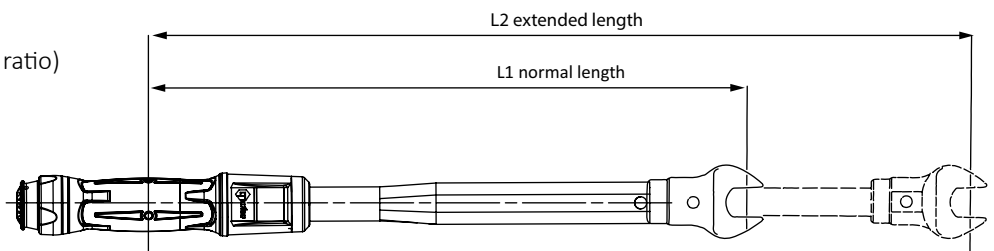
The required torque on the fastener is 130 N·m (M2) but what do you set on the torque wrench scale?

$$L1 = 500 \quad L2 = 650$$

(units of length not important, this is ratio)

$$M1 = 130 \times 500/650$$

$$M1 = 100$$



For further information and guidance on converting torque and calculating the effect of torque wrench extensions download our purpose built applications for iPhone and Android.



TORQUE MEASUREMENT

Norbar started manufacturing electronic torque measuring instruments in the early 1970s and now offers a comprehensive range, from the easy to use, cost effective TruCheck™ through to the sophisticated T-Box XL™ and TDMS software, which provides the complete solution for torque tool calibration, data logging and data management. Norbar's torque measuring instruments are renowned for high accuracy and superb reliability. Indeed, many of those early instruments are still in regular use today. For our interchangeable transducer instruments, we remain one of the few manufacturers in the world that issue a UKAS accredited calibration certificate both for the instrument and for the torque transducer. In doing so, customers can swap combinations of instrument and transducer while retaining complete traceability.

Norbar's torque transducers have established an excellent reputation based on exceptional quality and accuracy. A very wide torque range is covered, 0.04 N·m to 300,000 N·m and three basic transducer configurations are offered; Static, Impulse Rotary and Annular.

All transducers up to 100,000 N·m are supplied as standard with a UKAS accredited calibration certificate from Norbar's in-house laboratory.

For customers who wish to take advantage of Norbar's transducers but have an existing, non Norbar display instrument, transducers can be provided with a mV/V calibration.

Norbar's instruments and transducers are complemented by a wide range of ancillary products. Within this group are the products that would be required to set up a torque calibration laboratory, for example, torque wrench calibrators meeting ISO requirements and precision beam and weight systems for calibration of torque transducers.

Torque Measurement	77
TruCheck™ 0.1 N·m - 25 N·m	78
TruCheck™ 10 N·m - 2000 N·m	79
Pro-Test	80
TST	81
TTT	82
T-Box XL™	83
TDMS Software	83
Spares for Instrumentation Products	84
Part Number Suffix System	84
Transducers FMT	84
Static Transducers	85
Rotary Transducers	86
Annular Transducers	87
Transducer Leads	88
Torque Wrench Calibrator - Manual	89
Torque Wrench Calibrator - Ancillaries	90
ISO 3000 Loader	90
Torque Wrench Calibrator - Auto	91
Test Fixtures	93





TORQUE MEASUREMENT

Measurement and Calibration - Glossary of Terms

The following information may help in selecting the appropriate measuring device for your needs.

Accuracy

The precision of the instrument which can be reported in three ways.

1. By quoting the guaranteed tolerance as a percentage of the reading or indicated value (eg. "0.5% of Reading").
2. By quoting the guaranteed tolerance as a percentage of the full scale value of the instrument (eg. 0.1% FS or 0.1% FSD).
3. By quoting a 'class' of device in accordance with BS7882:2017 "Method for calibration and classification of torque measuring devices".

Modes of Operation

First Peak of Torque - when a "click type" torque wrench signals that the set torque has been achieved, the applied torque will momentarily drop before climbing again. Generally the fastener stops rotating at point 1, and from a standstill, the breakaway torque to achieve further rotation of the fastener will be higher than point 3b. Only if the operator is very insensitive to the break point will the final tightening effort be incorrect.

"First Peak of Torque" mode will detect the break point of the torque wrench, not the highest torque applied.

Peak Torque - this mode of operation will record the highest torque applied. In the case of a "click type" torque wrench this may be higher than the actual break point if the wrench continues to be loaded beyond the break.

Consequently, Peak Torque is more useful for calibrating devices without a break signal such as dial or electronic wrenches.

Track - this mode has no memory at all. When the load is removed the display will return to zero.

Track is used for calibrating the device itself or for monitoring a fluctuating torque.

Resolution

The smallest measurement interval that can be determined on the indicating device. This applies to analogue and digital devices.

Number of Digits

Digital displays are described as having a certain number of 'digits' or 'active digits'. Half digits can be used to increase the resolution of a device without the expense of going to an additional full active digit.

E.g. 1. 1000 N·m displayed on a 4 digit system would read 1000 (resolution = 1 N·m).

E.g. 2. 1000 N·m displayed on a 4½ digit system would read 1000.0 (resolution = 0.1 N·m).

Active digits change as the torque changes. Non active digits only assist in showing the magnitude of the torque. For example, 10,000 N·m requires 5 digits to display its magnitude.

E.g. 3. With 4 active digits (and 1 passive digit), 10,000 N·m would change in steps of 10 N·m.

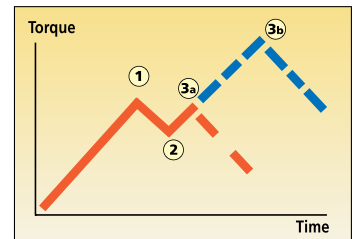
E.g. 4. With 4½ or 5 active digits, 10,000 N·m would change in steps of 1 N·m.

Signal Processing

Electronic Circuitry falls broadly into two types, analogue and digital, with most electronic measurement systems comprising a mixture of the two. There are also whole analogue electronic systems, but these are rare in torque measurement. Most systems start with an analogue signal. The point at which the signal is converted defines the type.

Analogue systems – one in which the signal is processed before being converted to digital.

Digital systems – the original analogue signal is converted to digital before processing.



- 1 = Torque wrench activates
- 2 = 'Click' heard
- 3a = Wrench released quickly
- 3b = Wrench released slowly



TRUCHECK™ 0.1 N·m - 25 N·m



TruCheck™ Plus 25



TruCheck™ Plus 3

For simple, cost effective testing of torque screwdrivers and torque wrenches

- Allows torque tool performance to be monitored and tools kept in peak condition
- Two versions, TruCheck™ and TruCheck™ Plus
- Basic version has no settable options. Ideal for non-expert users
- TruCheck™ Plus allows selection of torque units and modes for 'click' and dial type wrenches
- 'Plus' version allows operator to set a target value and tolerance
- Supplied with traceable calibration certificate

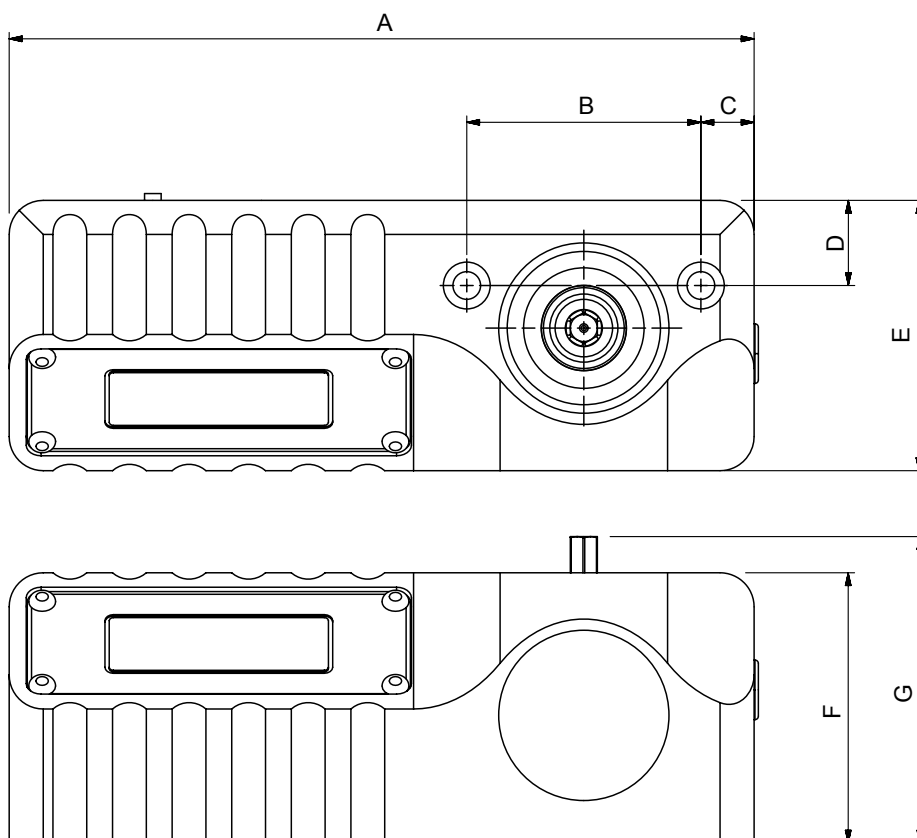
4	TRUCHECK™
43253*	TruCheck™ 0.1 - 3.0 N·m
43250*	TruCheck™ Plus 0.1 - 3.0 N·m
43254*	TruCheck™ 1 - 10 N·m
43251*	TruCheck™ Plus 1 - 10 N·m
43255*	TruCheck™ 1 - 25 N·m
43252*	TruCheck™ Plus 1 - 25 N·m

* 43250, 43251, 43253 and 43254 supplied with ¼" female hex to female sq. adaptor

† 43252 and 43255 supplied with ¼" female hex to ¼" female sq. adaptor and ¼" female hex to ⅜" female sq. adaptor

NOTE: UKAS accredited calibration is from 2% to 100% of full scale for 43253 & 43250 and from 10% to 100% of full scale for 43254 & 43251 and from 4% to 100% of full scale for 43255 & 43252.

Model		TruCheck™/Plus 0.1- 25 N·m
Part Number/s		43253 43250 43254 43251 43255 43252
Range		0.1- 3.0 N·m 1- 10 N·m 1- 25 N·m
Accuracy		±1%, ±1 digit over stated operating range
Display		4 digit, 7 segment LED
Dimensions (mm)	A	175
	B	55
	C	13
	D	20
	E	64
	F	64
	G	72
Weight (Kg)		2.6





TRUCHECK™ 10 N·m - 2000 N·m



One of the concerns in putting a torque tester into an environment where people are not calibration specialists is that incorrect selections will be made with the potential of incorrect tool setting and consequently joint failure.

The 'TruCheck™' torque wrench testers aim to cut the cost of purchasing a torque wrench calibration system, and remove the fears over the complexity of using such equipment.

There are two versions available, the 'TruCheck™' being the most basic version, and the 'TruCheck™ Plus' having greater functionality, to offer more flexibility.

4	TRUCHECK™
43221*	TruCheck™ 10 - 350 N·m
43226*	TruCheck™ 10 - 250 lbf·ft
43222*	TruCheck™ Plus 10 - 350 N·m
43230*	TruCheck™ 100 - 1000 N·m
43237*	TruCheck™ 75 - 750 lbf·ft
43231*	TruCheck™ Plus 100 - 1000 N·m
43244®	TruCheck™ 200 - 2000 N·m
43245®	TruCheck™ Plus 200 - 2000 N·m
TCACC.CW	UKAS accredited calibration - clockwise
TCACC. CW+CCW	UKAS accredited calibration - clockwise and counter clockwise

* 43221, 43222 and 43226 supplied with ½" female square drive

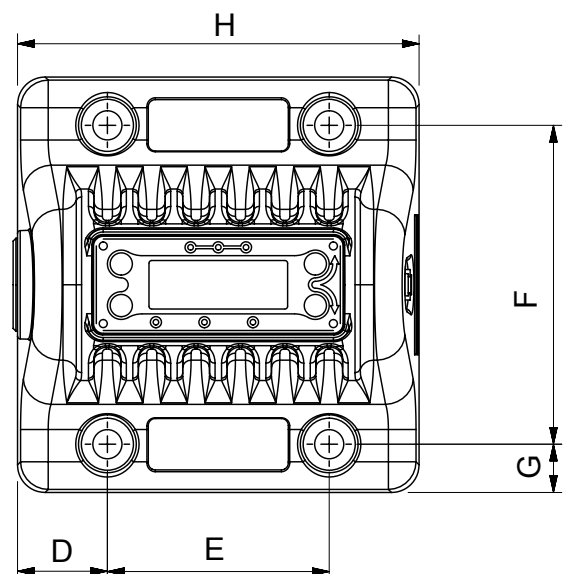
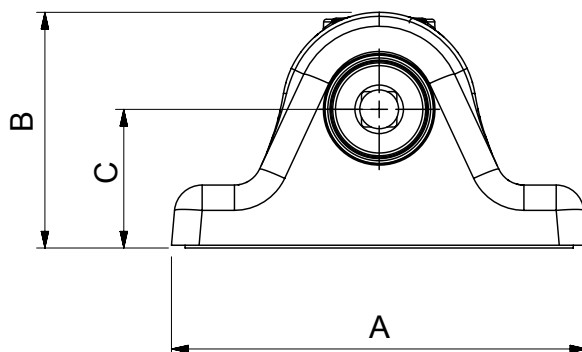
+ 43230, 43231 and 43237 supplied with 27 mm male hexagon plus ¾" sq. dr. socket

® 43244 and 43245 supplied with 27 mm male hexagon plus 1" sq.dr socket

NOTE: UKAS accredited calibration is from 5% to 100% of full scale for 43221, 43226, 43222 and 10% to 100% for 43230, 43231, 43237, 43244 & 43245.

NOTE: If you order a UKAS accredited calibration, this certificate will be provided in place of the traceable calibration certificate.

Model	TruCheck™/Plus 10- 350 N·m	TruCheck™ 100- 1000 N·m	TruCheck™ Plus 100- 1000 N·m	TruCheck™/Plus 200- 2000 N·m
Part Number/s	43221 43226 43222	43230 43237	43231	43244 43245
Range	10- 350 N·m 10- 250 lbf·ft	100- 1,000 N·m 75- 750 lbf·ft	100- 1,000 N·m	200- 2,000 N·m
Accuracy	±1%, ±1 digit over stated operating range			
Display	4 digit, 7 segment LED			
Dimensions (mm)	A	150	150	150
	B	85	85	85
	C	50	50	50
	D	33	33	33
	E	80	80	80
	F	115	115	115
	G	18	18	18
	H	145	145	145
Weight (Kg)	3.1	4.7	4.7	5.7





PRO-TEST



The Professional Torque Tester - Series 2, Pro-Test, is an accurate, highly specified and easy to operate instrument for testing and calibrating all types of torque wrench.

- 'Pro-Test' is priced to make in-house testing a viable proposition even for the smaller industrial and automotive torque wrench user
- Guaranteed classification to BS7882:2017, Class 1 or better over the primary calibration range (20% to 100% of full scale), Class 2 or better over the secondary calibration range (lowest calibrated value to 20% of full scale). Class 1 equates to $\pm 0.5\%$ of reading
- Three essential operating modes allow the Pro-Test to be used with all torque wrench types 'Track' displays the live value, 'Peak Memory' records the highest value and 'First Peak Memory' records the first peak of torque (for click type torque wrenches). Both memory modes can be used with manual or automatic reset
- Large back lit display is easily visible from a distance and in poor light
- Display and Transducer are hard-wired together with a 600mm cable
- All common units of torque measurement are included
- Pictorial mode selection incorporated for ease of use
- User can select the language they wish to work in (most European languages are included)
- Transducer can be mounted for torque wrench operation in the horizontal or vertical plane
- RS-232-C is included for the output of reading to a printer, PC, data capture unit, SPC software etc
- Optional mounting plate gives greater flexibility of mounting options
- All user settable parameters are menu selectable from the front panel
- Supplied in a robust carry case with a data transfer lead to connect to a PC or printer
- As standard, all transducers are calibrated in a clockwise direction. For additional counter clockwise direction order: Part No. PROTEST.CCW

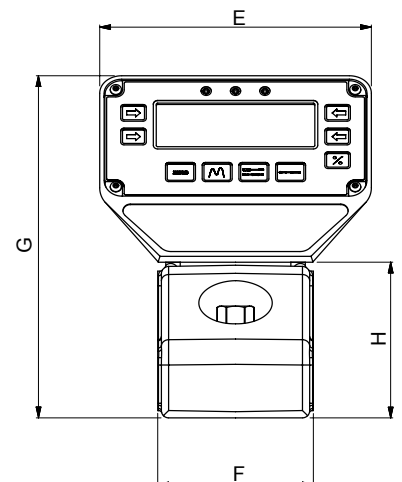
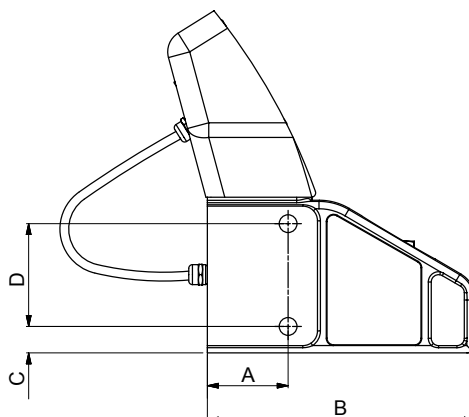


4	PRO-TEST (Professional Torque Tester Series 2)
43218	Pro-Test 60, 1.2 - 60 N·m
43219	Pro-Test 400, 8 - 400 N·m
43220	Pro-Test 1500, 30 - 1500 N·m

4	ANCILLARY PRODUCTS FOR PRO-TEST
62198.BLK9005	Mounting Bracket
60253	12v DC Power Supply for Series 2
29190	1" x 36mm socket
29179	¾" x 36mm socket
29143	½" x 36mm socket
29083	⅜" x 36mm socket
PROTEST.CCW	Counter Clockwise Calibration when ordered with new unit



Model	All Models
Part Number/s	43218 43219 43220
Dimensions (mm)	A 55
	B 182
	C 18
	D 70
	E 185
	F 106
	G 233
	H 106
Weight (Kg)	6.3 (Pro-Test 60) 6.4 (Pro-Test 400) 7.3 (Pro-Test 1500)





TST



The TST combines simplicity and functionality to provide a high quality instrument for the testing and calibration of low capacity torque tools.

Featuring an internal transducer complete with Rundown Fixture, the TST is available in 3 torque ranges, 0.04 to 2 N·m, 0.5 to 10 N·m and 1.25 to 25 N·m. Class 1 system accuracy over its Primary range ($\pm 0.5\%$ of reading from 20% to 100% of full scale).

What makes the TST genuinely versatile is the interface for an external transducer. This interface, accessed by a 2 way switch on the TST, allows the connection of any transducer from Norbar's 'SMART' range and most mV/V calibrated transducers from Norbar or other manufacturers.

- Pictorial display panel for easy mode selection
- Limit detection with low, pass and fail indication. Up to 8 target values can be set
- Digital limit state output for control of external tools
- Operation from fast charge internal battery pack (maximum time of 3 hours 20 minutes for full charge) or a.c. supply (90 to 264 Volts)
- RS-232-C serial data interface for connection to a printer or PC. Continuous RS 232 output when used in track mode (up to 11 readings per sec)
- Pulse count feature in Impulse mode and Clutch Tool mode
- 'SMART' intelligence for transducer recognition
- Memory for calibration details of 20 non-'SMART' mV/V calibrated transducers
- Analogue output allows the instrument to be used as part of a process control system for performance analysis
- User selectable frequency response for each mode of operation
- All user selectable features have password protection. The instrument can be issued to users with only the required modes of operation and units of measure enabled. This feature can virtually eliminate operator induced errors
- $\frac{1}{4}$ " Female Hex to $\frac{1}{4}$ " female square adaptor comes supplied as standard



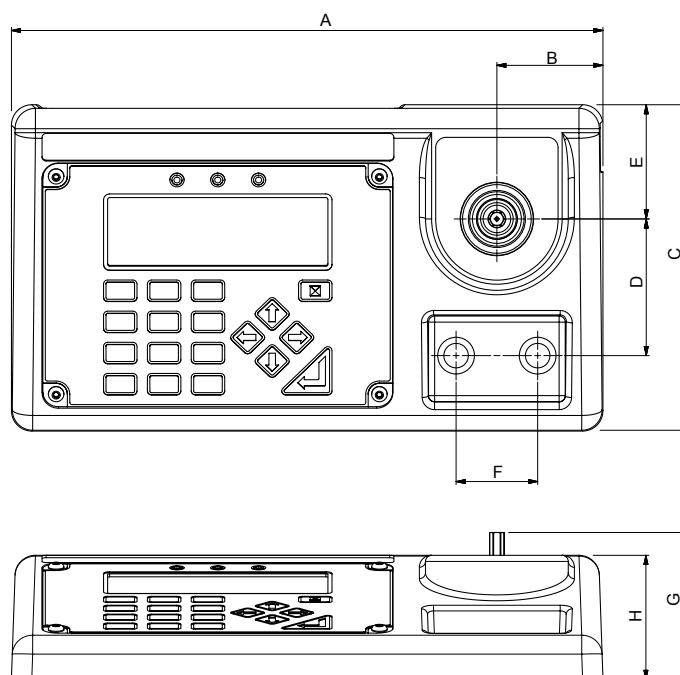
4	TST (Torque Screwdriver Tester Series 2)
43212	TST 2, 0.04 - 2 N·m
43213	TST 10, 0.5 - 10 N·m
43214	TST 25, 1.25 - 25 N·m
TST.CCW	Counter clockwise calibration when ordered with new unit

Above prices exclude Transducer lead for external transducer (see page 88).

TST is supplied complete with a Rundown Fixture for joint simulation. Additional rundowns are available see page 93.



Model	All Models
Part Number/s	43212 43213 43214
Dimensions (mm)	A 290
	B 52
	C 160
	D 67
	E 56
	F 40
	G 72
	H 61
Weight (Kg)	4.7





TTT



The TTT shares all of the extensive features of the TST except that it has no internal transducer. Instead, the TTT offers not one but three external transducer interfaces allowing any three transducers to be simultaneously connected. Selection between the transducers is made by a rotary switch at the back of the instrument case.

Any transducer from Norbar's 'SMART' range and most mV/V calibrated transducers from Norbar or other manufacturers can be connected to the TTT. The 'SMART' feature means that once a transducer has been connected, the instrument will automatically recognise calibration details such as mV/V output, serial number and capacity.

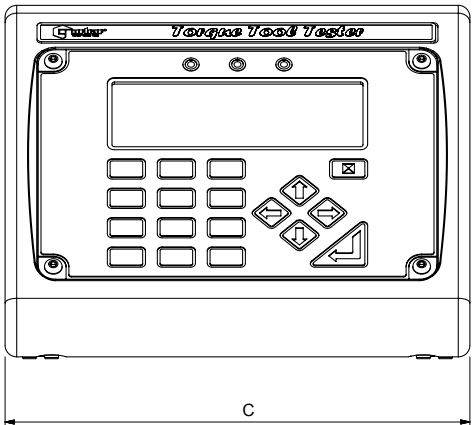
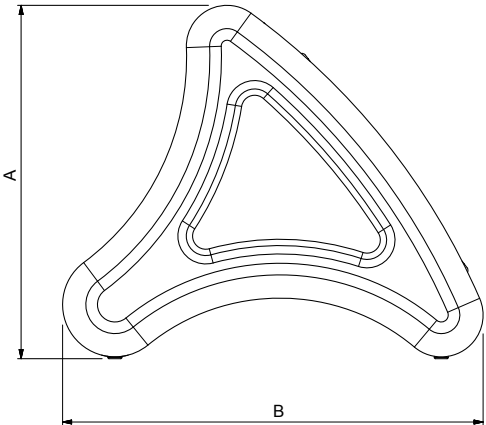
- Pictorial display panel for easy mode selection
- Limit detection with low, pass and fail indication. Up to 12 target values can be set
- Digital limit state output for control of external tools
- Operation from fast charge internal battery pack (maximum time of 3 hours 20 minutes for full charge) or a.c. supply (90 to 264 Volts)
- RS-232-C serial data interface for connection to a printer or PC. Continuous RS 232 output when used in track mode (up to 11 readings per sec)
- Pulse count feature in Impulse mode and Clutch Tool mode
- 'SMART' intelligence for transducer recognition, now displays transducer capacity, units and Serial No
- Memory for calibration details of 20 non-'SMART' mV/V calibrated transducers
- Analogue output allows the instrument to be used as part of a process control system for performance analysis.
- User selectable frequency response for each mode of operation
- All user selectable features have password protection. The instrument can be issued to users with only the required modes of operation and units of measure enabled. This feature can virtually eliminate operator induced errors
- Peak memory modes can now be configured to have auto reset (previously only manual reset was possible)
- Series 3 users can set up their own measurement units, making it possible to interface with non torque transducers, for example load or pressure



4	TTT (TORQUE TOOL TESTER SERIES 3)
43228	TTT Instrument
TTT.CCW	Counter clockwise calibration when ordered with new unit
Above TTT part number excludes Transducer leads (see page 88)	



Model	All Models	
Part Number/s	43228	
Dimensions (mm)	A	152
	B	181
	C	200
Weight (Kg)	4.8	





T-BOX XL™ & TDMS



The T-Box XL™ together with Norbar's Torque Data Management System (TDMS) software provides the complete solution for torque tool calibration, data logging and data management and archiving on your PC.

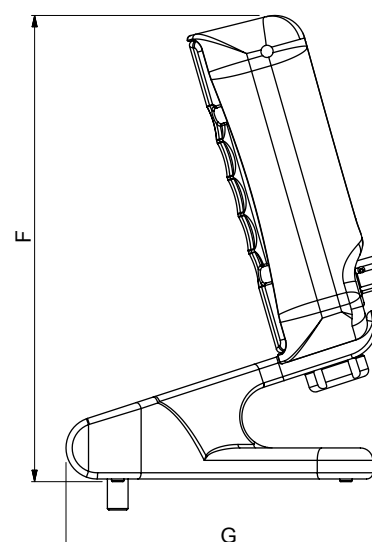
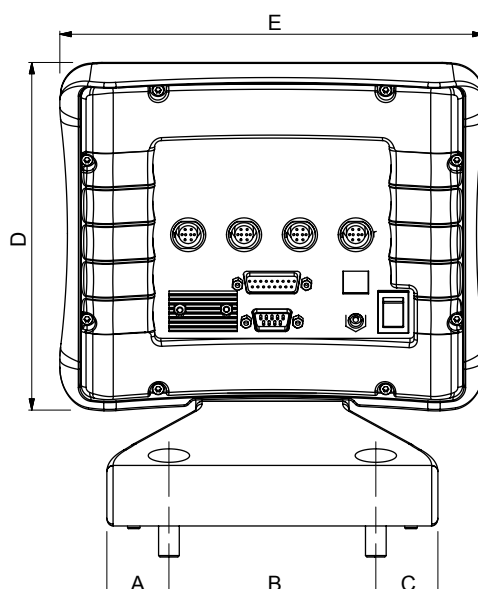
- Can be used as a hand held portable device – using the provided neck strap – or bench mounted
- Features a 7" (178mm) colour touch screen LCD display with on screen graphic icons for simple and easy tool selection
- Can connect up to 4 'SMART' transducers including transducers with angle capabilities for instant connectivity. Alternatively, non Norbar transducers with a mV/V output can be programmed into the T-Box XL™ memory
- 2 USB ports, one RS232 serial port and an ancillary connection (USB cable supplied as standard)
- T-Box XL™ contains a large capacity memory that will enable a user to collect data and store in excess of 100,000 individual test results directly to the instrument and then synchronise to the TDMS software
- Includes 8 modes for torque tool measurement: Track, Click, Dial & Electronic, Stall, Screwdriver, Hydraulic, Graph and Pulse
- Templates for all Norbar tools (Torque Wrenches, PneuTorques & EvoTorques) to enable the operator to easily perform calibrations on their tools to the relevant ISO standard using the in-built calibration program
- Pre-programmed routines for ISO 6789-1:2017 conformance tests and ISO 6789-2:2017 Calibrations
- Automatically guides the user through the calibration routine required for the tool
- In built uncertainty test routines for tools requiring ISO 6789-2:2017 Certificates of Calibration



4 | **T-BOX XL™**
43258 | T-Box XL™ Instrument with TDMS Software

4 | **TDMS SOFTWARE**
61132 | TDMS Software (supplied on USB Flash Drive)
Supplied as standard with T-Box XL™.

Model		T-Box XL™
Part Number/s		43258
Dimensions (mm)	A	30
	B	100
	C	30
	D	165
	E	205
	F	225
	G	151
Weight (Kg)		4.8





SPARES FOR INSTRUMENTATION PRODUCTS

4	SPARES FOR INSTRUMENTATION PRODUCTS
38876	Rechargeable Battery Pack for Pro-Log, TST & TTT
39406	Battery Pack for T-Box and T-Box XL™
29610	¼" Female – ½" Male Sleeve Adaptor
29611	½" Female – ¾" Male Sleeve Adaptor
29612	½" Female – 1" Male Sleeve Adaptor
29613	¾" Female – 1" Male Sleeve Adaptor
29614	¾" Female – ½" Male Sleeve Adaptor

4	SERIAL DATA LEAD KIT
60248	Serial Data Lead Kit

Note: Serial Data Lead Kit is not suitable for use with HE Instrument and TruCheck™

60259	USB to Serial Data Lead (Does not work with USM)
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This kit enables Norbar "CE Marked" instruments (Post January 1996 ETS, TWA and DTS plus all Pro-Test, TST and TTT) to connect to most PCs.

PART NUMBER SUFFIX SYSTEM

Transducers can be ordered for use with Norbar's current range of instruments (TST, TTT, TTL-HE and T-Box XL™), and as Industry Standard (mV/V calibrated) for certain display instruments from other manufacturers.

A part number suffix system is used to identify the type of calibration required. For example, a 1000 N·m Static Transducer for use with a TTT instrument would become part number 50772.LOG.

SUFFIX	USAGE	CERTIFIED IN
.LOG	TST, TTT, TTL-HE & T-Box XL™	Torque Units
.IND	Instruments of non Norbar manufacture (check with Norbar for suitability) and TST, TTT, TTL-HE & T-Box XL™	mV/V

Where the transducer suffix .LOG is used, the transducer is calibrated with an instrument, as a system, a calibration certificate is provided in torque units. A full scale mV/V figure is also supplied.

TRANSDUCERS FMT



4	FMT (Flange Mounted Transducers)
50671.LOG*	0.04-2 N·m ¼" sq. dr. with Joint Simulator
50671.IND*	0.04-2 N·m ¼" sq. dr. with Joint Simulator
50672.LOG	0.5-10 N·m ¼" sq. dr. with Joint Simulator
50672.IND	0.5-10 N·m ¼" sq. dr. with Joint Simulator
50673.LOG	1.25-25 N·m ¼" + ⅜" sq. dr. with Joint Simulator
50673.IND	1.25-25 N·m ¼" + ⅜" sq. dr. with Joint Simulator
50677.LOG*	0.4-20 lbf·in ¼" sq. dr. with Joint Simulator
50677.IND*	0.4-20 lbf·in ¼" sq. dr. with Joint Simulator
50678.LOG	5-100 lbf·in ¼" sq. dr. with Joint Simulator
50678.IND	5-100 lbf·in ¼" sq. dr. with Joint Simulator
50679.LOG	12.5-250 lbf·in ¼" + ⅜" sq. dr. with Joint Simulator
50679.IND	12.5-250 lbf·in ¼" + ⅜" sq. dr. with Joint Simulator

* If using this transducer with a Series 1 TST or TTT (Part No. s 43198 - 43201) or a Pro-Log Display instrument, please contact Norbar.

4	FMT (Flange Mounted Transducers)
50674.LOG	7.5-150 N·m ½" + ⅜" sq. dr. with Joint Simulator
50674.IND	7.5-150 N·m ½" + ⅜" sq. dr. with Joint Simulator
50680.LOG	5-100 lbf·ft ½" + ⅜" sq. dr. with Joint Simulator
50680.IND	5-100 lbf·ft ½" + ⅜" sq. dr. with Joint Simulator
50675.LOG	20-400 N·m ½" + ¾" sq. dr.
50675.IND	20-400 N·m ½" + ¾" sq. dr.
50681.LOG	12.5-250 lbf·ft ½" + ¾" sq. dr.
50681.IND	12.5-250 lbf·ft ½" + ¾" sq. dr.



FMT 2 N·m

FMT 1500 N·m

Flange Mounted Transducers incorporate mounting points for securely fixing the transducer to the working surface. The transducer lead is also included and is fitted with a high quality connector, suitable for attachment to TST, TTT and T-Box XL™ instruments.

4	FMT (Flange Mounted Transducers)
50676.LOG	30-1500 N·m ½", ¾" + 1" sq. dr.
50676.IND	30-1500 N·m ½", ¾" + 1" sq. dr.
50682.LOG	20-1000 lbf·ft ½", ¾" + 1" sq. dr.
50682.IND	20-1000 lbf·ft ½", ¾" + 1" sq. dr.
TD1.CCW	Counter clockwise calibration for FMT & STB when ordered with new unit

Includes integral transducer lead with connector to suit TST, TTT and T-Box XL™

4	FMT (Ancillary Section)
50539	2 N·m Joint Simulator (also fits TST)
50540	10 N·m Joint Simulator (also fits TST)
50541	25 N·m Joint Simulator (also fits TST)
50692	150 N·m Joint Simulator
50819	400 N·m Joint Simulator

52236	¼" Hexagon - ¼" Square Drive Adaptor
52237	¼" Hexagon - ⅜" Square Drive Adaptor
52251	⅜" Female Square - 22mm Bi Square Adaptor
52246	½" Female Square - 22mm Bi Square Adaptor
52245	¾" Female Square - 22mm Bi Square Adaptor
52254	½" Female Square - 35mm Bi Square Adaptor
52241	¾" Female Square - 35mm Bi Square Adaptor
52242	1" Female Square - 35mm Bi Square Adaptor

4	FMT Mounting Brackets
62221.BLK9005	FMT Mounting Bracket 2 to 400 N·m
62220.BLK9005	FMT Mounting Bracket 150 to 1500 N·m



STATIC TRANSDUCERS



The accuracy and quality of the Norbar Static Torque Transducers has made them the first choice of many calibration laboratories throughout the world. Up to 5000 N·m (5000 lbf·ft) classified to BS7882:2017, typically better than Class 1 for the primary classification range ($\pm 0.5\%$ of reading from 20% to 100% of full scale).

- Robust, heat treated, alloy steel torsion shaft design
- Designed to ignore non torsional forces
- Operates in clockwise and anti-clockwise directions
- Calibration up to 100,000 N·m with a UKAS accredited Certificate
- Calibrated in clockwise direction as standard. Anti-clockwise provided on request



4	STATIC TRANSDUCERS	
50587.xxx*	0.1-1 N·m	¼" M x ¼" F
50588.xxx	0.25-2.5 N·m	¼" M x ¼" F
50589.xxx	0.5-5 N·m	¼" M x ¼" F
50590.xxx	1-10 N·m	¼" M x ¼" F
50591.xxx	2.5-25 N·m	⅜" M x ⅜" F
50592.xxx	5-50 N·m	⅜" M x ⅜" F
50593.xxx	10-100 N·m	½" M x ½" F
50594.xxx	25-250 N·m	½" M x ½" F
50701.xxx	25-250 N·m	¾" M x ¾" F
50596.xxx	50-500 N·m	¾" M x ¾" F
50772.xxx	100-1000 N·m	1" M x 1" F
50766.xxx	150-1500 N·m	1" M x 1" F
50611.xxx	0.1-1 lbf·ft	¼" M x ¼" F
50615.xxx	0.5-5 lbf·ft	¼" M x ¼" F
50618.xxx	1-10 lbf·ft	¼" M x ¼" F
50620.xxx	2.5-25 lbf·ft	⅜" M x ⅜" F
50836.xxx	5-50 lbf·ft	½" M x ½" F
50624.xxx	10-100 lbf·ft	½" M x ½" F
50625.xxx	25-250 lbf·ft	½" M x ½" F
50702.xxx	25-250 lbf·ft	¾" M x ¾" F
50627.xxx	50-500 lbf·ft	¾" M x ¾" F
50773.xxx	100-1000 lbf·ft	1" M x 1" F
50610.xxx*	1-10 lbf·in	¼" M x ¼" F
50612.xxx	2.5-25 lbf·in	¼" M x ¼" F
50614.xxx	5-50 lbf·in	¼" M x ¼" F
50617.xxx	10-100 lbf·in	¼" M x ¼" F
50619.xxx	25-250 lbf·in	⅜" M x ⅜" F
50621.xxx	50-500 lbf·in	⅜" M x ⅜" F
50623.xxx	100-1000 lbf·in	½" M x ½" F
50609.xxx*	10-100 ozf·in	¼" M x ¼" F

TD2.CCW Alternative calibration direction for transducers up to 1500 N·m / 1000 lbf·ft when ordered with new unit

M=Male F=Female

Standard Calibration is performed loading clockwise only

- 'SMART' transducers have a built in memory circuit which contains essential information about the transducer. This information can be read by Norbar's TST, TTT, TTL-HE & T-Box XL™ instruments meaning that when the transducer is connected, it is immediately recognised and ready for use.
- 'SMART' transducers can also be used with many other instruments. However, these will operate as normal ratio calibrated (mV/V) transducers- the 'SMART' data will not be read.



4	STATIC TRANSDUCERS	
50703.xxx	250-2500 N·m	1½" M x 1½" F
50791.xxx	300-3000 N·m	1½" M x 1½" F
50599.xxx	500-5000 N·m	1½" M x 1½" F
50669.xxx@	700-7000 N·m	1½" M x 1½" F
50704.xxx	250-2500 lbf·ft	1½" M x 1½" F
50630.xxx	500-5000 lbf·ft	1½" M x 1½" F
TD5.CCW@	Alternative calibration direction for transducers from 1501 N·m to 7000 N·m / 1001 lbf·ft to 5000 lbf·ft when ordered with new unit	
50776.xxx	1000-10000 N·m	2½" M x 2½" F
50603.xxx	2500-25000 N·m	2½" M x 2½" M
50797.xxx	2500-25000 N·m	2½" M x 2½" F
50781.xxx	5000-50000 N·m	2½" M x 2½" F
50794.xxx	5000-50000 N·m	3½" M x 3½" M
50783.xxx	8000-80000 N·m	3½" M x 3½" F
50816.xxx	10000-100000 N·m	3½" M x 3½" F
50796.xxx	10000-100000 N·m	3½" M x 3½" M
50777.xxx	1000-10000 lbf·ft	2½" M x 2½" F
50635.xxx	2500-25000 lbf·ft	2½" M x 2½" M
50798.xxx	2500-25000 lbf·ft	2½" M x 2½" F
50799.xxx	3000-30000 lbf·ft	2½" M x 2½" F
50795.xxx	5000-50000 lbf·ft	3½" M x 3½" M
50782.xxx	6000-60000 lbf·ft	3½" M x 3½" F
50637.xxx+	10000-100000 lbf·ft	3½" M x 3½" M
TD3.CCW+	Alternative calibration direction for transducers from 7001 N·m to 100000 N·m / 5001 lbf·ft to 100000 lbf·ft when ordered with new unit	
-	15000-150000 N·m	4½" M x 4½" M
-	20000-200000 N·m	4½" M x 4½" M

xxx Indicates .LOG or .IND versions, please see page 84.

* .LOG versions not suitable for use with TST, TTT or TTL-HE, purchased pre Feb 2016.

@ UKAS accredited calibration up to 6000 N·m. A non-accredited value at 7000 N·m is extrapolated and provided for reference only.

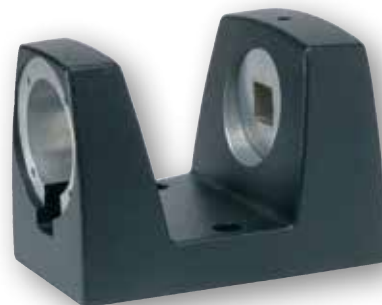
+ UKAS accredited calibration up to 80000 lbf·ft. A non-accredited value at 100000 lbf·ft is extrapolated and provided for reference only.



STATIC TRANSDUCERS



4	STATIC TRANSDUCERS
SECCAL.CW	Secondary Calibration in one direction on static transducers with 2½" square drives to extend the range below 10% of the rated capacity, when ordered with new unit
SECCAL.CW+CCW	Secondary Calibration in two directions on static transducers with 2½" square drives to extend the range below 10% of the rated capacity, when ordered with new unit
ADDCALPOINTS.NEW	Additional calibration steps below 10% of rated capacity to 2% for transducers up to 7000 N·m (5000 lbf·ft) when ordered with new unit



Bench stands ensure the correct mounting of Norbar's Static Torque Transducers up to 7000 N·m (5000 lbf·ft).

4	BENCH STANDS FOR STATIC TORQUE TRANSDUCERS
50211	Small frame size (10 N·m) ¼" sq.
50212	Small frame size (50 N·m) ⅜" sq.
50213	Small frame size (100/250 N·m) ½" sq.
50220	Large frame size (250/500 N·m) ¾" sq.
50221	Large frame size (1000/1500 N·m) 1" sq.
50127.BLK9005	Extra large size (7000 N·m) 1½" sq.
52014	¼" Insert for Small Bench Stands
52015	⅜" Insert for Small Bench Stands
52016	½" Insert for Small Bench Stands
52017	¾" Insert for Large Bench Stands
52018	1" Insert for Large Bench Stands

ROTARY TRANSDUCERS



Rotary transducers are designed to measure the torque from continuously rotating shafts such as Impulse Power Tools and certain non-impulse tools with a severe clutch action.

This range offers class leading performance with impulse tools and will be supplied with a UKAS accredited calibration certificate from Norbar's laboratory.

These transducers are known as 'SMART' transducers. They have built-in intelligence in the form of a memory circuit which contains essential information about the transducer which can be read by the appropriate type of instrument (TST, TTT, TTL-HE & T-Box XL™), thus reducing set-up time.

They will also work with instruments that cannot read the memory information, by inputting the relevant calibration details manually.

Not for use with Impact Tools.

Angle measurement also available.

4	ROTARY TRANSDUCERS
50708.xxx	0.25-5 N·m ¼" M/F Hex
50709.xxx	1-20 N·m ¼" M/F Hex
50710.xxx	1-20 N·m ¼" F/M sq. dr.
50719.xxx	0.75-15 lbf·ft ¼" F/M sq. dr.
50711.xxx	3.75-75 N·m ⅜" F/M sq. dr.
50720.xxx	2.5-50 lbf·ft ⅜" F/M sq. dr.
50712.xxx	10-200 N·m ½" F/M sq. dr.
50721.xxx	7.5-150 lbf·ft ½" F/M sq. dr.

4	ROTARY TRANSDUCERS
50713.xxx	12.5-250 N·m ¾" F/M sq. dr.
50722.xxx	10-200 lbf·ft ¾" F/M sq. dr.
50714.xxx	25-500 N·m ¾" F/M sq. dr.
50723.xxx	15-300 lbf·ft ¾" F/M sq. dr.
50715.xxx	75-1500 N·m 1" F/M sq. dr.
50724.xxx	50-1000 lbf·ft 1" F/M sq. dr.
TD2.CCW	Counter clockwise calibration.
Angle options available, contact Norbar.	



ANNULAR TRANSDUCERS



These Annular Transducers are designed to fit directly to Norbar torque multipliers and will accurately measure the torque output from the gearbox, via a display instrument (Instrument supplied separately, see pages 82 - 83).

- Up to 6000 N·m classified to BS7882:2017, typically better than Class 1 for the primary classification range ($\pm 0.5\%$ of reading from 20% to 100% of full scale)
- Robust heat treated alloy steel torsion tube design
- Designed to ignore non torsional forces



4 ANNULAR TRANSDUCERS FOR HT/ET/PTS™/PTM-92 AND HT/ET/PTS™/PTM-119 SERIES

Suitable for HT/ET/PTS™/PTM-92

50753.xxx 270-2700 N·m 1" sq. dr.

50793.xxx 400-4000 N·m 1" sq. dr.

Suitable for HT/ET/PTS™/PTM-119

50755.xxx 450-4500 N·m 1½" sq. dr.

50756.xxx 600-6000 N·m 1½" sq. dr.

Standard Calibration is performed loading counter clockwise only.



- 'SMART' transducers have a built in memory circuit which contains essential information about the transducer. This information can be read by Norbar's TST, TTT, TTL-HE & T-Box XL™ instruments meaning that when the transducer is connected, it is immediately recognised and ready for use
- 'SMART' transducers can also be used with many other instruments. However, these will operate as normal ratio calibrated (mV/V) transducers- the 'SMART' data will not be read

4 ANNULAR TRANSDUCERS FOR STANDARD SERIES GEARBOX

Suitable for PT1, PT1A and PT2

50638.xxx 100-1000 N·m ¾" sq. dr.

50648.xxx 100-1000 lbf-ft ¾" sq. dr.

Suitable for heavy duty HT2, PT1, PT1A and PT2

50639.xxx 150-1500 N·m 1" sq. dr.

50649.xxx 150-1500 lbf-ft 1" sq. dr.

TD2.CCW Alternative calibration direction for transducers up to 1500 N·m / 1000 lbf-ft when ordered with new unit

Suitable for HT5 and PT5

50640.xxx 250-2500 N·m 1" sq. dr.

50650.xxx 250-2500 lbf-ft 1" sq. dr.

50641.xxx 350-3500 N·m 1" sq. dr.

Suitable for HT6 and PT6

50700.xxx 350-3500 N·m 1½" sq. dr.

Suitable for HT7 and PT7

50643.xxx 500-5000 N·m 1½" sq. dr.

50652.xxx 500-5000 lbf-ft 1½" sq. dr.

TD5.CCW@ Alternative calibration direction for transducers from 1501 N·m to 7000 N·m / 1001 lbf-ft to 5000 lbf-ft when ordered with new unit

4 ANNULAR TRANSDUCERS FOR 72MM SERIES GEARBOX (HT & PT) (Not suitable for PTS™/PTM tools)

Suitable for PT 72mm Remote series and HT-72

50666.xxx 100-1000 N·m

50667.xxx 150-1500 N·m

50668.xxx 200-2000 N·m

Standard Calibration is performed loading counter clockwise only.

4 ANNULAR TRANSDUCERS FOR PTS/PTM 72

Suitable for PTS/PTM 72mm series

50840.xxx 100-1000 N·m

50841.xxx 150-1500 N·m

50842.xxx 200-2000 N·m

4 ANNULAR TRANSDUCERS FOR SMALL DIAMETER SERIES GEARBOX (HT & PT)

Suitable for HT60 and PT5500

50663.xxx 600-6000 N·m 1½" sq. dr.

Standard Calibration is performed loading counter clockwise only.

4 ANNULAR TRANSDUCERS FOR STANDARD SERIES GEARBOX

Suitable for HT9 and PT9

50644.xxx 1000 - 10000 N·m 1½" sq. dr.

50653.xxx 700 - 7000 lbf-ft 1½" sq. dr.

Suitable for HT11 and PT11

50645.xxx 2000-20000 N·m 2½" sq. dr.

50654.xxx 1500-15000 lbf-ft 2½" sq. dr.

Suitable for HT12 and PT12

50764.xxx 3500-35000 N·m 2½" sq. dr.

50765.xxx 2500-25000 lbf-ft 2½" sq. dr.

Suitable for HT13 and PT13

50646.xxx 5000-50000 N·m 2½" sq. dr.

Suitable for PT14

50647.xxx 10000-100000 N·m 3½" sq. dr.

TD4.CCW Alternative calibration direction for transducers from 7001 N·m to 100000 N·m / 5001 lbf-ft to 75000 lbf-ft when ordered with new unit

Suitable for PT18.MTS

- 30000-300000 N·m

Standard Calibration is performed loading counter clockwise only.

@ UKAS accredited calibration up to 6000 N·m. A non-accredited value at 7000 N·m is extrapolated and provided for reference only.



ANNULAR TRANSDUCERS



Fixed Connector



180° Swivel Connector

4 TORQUE & ANGLE ANNULAR TRANSDUCERS

Suitable for heavy duty PT1, PT1A and PT2

50820.LOGA* 100-1000 N·m ¾" sq. dr.
Fixed Connector50821.LOGA** 150-1500 N·m 1" sq. dr.
Fixed Connector* Can only be used with remote/plain sleeve motors i.e. not a standard PT handle,
due to cable interference

* Only fits to PT with HD final stage carrier having 1" female sq. dr.

Suitable for HT5 and PT5

50822.LOGA 350-3500 N·m 1" sq. dr.
Fixed Connector

Suitable for HT7 and PT7

50834.LOGA 500-5000 N·m 1½" sq. dr.
180° Swivel Connector

Suitable for HT9 and PT9

50824.LOGA 1000-10000 N·m 1½" sq. dr.
180° Swivel Connector

Suitable for HT11 and PT11

50825.LOGA 2000-20000 N·m 2½" sq. dr.
180° Swivel Connector

Suitable for HT12 and PT12

50826.LOGA 3500-35000 N·m 2½" sq. dr.
180° Swivel Connector

Suitable for HT13 and PT13

50827.LOGA 5000-50000 N·m 2½" sq. dr.
180° Swivel Connector

Suitable for HT14 and PT14

50828.LOGA 10000-100000 N·m 3½" sq. dr.
180° Swivel Connector

PT13 & PT14 require special front cover plate with added dowel clearance holes

Suitable for HT15 and PT15

50832.LOGA 15000-150000 N·m 4½" sq. dr.
180° Swivel Connector

Suitable for HT16 and PT16

50829.LOGA 20000-200000 N·m 5" sq. dr.
180° Swivel Connector

Suitable for HT17 and PT17

50830.LOGA 25000-250000 N·m 6" sq. dr.
180° Swivel Connector

Suitable for HT18 and PT18

50831.LOGA 30000-300000 N·m 6" sq. dr.
180° Swivel Connector

Torque and Angle Annular Transducer Note:

- 5000 N·m and above include dowels on both mounting faces
- Angle resolution < 1° when used with T-Box XL™
- CW+CCW calibration is standard
- Use 60308.xxx series lead for direct connection to T-Box XL™ for torque and angle/turns monitoring and storage
- PT square drive and other parts may require removal to fit transducer
- All the above are standard construction. Harsh Environment models are available on request
- 'INDA' versions are available on request

Note: PTS™ and reactions with dowel holes can be supplied at an extra cost on request. Request details on PneuTorque® Type 'XD'

4 ANNULAR TRANSDUCERS

SECCAL.CW Secondary Calibration in one direction on annular transducers for HT/PT9 & HT/PT11 to extend the range below 10% of the rated capacity, when ordered with new unit

SECCAL.CW+CCW Secondary Calibration in two directions on annular transducers for HT/PT9 & HT/PT11 to extend the range below 10% of the rated capacity, when ordered with new unit

ADDCALPOINTS.NEW Additional calibration steps below 10% of rated capacity to 2% for transducers up to 7000 N·m (5000 lbf·ft) when ordered with new unit

If ordering a static, annular or rotary transducer you will also require a corresponding lead (see list below).
To comply with the latest calibration standards, most new transducer leads will have a suffix to indicate the length in centimetres.

4 TRANSDUCER LEADS

60216.200 PRO-LOG, TST, TTT & T-Box XL™ to 10 Way Transducer for use with Norbar Rotary Transducers

60217.200 PRO-LOG, TST, TTT & T-Box XL™ to 6 Way Transducer for use with Norbar Static & Annular Transducers

60223.200 PRO-LOG, TST, TTT & T-Box XL™ to no connector

60224.200 10 Way Transducer to no connector

60225.200 6 Way Transducer to no connector

51067.225 ETS to Transducer (Pre 1994) + 5 way (60055)

60152.225 ETS to Transducer (Post 1994) + 5 way (60163)

60308.400 PRO-LOG, TST, TTT & T-Box XL™ to Torque & Angle Annular Transducers

60308.600 PRO-LOG, TST, TTT & T-Box XL™ to Torque & Angle Annular Transducers

60308.1000 PRO-LOG, TST & TTT to Torque & Angle Annular Transducers

Other lengths can be ordered at an additional cost.

Note: The system should be calibrated with the increased length lead, as calibration may be effected.

Note: The maximum permissible cable length is 15m for TST or TTT. Contact Norbar for further details.



TORQUE WRENCH CALIBRATOR - MANUAL



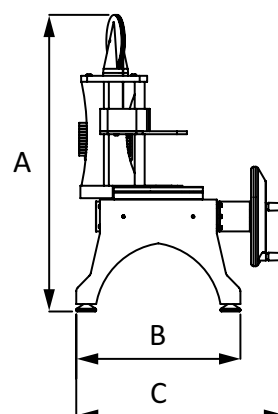
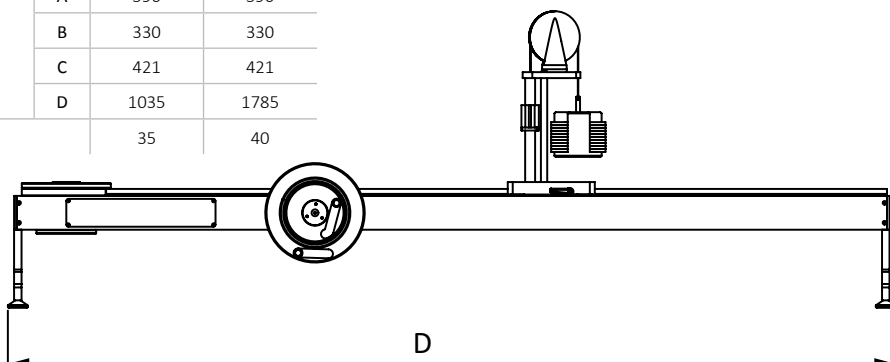
Torque Wrench Calibrator (TWC) 1500 N-m manual shown with Counter-Balanced Reaction Post (62272)

- Enables torque wrench calibration or testing in accordance with ISO 6789-2:2017 if used with T-Box XL™ software version 3.0.0.X and TDMS version 4.0.X
- Also in accordance with BS EN 26789:2003, ISO 6789-1:2017
- Counter Balance Reaction system is designed to allow the tool to level to reduce parasitic loads or movements
- Two speed gearbox designed for a sufficient balance of speed and control which allows for both fast loading of the torque wrench and a slower more precise loading
- Lightweight alloy construction ensures the TWC is easily transported, making it particularly suited for mobile laboratory applications
- Works with Flange Mounted Transducers, Static Transducers (when using part number: 60318), T-Box XL™, TST, TTT and Pro-Test (when using part number: 60323)
- During calibration the TWC maintains a fixed position on the handle of the torque wrench
- Rotating transducer design ensures that the load is applied 90° to the torque wrench handle. The benefit of this precise alignment is that forces are applied squarely to the load point of the handle



Torque Wrench Calibrator (TWC) manual shown with Counter-Balanced Reaction Post (62272), Flange Mounted Transducer and a T-Box XL™

Model		TWC 400	TWC 1500
Part Number/s		60311	60314
Wrench length (Torque Radius)	Min	135	135
	Max	750	1500
Dimensions (mm)	A	596	596
	B	330	330
	C	421	421
	D	1035	1785
Weight (Kg)		35	40



4	TORQUE WRENCH CALIBRATOR (TWC)
60311	Torque Wrench Calibrator 400 N-m Manual
60314	Torque Wrench Calibrator 1500 N-m Manual



TORQUE WRENCH CALIBRATOR - ANCILLARIES

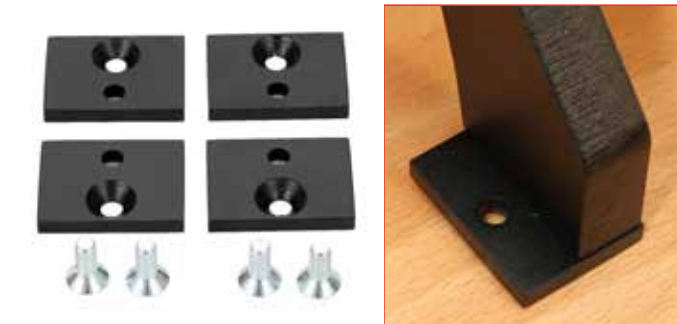
4	TWC ANCILLARIES
60318	Static Transducer Support Kit
60319	Short Length Reaction Post
60322	Quick Release FMT Kit
60323	Pro-Test and Static Torque Block Adaptor Kit
60324	Hexagon Adaptor Kit
60326	Bench Mounting Kit
60327	FMT 25 Adaptor Kit
29214	1" Male to 3/4" Female Flanged Square Drive Adaptor
29215	1" Male to 1/2" Female Flanged Square Drive Adaptor
29216	1" Male to 3/8" Female Flanged Square Drive Adaptor
29217	1" Male to 1/4" Female Flanged Square Drive Adaptor



60318 Static Transducer Support Kit and
60319 Short Length Reaction Post



60322 Quick Release FMT Kit



60326 Bench Mounting Kit



60324 Hexagon Adaptor Kit

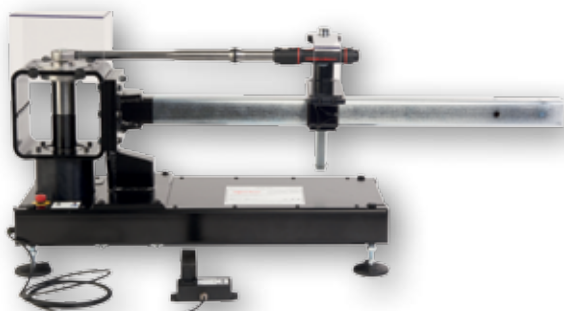


29214 Flanged Square Drive Adaptor



60323 Pro-Test and Static Torque Block Adaptor Kit

ISO 3000 LOADER



4	TORQUE WRENCH LOADERS
20505	Loader, ISO 3000 N·m
20506	Motorised ISO 3000 N·m





TORQUE WRENCH CALIBRATOR - AUTO

Coming
Soon

For a complete torque wrench calibration system, just add the transducer range appropriate for the wrenches you wish to calibrate and accessories from page 90.

4	TORQUE WRENCH CALIBRATOR (TWC)
60312	Torque Wrench Calibrator 400 N-m Auto
60313	Torque Wrench Calibrator 1500 N-m Auto

- Enables torque wrench calibration or testing in accordance with ISO 6789:2017 Part 1 and 2
- Counter Balance Reaction system is designed to allow the tool to level to reduce parasitic loads or movements
- Lightweight alloy construction ensures the TWC is easily transported, making it particularly suited for mobile laboratory applications
- Works with Flange Mounted Transducers and Static Transducers
- During calibration, the TWC maintains a fixed position on the handle of the torque wrench
- Rotating transducer design ensures that the load is applied 90° to the torque wrench handle. The benefit of this precise alignment is that forces are applied squarely to the load point of the handle
- Supplied with a powerful yet simple touchscreen User Interface (UI) (keyboard and mouse also supported if desired)
- Flexible tool template system; define templates by type, ISO classification and supported units and torque ranges, program in your desired calibration workflow then use these to register tools for calibration
- Ability to store multiple units and ranges in a single template for a neater, smaller list of templates
- Programmable calibration workflow for each template, can be pre-set to ISO compliant flow for the given tool for a faster set-up or can also support bespoke non-ISO compliant workflows
- Calibration job management; book calibrations, track progress of previous bookings and resume them
- Automated management of calibration and conformance workflows for non-indicating tools
- Intelligent rate control system ensures fast cycling of tools while maintaining compliance with 2017 standards
- Environmental monitoring (humidity/temperature) to ensure compliance with 2017 requirements
- Automated management of uncertainty data for ISO 6789-2:2017 calibrations, guiding the user through the process using dynamically generated instructions based on the current tool's ISO classification and workflow
- Inbuilt data analysis and certification generation seamlessly move from calibration/conformance procedure to certificate generation, no third-party software required
- Huge amount of inbuilt storage allowing for year's worth of calibration data through normal use

The Automated TWC is currently in development and is subject to change, therefore the information provided may alter upon the launch of the product.



TORQUE WRENCH CALIBRATOR - AUTO

Screen shot samples of what the software may look like:



Main menu



Tool template editor



Calibration job booking / editor

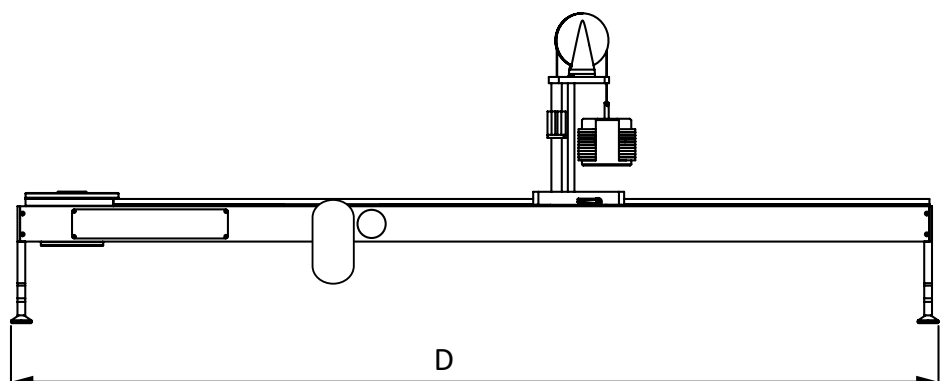
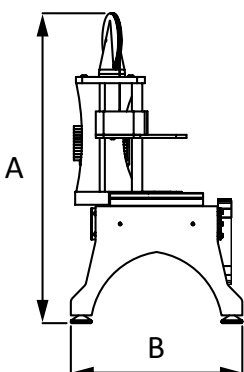


Tool cycling and adjustment

Model		TWC Auto 400	TWC Auto 1500
Part Number/s		60312	60313
Wrench length (Torque Radius)	Min	135	135
	Max	750	1500
Dimensions (mm)	A	596	596
	B	330	330
	D	1035	1785
Weight (Kg)		TBC	TBC



Tool cycling and adjustment whilst in operation





TEST FIXTURES

The Norbar Joint Simulation Rundown Assemblies are designed to simulate the working conditions of screwed or bolted joints. Used in conjunction with a Norbar transducer and display instrument, the output of torque controlled power tools can be measured against a range of simulated joint rates, from hard through to soft.



4	JOINT SIMULATION RUNDOWN ASSEMBLIES
50313	0.2-2 N·m (2-20 lbf·in)
50251	2-10 N·m (20-100 lbf·in)
50252	5-50 N·m (5-50 lbf·ft)
50253	10-100 N·m (10-100 lbf·ft)
50254*	100-500 N·m (100-500 lbf·ft)

The above are for use with Norbar static square to square transducers and bench stands.

* To be used with large frame size bench stands, all others to be used with small frame bench stands.

50693	10-140 N·m (10-100 lbf·ft)
50694	100-700 N·m (70-500 lbf·ft)

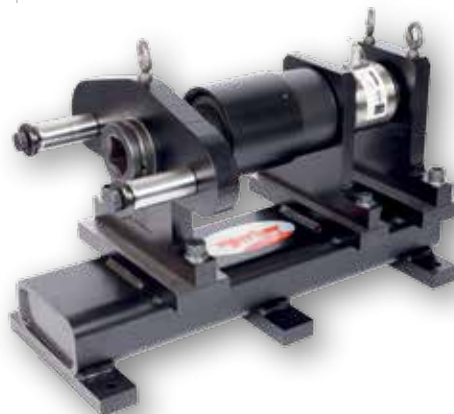
The above are for use with the Norbar STB1000.



Shown with TruCheck™ Plus 1000 (not included)

4	POWER TOOL TEST FIXTURE FOR TRUCHECK™ PLUS 1000 AND 2000
50757	Power Tool Test Fixture for TruCheck™ Plus 1000
50774	Power Tool Test Fixture for TruCheck™ Plus 2000
50758	1000 N·m Joint Simulator Rundown Assembly
50775	2000 N·m Joint Simulator Rundown Assembly

4	WASHER STACKS FOR JOINT SIMULATION RUNDOWN ASSEMBLIES
50175	0.2-0.7 N·m Stack A for use with 50313
50176	0.5-1.4 N·m Stack B for use with 50313
50177	1.2-2.8 N·m Stack C for use with 50313
50178	2-6 N·m Stack D for use with 50251
50179	6-12 N·m Stack E for use with 50251
50695	5-30 N·m Stack A for use with 50252
50696	20-50 N·m Stack B for use with 50252
50697	50-70 N·m Stack C for use with 50252
50180	10-50 N·m Stack F for use with 50253 and 50693
50192	30-100 N·m Stack G for use with 50253 and 50693
50698	80-140 N·m Stack H for use with 50253 and 50693



Shown with 1½" M/F Static Transducer (not included)

4	ET/PT POWER TOOL TEST RIG
50800	7000 N·m ET, PT Power Tool Test Rig (supplied with the 8 reaction plates on page 94 (excluding blank reaction plate) and ¾", 1" and 1½" sq. dr. adaptors)
50803	7000 N·m ET, PT Power Tool Test Rig without Reaction Plates (supplied with ¾", 1" and 1½" sq. dr. adaptors)

Note: The static transducer 50669.LOG does not come supplied as standard with the tool test rig. The standard range of 700 - 7000 N·m will not cover the full powered multiplier range, additional calibration may be required, please see below:

ADDCALPOINTS.NEW

Additional calibration steps below 10% of rated capacity to 2% for transducers up to 7000 N·m (5000 lbf·ft) when ordered with new unit



TEST FIXTURES



1½" M/F Static Transducer required (not included)

4	7000 N-m UNIVERSAL TOOL TEST RIGS
50801	Universal 7000 N-m ET, PT & Hydraulic Tool Test Rig (supplied with the 8 reaction plates to the right (excluding blank reaction plate) and ¾", 1" and 1½" sq. dr. adaptors)
50804	Universal 7000 N-m Test Rig without Reaction Plates (supplied with ¾", 1" and 1½" sq. dr. adaptors)



Universal Hydraulic Tool Test Rig
with Reaction Plates (50801)



4	SPARES FOR 50800, 50801, 50803 & 50804
50800.29	2" AF Socket 1½" sq. dr.
50800.28	2" AF Socket 1" sq. dr.
50800.27	2" AF Socket ¾" sq. dr.



50800.26	Special 2" UNC Bolt
50800.25	Type B UNC High Tensile 2" UNC Nut
50548.4	Washer Stack Kit 100 - 7000 N-m (Also for use with RD5000)

See page 96 for accessories for use with Hydraulic Tool Calibration Fixture.

4 REACTION PLATES FOR USE WITH 50803 & 50804



81024	Suitable for ET/PTM 119, PT 4500 and PT 5500
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81025	Suitable for ET/PTM 92
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81026	Suitable for ET/PT/PTM 72
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81027	Suitable for PTM 52
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81028	Suitable for PT 2700
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81029	Suitable for PT 1, PT 1A and PT 2
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81030	Suitable for PT 5 and PT 6
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81031	Suitable for PT 7
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81032	Blank Reaction Plate for Universal Test Rigs
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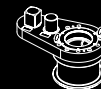
HYDRAULIC TOOL CALIBRATION FIXTURES

Hydraulic Tool Calibration Fixtures	96
Hexagon to Square Adaptors	97

Norbar's Hydraulic Tool Calibration Fixture is a robust device that allows accurate testing of hydraulic torque wrenches. A system comprises of a Calibration Fixture and Transducer, also required is a torque measuring instrument and transducer cable.

- Bearing support for transducer gives improved accuracy
- Interchangeable stainless steel square and round reaction posts
- Hardened steel inserts to location reaction posts in two positions: suits most hydraulic wrenches
- Optimised material sections for robust but portable design
- For hexagon link wrenches, a wide range of hexagon to square adaptors are available





HYDRAULIC TOOL CALIBRATION FIXTURES



Hydraulic Tool Calibration Fixture shown with Transducer
(Transducer not included)

4	CALIBRATION FIXTURES
80031	Hydraulic Calibration Fixture up to 7000 N·m
80029	Hydraulic Calibration Fixture up to 50000 N·m
80032	Hydraulic Calibration Fixture up to 80000 N·m
81022	Reaction Bar for 80031
81023	Reaction Bar for 80029

4	TRANSDUCERS FOR USE WITH 80031 / 80030
50703.xxx*	250-2500 N·m 1½" sq. dr. M/F
50704.xxx*	250-2500 lbf·ft 1½" sq. dr. M/F
50599.xxx*	500-5000 N·m 1½" sq. dr. M/F
50630.xxx*	500-5000 lbf·ft 1½" sq. dr. M/F
50669.xxx*	700-7000 N·m 1½" sq. dr. M/F

4	TRANSDUCERS FOR USE WITH 80029 / 80030
50776.xxx@	1000-10000 N·m 2½" sq. dr. M/F
50777.xxx@	1000-10000 lbf·ft 2½" sq. dr. M/F
50797.xxx@	2500-25000 N·m 2½" sq. dr. M/F
50781.xxx@	5000-50000 N·m 2½" sq. dr. M/F
50798.xxx@	25000 lbf·ft 2½" sq. dr. M/F

4	TRANSDUCERS FOR USE WITH 80032
50782.xxx	6000-60000 lbf·ft 3½" sq. dr. M/F
50783.xxx	8000-80000 N·m 3½" sq. dr. M/F

Harsh Environment Transducers available on request.

4	DUAL CALIBRATION FIXTURE
80030	Dual Calibration Fixture

Note: Houses 1 transducer up to 7000 N·m and 1 transducer up to 50000 N·m in a bench top plate.

9	ADDITIONAL CALIBRATION
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The transducers shown include clockwise only calibration from 10% to 100% of rated capacity. For other calibration options, see below:

*ADDCALPOINTS.NEW

Additional calibration steps below 10% of rated capacity to 2% for transducers up to 7000 N·m (5000 lbf·ft) when ordered with new unit

@SECCAL.CW

Secondary Calibration in one direction on static transducers with 2½" square drives to extend the range below 10% of the rated capacity, when ordered with new unit

SECCAL.CW+CCW

Secondary Calibration in two directions on static transducers with 2½" square drives to extend the range below 10% of the rated capacity, when ordered with new unit



Hexagon to Square Adaptor

4	HEXAGON TO SQUARE ADAPTORS - METRIC
29619.24	24mm Hex to 1½" Sq. (Max 3000 N·m)
29619.27	27mm Hex to 1½" Sq. (Max 4000 N·m)
29619.30	30mm Hex to 1½" Sq. (Max 4000 N·m)
29619.32	32mm Hex to 1½" Sq. (Max 4900 N·m)
29619.36	36mm Hex to 1½" Sq. (Max 7000 N·m)
29619.41	41mm Hex to 1½" Sq. (Max 8700 N·m)
29619.46	46mm Hex to 1½" Sq. (Max 8700 N·m)
29619.50	50mm Hex to 1½" Sq. (Max 8700 N·m)
29619.55	55mm Hex to 1½" Sq. (Max 8700 N·m)
29619.60	60mm Hex to 1½" Sq. (Max 8700 N·m)
29619.65	65mm Hex to 1½" Sq. (Max 8700 N·m)
29619.70	70mm Hex to 1½" Sq. (Max 8700 N·m)
29619.75	75mm Hex to 1½" Sq. (Max 8700 N·m)
29619.80	80mm Hex to 1½" Sq. (Max 8700 N·m)
29620.50	50mm Hex to 2½" Sq. (Max 18500 N·m)
29620.55	55mm Hex to 2½" Sq. (Max 25000 N·m)
29620.60	60mm Hex to 2½" Sq. (Max 32000 N·m)
29620.65	65mm Hex to 2½" Sq. (Max 36000 N·m)
29620.70	70mm Hex to 2½" Sq. (Max 36000 N·m)
29620.75	75mm Hex to 2½" Sq. (Max 36000 N·m)
29620.80	80mm Hex to 2½" Sq. (Max 59000 N·m)
29620.85	85mm Hex to 2½" Sq. (Max 59000 N·m)
29620.90	90mm Hex to 2½" Sq. (Max 59000 N·m)
29620.95	95mm Hex to 2½" Sq. (Max 59000 N·m)
29620.100	100mm Hex to 2½" Sq. (Max 52000 N·m)
29620.105	105mm Hex to 2½" Sq. (Max 52000 N·m)
29620.110	110mm Hex to 2½" Sq. (Max 52000 N·m)
29620.115	115mm Hex to 2½" Sq. (Max 52000 N·m)
29620.130	130mm Hex to 2½" Sq. (Max 52000 N·m)



Dual Calibration Fixture
Part No. 80030
(Transducers not included)



HEXAGON TO SQUARE ADAPTORS

*Fixture shown with Hydraulic Torque Wrench*

4	HEXAGON TO SQUARE ADAPTORS - IMPERIAL
29623.I20	1¼" Hex to 1½" Sq. (Max 4900 N·m)
29623.I23	1⅞" Hex to 1½" Sq. (Max 7000 N·m)
29623.I26	1⅝" Hex to 1½" Sq. (Max 8700 N·m)
29623.I29	1⅜" Hex to 1½" Sq. (Max 8700 N·m)
29623.I32	2" Hex to 1½" Sq. (Max 8700 N·m)
29623.I35	2⅜" Hex to 1½" Sq. (Max 8700 N·m)
29623.I38	2⅝" Hex to 1½" Sq. (Max 8700 N·m)
29623.I41	2⅞" Hex to 1½" Sq. (Max 8700 N·m)
29624.I35	2⅜" Hex to 2½" Sq. (Max 25000 N·m)
29624.I38	2⅝" Hex to 2½" Sq. (Max 32000 N·m)
29624.I41	2⅞" Hex to 2½" Sq. (Max 36000 N·m)
29624.I44	2¾" Hex to 2½" Sq. (Max 36000 N·m)
29624.I47	2⅝" Hex to 2½" Sq. (Max 36000 N·m)
29624.I50	3⅝" Hex to 2½" Sq. (Max 59000 N·m)

4	HEXAGON TO SQUARE ADAPTORS - IMPERIAL
29624.I56	3½" Hex to 2½" Sq. (Max 59000 N·m)
29624.I62	3⅞" Hex to 2½" Sq. (Max 52000 N·m)
29624.I68	4¼" Hex to 2½" Sq. (Max 52000 N·m)
29624.I74	4⅝" Hex to 2½" Sq. (Max 52000 N·m)
29624.I80	5" Hex to 2½" Sq. (Max 52000 N·m)
29624.I86	5⅜" Hex to 2½" Sq. (Max 52000 N·m)
29624.I98	6⅝" Hex to 2½" Sq. (Max 52000 N·m)

4	SLEEVE ADAPTORS
86034.4	Adaptor 1½" Male sq. ¾" Female sq.
21214	Adaptor 1½" Male sq. 1" Female sq.
29617	Adaptor 2½" Male sq. 1½" Female sq.
29618	Adaptor 3½" Male sq. 2½" Female sq.

Special 'Engineer to Order' hexagon and square adaptors available on request.

*Sleeve Adaptors*



HARSH ENVIRONMENT

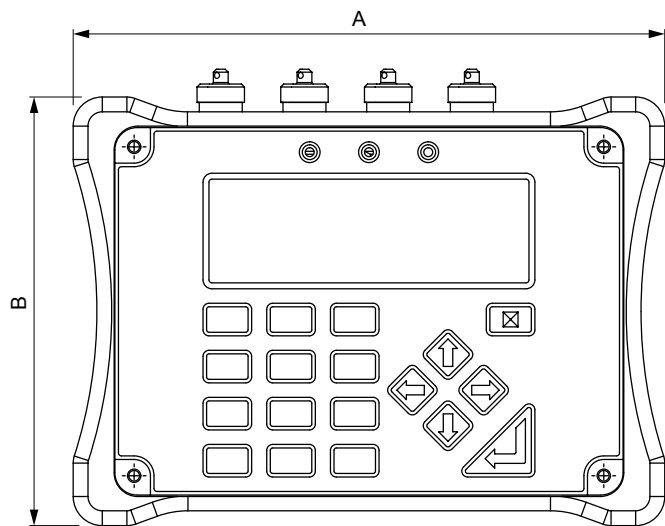
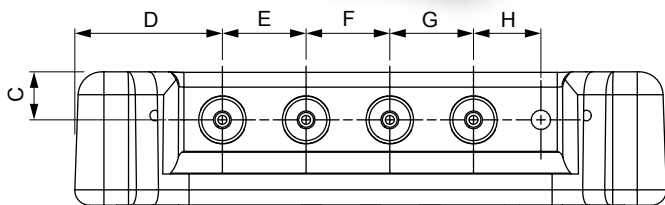
Norbar have worked closely with the oil and gas industry to produce a range of torque instruments and transducers suitable for use in the harshest environments such as ship decks, oil rigs and refineries. Norbar uses a variety of corrosion resistant materials, high specification connectors and sealing techniques meaning that products in our HE range can be used in such environments without impairing their performance or life span. Although originally designed to meet the needs of the oil and gas industry, Norbar's HE range is the ideal choice whenever it is necessary to apply or measure torque outdoors in potentially wet or dusty conditions.

Harsh Environment Instrument	99
TTL-HE Instrument And Transducer Kits	99
Harsh Environment Transducers	100
Intervention Tool Verification Kits	101
Intervention Tool Test Pots	102
Multipliers For Subsea	102
Engineer To Order	103





HARSH ENVIRONMENT INSTRUMENT



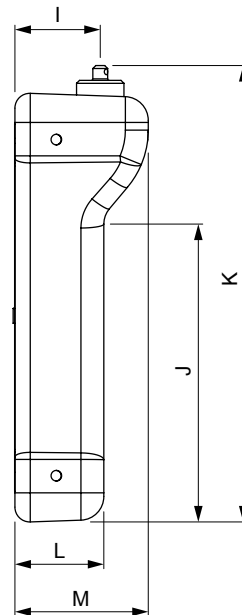
TTL-HE is a portable torque measuring instrument designed for use in harsh environments. The TTL-HE operating on battery power with one of the 'HE' range of transducers connected, has an ingress protection rating of IP65/IP67. Typical operating environments are where high humidity, water or salt water spray and dust may be an issue. Features include; 10 measurement modes, 13 units of torque (with additional USER units feature), 12 pairs of limits and text displayed in 11 languages.

- IP65/67 rated
- Bi-directional calibration
- Battery power use in harsh environments (mains supply for charging)
- All features are in common with TST and TTT instruments
- Supplied in IP67 rated carry case
- 5 digit resolution for all Norbar transducers
- 240 x 64 pixel dot matrix display with update rate of twice per second
- Please contact Norbar for full details of available transducers

4 HARSH ENVIRONMENT RANGE

43217 TTL-HE Instrument (inc. IP67 rated carry case)

Supplied with clockwise and counterclockwise calibration.



Model	TTL-HE	
Part Number/s	43217	
Dimensions (mm)	A	200
	B	145
	C	16
	D	50
	E	28
	F	28
	G	28
	H	23
	I	29
	J	101
	K	154
Weight (Kg)	4.87	

TTL-HE INSTRUMENT AND TRANSDUCER KITS



4 TTL-HE INSTRUMENT AND TRANSDUCER KITS

60287.LOG	5000 N·m M/M TTL-HE Kit, inc. Lead	(Class 4)
60295.LOG	10000 N·m M/M TTL-HE Kit, inc. Lead	(Class 5)
60296.LOG	15000 N·m M/M TTL-HE Kit, inc. Lead	(Class 6)
60289.LOG	40000 N·m M/M TTL-HE Kit, inc. Lead	(Class 7)

Note: Kits for use with Intervention Tool Test Pots



HARSH ENVIRONMENT TRANSDUCERS



The accuracy and quality of the Norbar torque transducers has made them the first choice of many calibration laboratories throughout the world. The Harsh Environment Range of transducers has been specifically designed for use with the Norbar TTL-HE instrument.

- Class 1 accuracy over the 'Primary' classification range ($\pm 0.5\%$ of reading from 20 to 100% of full scale)
- IP65/IP67 rated
- Stainless steel design with 'SMART' intelligence
- Bi-Direction calibration as standard



4	STATIC TRANSDUCERS
50787.xxx	300-3000 N·m 1½" M/F sq. dr.
50751.xxx*	300-3000 N·m 1½" M/M sq. dr.
50705.xxx	500-5000 N·m 1½" M/F sq. dr.
50729.LOG	500-5000 N·m 1½" M/M sq. dr.
50706.xxx	500-5000 lbf-ft 1½" M/F sq. dr.
50728.xxx	1000-10000 N·m 2½" M/F sq. dr.
50788.xxx	1000-10000 N·m 2½" M / 2" M sq. dr.
50789.xxx	1500-15000 N·m 2½" M / 2½" M sq. dr.
50726.xxx	2500-25000 N·m 3½" M/M sq. dr.
50727.xxx	4000-40000 N·m 3½" M/M sq. dr.
50743.xxx+	10000-100000 lbf-ft 3½" M/M sq. dr.

* Suitable for use in Hydraulic Test Pots.

+ UKAS accredited calibration up to 80000 lbf-ft. A non-accredited value at 100000 lbf-ft is extrapolated and provided for reference only. Static Transducers 3000 N·m and above supplied in carry case.

4	ANNULAR TRANSDUCERS
50767.xxx	100 - 1000 N·m including drive shaft
50745.xxx	350 - 3500 N·m including drive shaft
50725.xxx	1000 - 10000 N·m no drive shaft

Other transducers available upon request.

All above HE transducers supplied with clockwise and counterclockwise calibration.

Designed for use with the Harsh Environment Instrument range (TTL-HE) of products

4	INSTRUMENTATION LEADS
60245.200	TTL-HE to HE Transducer
60250.200	TTL-HE to Norbar Static & Annular Transducers
60263.200	TTL-HE to Rotary Transducers
60266.200	HE Transducer to TTT, TST and T-Box XL™
60261.200	Serial Data Lead for TTL-HE

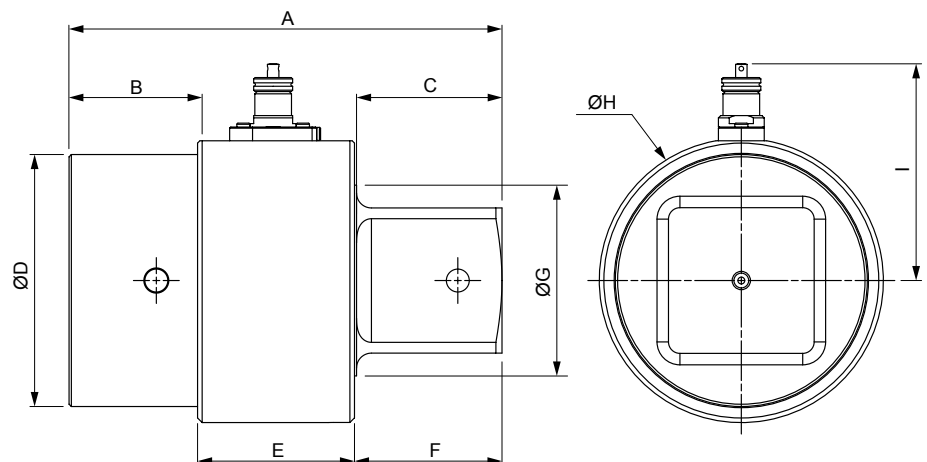
Other lengths can be ordered at an additional cost.

Note: The system should be calibrated with the increased length lead, as calibration may be affected.

Note: The maximum permissible cable length 15m for Transducer Leads, 7m if using 60266 with a T-Box XL™. Contact Norbar for further details.

Static Transducers - Male to Female (M/F) Square Drives

Model	3,000 N·m 5,000 N·m 5,000 lbf-ft	10,000 N·m
Part Number/s	50787.xxx 50705.xxx 50706.xxx	50728.xxx
Dimensions (mm)	A	160
	B	40
	C	43
	ØD	80
	E	72
	F	49
	ØG	50
	ØH	95
	I	80
Weight (Kg)	5.0	9.1



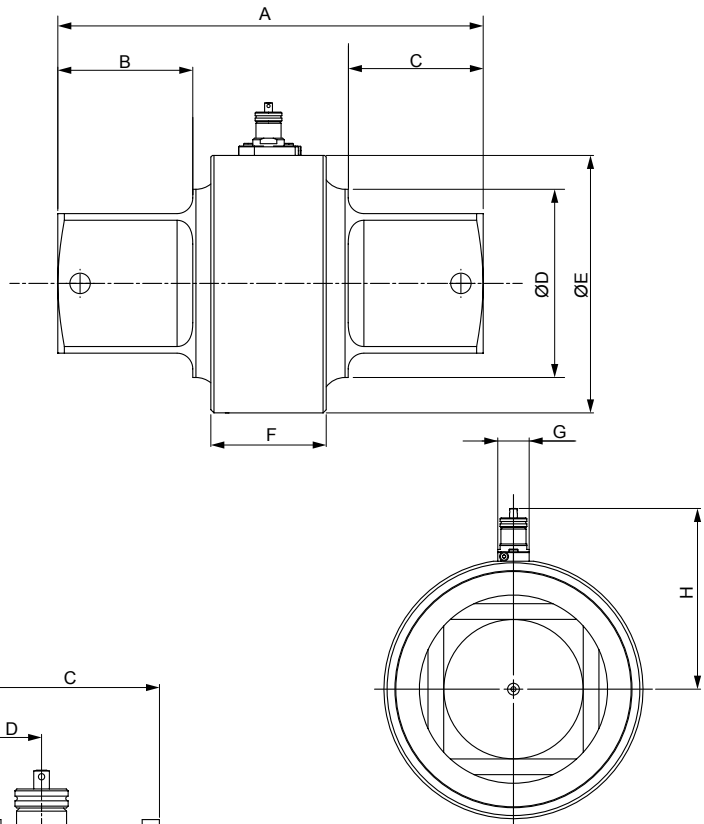


HARSH ENVIRONMENT TRANSDUCERS

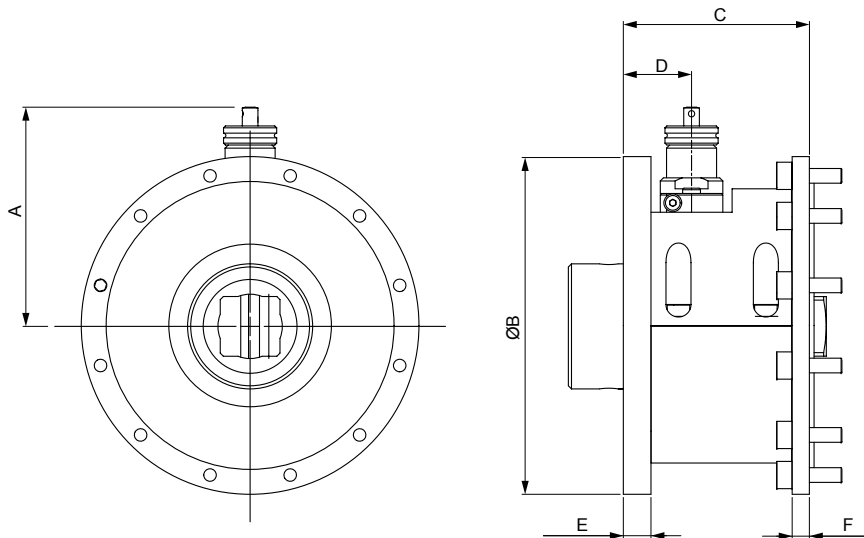


Static Transducers - Male to Male (M/M) Square Drives

Model	3,000 N-m 5,000 N-m	10,000 N-m	15,000 N-m	25,000 N-m 40,000 N-m 100,000 lbf-ft
Part Number/s	50751.xxx 50729.xxx	50788.xxx	50789.xxx	50726.xxx 50727.xxx 50743.xxx
Dimensions (mm)	A	168	200	225
	B	43	64	89
	C	43	64	86
	ØD	50	81	87
	ØE	95	110	110
	F	72	69	69
	G	20	20	20
	H	80	87	87
Weight (Kg)	3.4 (3,000 N-m) 5.0 (5,000 N-m)	11.4	11.4	21.5 (25,000 N-m) 22.0 (40,000 N-m) 25.0 (100,000 lbf-ft)



Annular Transducers



Model	1,000 N-m	3,500 N-m	10,000 N-m
Part Number/s	50767.xxx	50745.xxx	50725.xxx
Dimensions (mm)	A	70	100
	ØB	108	178
	C	60	77
	D	22	39
	E	9	16
	F	6	16
Weight (Kg)	3.4	4.0	5.8

INTERVENTION TOOL VERIFICATION KITS



4	INTERVENTION TOOL TORQUE VERIFICATION KIT
60278.xxx	3000 N-m ISO13628 Class 4 Intervention Tool Torque Verification Kit
60281.xxx	10000 N-m ISO13628 Class 5 Intervention Tool Torque Verification Kit
60282.xxx	15000 N-m ISO13628 Class 6 Intervention Tool Torque Verification Kit
60279.xxx	25000 N-m API 17D Class 7 (short) Intervention Tool Test Kit
60280.xxx	40000 N-m API 17D Class 7 (short) Intervention Tool Test Kit

Other Test Pots and Torque Verification Kits are available for standard and non standard API Intervention tool test and verification. Please contact Norbar.



INTERVENTION TOOL TEST POTS

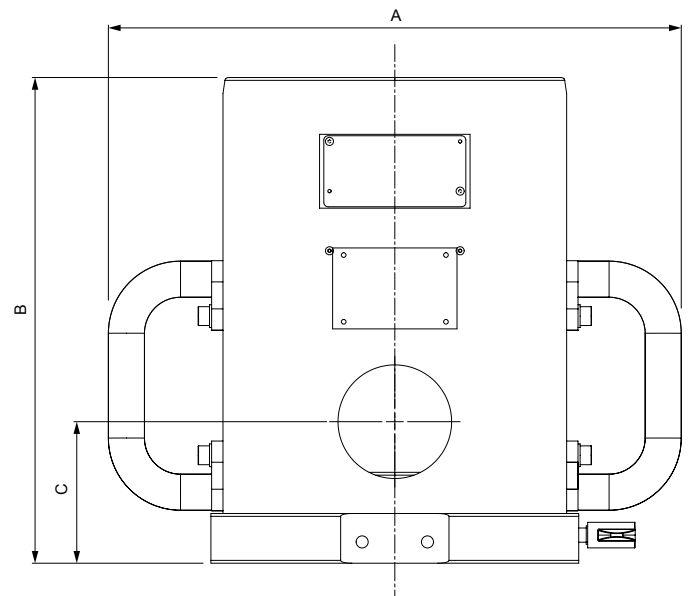


These reaction pots allow for the accurate testing of API rotary intervention tools.

- Conform to ISO13628-8:2002 and API 17D
- Customer specific solutions also available
- Lightweight all aluminium construction
- Incorporated lifting handles
- Eye bolts provided on larger units

4	INTERVENTION TOOL TEST POTS
80019	ISO13628-8:2002 Class 4 Intervention Tool Test Pot
80024	ISO13628-8:2002 Class 5 Intervention Tool Test Pot
80025	ISO13628-8:2002 Class 6 Intervention Tool Test Pot
80020	API 17D Class 7 Intervention Tool Test Pot
81018	Deck Mount Kit for API Verification Pot

Model	Class 4	Class 5	Class 6	Class 7
Part Number/s	80019	80024	80025	80020
Dimensions (mm)	A	372	403	428
	B	215	246	326
	C	312	342	428
Weight (Kg)	17.5	22	51	48



MULTIPLIERS FOR SUBSEA



4	MULTIPLIERS FOR INTEGRATION INTO SUB SEA INTERVENTION TOOLS
77331	HT5 5:1 for Sub Sea Intervention Tools
77301	HT5 5:1 for Sub Sea Splined Output

As above but supplied with transducer with an accuracy of $\pm 2\%$.

4	MULTIPLIERS WITH INTEGRATED TRANSDUCER
77141.IND	HT5 5:1 with Integrated Transducer 350 - 3500 N·m
77142.MAO2	HT5 5:1 with Integrated Transducer 4 - 20 mA 2 wire 600 - 3000 N·m





ENGINEER TO ORDER

Norbar's wide range of standard equipment may not meet your exact requirements as there are applications when something special is required.

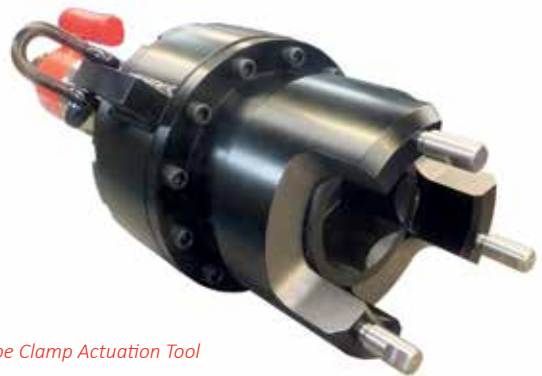
As an ISO 9001 accredited company, Norbar will undertake the design and manufacture of special equipment against agreed customer specifications.

These projects range from modified torque wrench end fittings to complete torque and angle control of valve testing kits. Relevant European safety directives are applied where appropriate, leading to well engineered reliable products that are designed to make tasks safer and easier.

For more information on Norbar's Engineer to Order service please e-mail your enquiry to technical@norbar.com or visit the Engineer to Order section of the Norbar website at: www.norbar.com/Services/Engineer-to-Order



Valve Testing Kit



Pipe Clamp Actuation Tool



*Remote Operated
Torque & Angle Kits*



Wet Pipe Clamp Tool under test

*Subsea Torque Multipliers
(Class 4-6/7 shown)*





USM

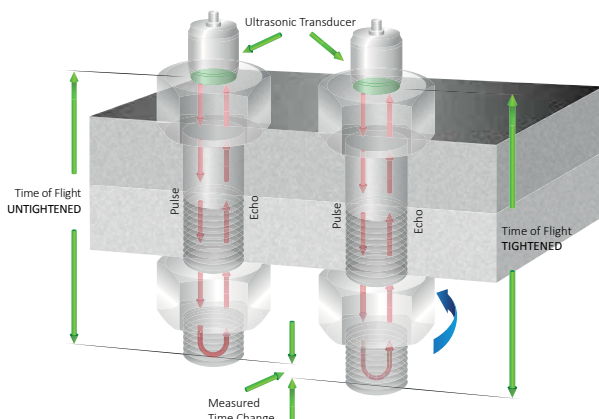


Ultrasonic measurement provides a very precise method of determining the elongation of a fastener due to tightening. This elongation is proportional to the load force generated by the fastener.



The basic principle behind this method of tension control is similar to sonar. The ultrasonic measurement of bolt tension is achieved by introducing a sonic pulse at one end of the fastener and accurately measuring the time of flight (TOF) required for the echo to return from the opposite end. Using material constants, the USM-3 converts this TOF into an "acoustic length" of the fastener, providing a baseline from which future measurements will be made. When the fastener is tightened: the TOF increases and the USM-3 will again utilise material constants to eliminate the effects of stress and temperature variations on sound velocity, providing an accurate elongation or load measurement.

The USM-3 uses state of the art hardware and digital signal processing to achieve these measurements with maximum automation, minimizing the need for operator interpretation. Once measurements have been recorded to the USM-3 internal memory, the included SonicBolt software will transfer the data to a computer for backup of files, creation of project reports, and conversion of data to Excel format for further analysis. In addition, the analogue signal output can be used to automatically shut-off powered torque and tensioning tools based on elongation or load, in even the most demanding applications.



9 USM-3 ULTRASONIC STRESS METER

40334 USM-3 instrument with AC adaptor, nylon case, storage case, transducer cable, RS232 cable, couplant and manual

Magnetic Transducers - This standard style is used with ferrous materials, and consists of a rare earth magnet surrounding the piezo electric transducer.

9 TRANSDUCERS

56016 $\frac{3}{16}$ " 5 MHz Magnetic Transducer

56017 $\frac{3}{16}$ " 7.5 MHz Magnetic Transducer

56018 $\frac{3}{16}$ " 10 MHz Magnetic Transducer

56009 $\frac{1}{4}$ " 5 MHz Magnetic Transducer

56019 $\frac{1}{4}$ " 10 MHz Magnetic Transducer

56011 $\frac{1}{2}$ " 2.25 MHz Magnetic Transducer

56010 $\frac{1}{2}$ " 5 MHz Magnetic Transducer

56020 $\frac{3}{4}$ " 1 MHz Magnetic Transducer

56013 $\frac{3}{4}$ " 2.25 MHz Magnetic Transducer

56012 $\frac{3}{4}$ " 5 MHz Magnetic Transducer

56021 Glue on, 3mm square, 7.5 MHz, pack of 100

Operating temperature limit for transducers is 55°C. Contact Norbar for details of high temperature transducers with a temperature limit of 175°C.

9 TRANSDUCER LEADS

60235 Transducer Lead 10' (approx 3m)

60236 Transducer Lead 20' (approx 6m)

56023 Probe for glue on Ultrasonic TD's

9 SPARES & ACCESSORIES

61112 Ultrasonic Couplant Bottle 4oz (approx 0.12 litres)

61116 Serial Lead 6' DB9 M to DB9 F

61117 Length Bar Set 3" & 6" with certificate

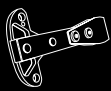
60271 Digital Thermometer (Accuracy $\pm 0.5^\circ\text{C}$ / $\pm 1^\circ\text{F}$)



Designed to remove potential sources of measurement error, these beams can be used to calibrate Norbar torque transducers, and torque transducers from other manufacturers (where design permits), as well as mechanical test devices. A UKAS accredited calibration certificate for the measurement of the torque radius is provided with each beam. Note: A temperature controlled environment is essential for use of these beams. The selection of weights will be influenced by gravitational constant and air buoyancy values at the proposed laboratory site.

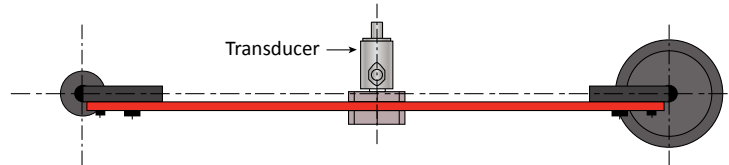
Principles of Operation	107
Calibration Beams & Weights	108





CALIBRATION BEAMS & WEIGHTS - PRINCIPLES OF OPERATION

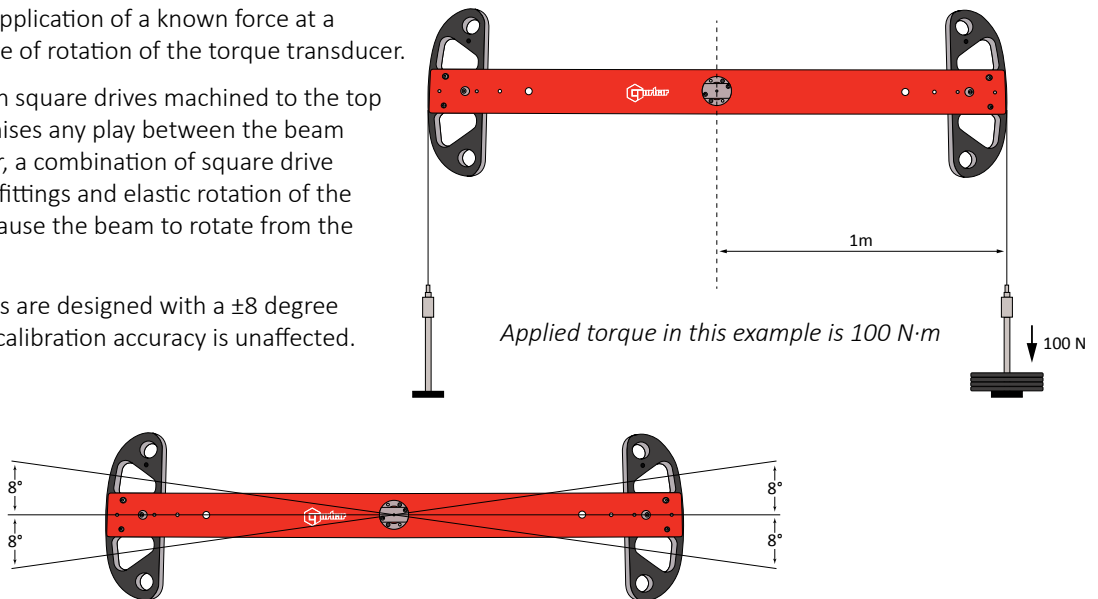
Norbar's test beams are designed for the static calibration of torque transducers. They are ideally suited to Norbar's transducers, but can be employed on other manufacturer's equipment.



Torque is generated by the application of a known force at a known radius from the centre of rotation of the torque transducer.

The beams are designed with square drives machined to the top limit of ISO 2725. This minimises any play between the beam and the transducer. However, a combination of square drive tolerances, misalignment of fittings and elastic rotation of the transducer shaft inevitably cause the beam to rotate from the horizontal under load.

Norbar's radius ended beams are designed with a $\pm 8^\circ$ degree usable arc within which the calibration accuracy is unaffected.



Additionally, the beams are designed to apply load on a vertical plane which cuts through the square drive inside the transducer. This minimises bending moments on the transducer and, for safe operation, ensures that the beam will not fall out of the transducer.

Gravitational Effects

It is very important that the gravitational value for the laboratory is established. The effect of not doing this could be a variation in the force produced by the weight of perhaps 0.5% of reading.

It is therefore strongly recommended that you establish the local value of gravity (g) for your Laboratory and use weights that have been calibrated at that gravitational constant.

Norbar will supply weights calibrated to gravitational constants specified by the customer. However, if the customer does not specify a value for ' g ' they will have been calibrated at an estimated gravitational constant for the customers' location.

Buoyancy Effects

The Norbar system uses calibrated weights to generate a downwards force.

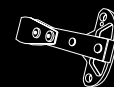
This means that Archimedes' principle applies, ie. air pressure under the weights causes an upwards force. This reduces the effective force generated by the weights and therefore the mass must be increased to allow for this.

Under standard conditions (ie. air density 1.2 kg/m^3 and 20 degrees centigrade and working in conventional mass terms) the increase required is by a factor of 0.015%.

Weights purchased from Norbar will already have this factor taken into account.

Weights that are calibrated to standard procedures do not have this factor taken into account because the air buoyancy affects both sides of the mass balance and can be ignored. It is important that weights used for torque transducer calibration are adjusted for air buoyancy.

It should also be noted that the double ended beam design employed by Norbar means that each half of the beam is balanced with regard to buoyancy of the beam. This is a significant advantage over single-arm counterbalanced systems.



CALIBRATION BEAMS & WEIGHTS



9	NEWTON METRE SIZES	
21400	100mm	Torque Radius Disc (100mm)
21429	0.5-60 N·m	Radius Ended Beam (0.25m)
21421	5-150 N·m	Radius Ended Beam (0.5m)
21427	50-500 N·m	Radius Ended Beam (0.5m)
21428	10-1500 N·m	Radius Ended Beam (1.0m)
21842	500-5000 N·m	Free Standing Beam

With the exception of 21842 all calibration beams are supplied in a protective wooden box. A UKAS accredited calibration certificate for the measurement of the torque radius is provided with each beam.

9	WEIGHTS FOR THE DISC 21400	
21452.NAM	Brass weight set to give 0.5 N·m	
21450.NAM	Brass weight set to give 1.0 N·m	
21479.NAM	Brass weight set to give 2.5 N·m	

9	WEIGHTS FOR THE BEAM 21429	
21476.NAM	Cast iron weight set to give 5 N·m	
21454.NAM	Cast iron weight set to give 10 N·m	
21458.NAM	Cast iron weight set to give 50 N·m	
Q2343.NAM	Cast iron weight set to give 60 N·m	

9	WEIGHTS FOR THE BEAM 21421	
21477.NAM	Cast iron weight set to give 50 N·m	
21458.NAM	Cast iron weight set to give 100 N·m	

9	WEIGHTS FOR THE BEAM 21427/21428	
21459.NAM	Cast iron weight set to give 250 / 500 N·m	
Q2344.NAM	Cast iron weight set to give 400 N·m	
21460.NAM	Cast iron weight set to give 500 / 1000 N·m	
21483.NAM	Cast iron weight set to give 500 / 1000 & 1500 N·m	

e.g. set 21459.NAM will give 250 N·m on a 21427 beam and 500 N·m on a 21428.

9	WEIGHTS FOR THE BEAM 21842	
21469.NAM	Cast iron weight set to give 5000 N·m	

All weight sets come with traceable UKAS accredited calibration certificate. This requires the customer to provide the value for "g" (local gravity) for the intended place of use when ordering.



9	IMPERIAL - POUNDS FEET SIZES	
21400	100mm	Torque Radius Disc (100mm)
21430	10-500 lbf·in	Radius Ended Beam (10")
21424	10-100 lbf·ft	Radius Ended Beam (12")
21425	50-500 lbf·ft	Radius Ended Beam (24")
21426	100-1000 lbf·ft	Radius Ended Beam (48")
21842	500-5000 lbf·ft	Free Standing Beam

With the exception of 21842 all calibration beams are supplied in a protective wooden box. A UKAS accredited calibration certificate for the measurement of the torque radius is provided with each beam.

9	WEIGHTS FOR THE DISC 21400	
21455.NAM	Brass weight set to give 50 ozf·in	
21453.NAM	Brass weight set to give 100 ozf·in	
21451.NAM	Brass weight set to give 160 ozf·in	

9	WEIGHTS FOR THE BEAM 21430	
21465.NAM	Cast iron weight set to give 100 lbf·in	
21466.NAM	Cast iron weight set to give 500 lbf·in	

9	WEIGHTS FOR THE BEAM 21424	
21467.NAM	Cast iron weight set to give 100 lbf·ft	

9	WEIGHTS FOR THE BEAM 21425	
21468.NAM	Cast iron weight set to give 500 lbf·ft	

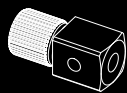
9	WEIGHTS FOR THE BEAM 21426	
21468.NAM	Cast iron weight set to give 1000 lbf·ft	

9	WEIGHTS FOR THE BEAM 21842	
21469.NAM	Cast iron weight set to give 5000 lbf·ft	

All weight sets come with a traceable UKAS accredited calibration certificate. This requires the customer to provide the value for "g" (local gravity) for the intended place of use when ordering.

9	ANCILLARY PRODUCTS FOR CALIBRATION BEAMS	
80000	Pedestal for mounting calibration equipment	
80005	Adjustable Angle Attachment	
21221	Adaptor STM Calibration ½"	

9	CALIBRATION FIXTURES	
J2239	Transducer calibration fixture ¼" sq	
J2237	Transducer calibration fixture ⅜" sq	
J2244	Transducer calibration fixture ½" sq	
J2240	Transducer calibration fixture ¾" sq	
J2241	Transducer calibration fixture 1" sq	
J3305	3° Angled Plate for use with calibration fixtures	



SPARES KITS

In order to maintain the quality, performance and peace of mind associated with their products Norbar recommend that only genuine Norbar spares are fitted to their products.

SERVICE REPLACEMENT POLICY

Our aim is to give you the fastest possible service when you send in a wrench for repair. Therefore, our policy is that all Norbar wrenches will, at Norbar's discretion, either be repaired or a 'service replacement' tool will be offered. This policy may be extended to wrenches from other manufacturers sent to Norbar for repair/replacement.

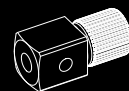
Repair

Where Norbar judges that a repair is viable, a combined repair and "declaration of conformance" (COMBO) service will be offered – see page 114. The setting of the wrench and documentation of the results will be carried out in conformance with ISO6789-1:2017. For customers requiring a calibration certificate conforming to ISO6789-2: 2017 from Norbar's UKAS accredited laboratory, this service can also be offered at an additional cost.

Service Replacement

When Norbar judges that a repair is not commercially viable, a 'service replacement' tool will be offered. A 'service replacement' tool is manufactured from new parts, carries a twelve month warranty and is supplied with the same documentation as a new product of the equivalent type. For Professional, adjustable models from Model 15 to Model 1500 a calibration certificate conforming to ISO6789-2:2017 will be supplied as standard from the production line. All other service replacement models, for example NorTorque and TTi wrenches, will be supplied with a declaration of conformance to ISO6789-1:2017. As with repairs, customers preferring a certificate from Norbar's UKAS accredited laboratory can specify this service at an additional cost.





SPARES KITS

8	TORQUE SCREWDRIVER
13593.001NM	TTs Handle Repair Kit for 1.5 N-m Tool
13593.003NM	TTs Handle Repair Kit for 3.0 N-m Tool
13593.006NM	TTs Handle Repair Kit for 6.0 N-m Tool
13593.013LBI	TTs Handle Repair Kit for 13 lbf-in Tool
13593.026LBI	TTs Handle Repair Kit for 26 lbf-in Tool
13593.053LBI	TTs Handle Repair Kit for 53 lbf-in Tool
13593.P	TTs Handle Repair Kit for P Type Tool
13594	TTs Adjusting Screw & Retention Clip Repair Kit
13595	TTs Body Tube & Cam Assembly Repair Kit
13596	TTs End Knob Assembly Repair Kit
13597	TTs ¼" Blade Repair Kit
13609	TTs P Type Locking Knob Repair Kit

8	TT WRENCHES UP TO 50 N-m/35 lbf-ft
13425	¼" Ratchet Repair Kit, Mdl 20 N-m, 180 lbf-in
13426	⅜" Ratchet Repair Kit, Mdl 20 N-m, 180 lbf-in, 50 N-m, 35 lbf-ft
13427	½" Ratchet Repair Kit, Mdl 50 N-m, 35 lbf-ft
13636.020NLF	Handle Repair Kit, 20 N-m/lbf-in Scale
13636.020NM	Handle Repair Kit, 20 N-m Scale
13636.180LBI	Handle Repair Kit, 180 lbf-in Scale
13636.050NLF	Handle Repair Kit, 50 N-m/lbf-ft Scale
13636.050NM	Handle Repair Kit, 50 N-m Scale
13636.035LBF	Handle Repair Kit, 35 lbf-ft Scale
13417	Adjusting Knob Repair Kit
13637	Thrust Washer Repair Kit
11762	Rivet Repair Kit

8	TT WRENCHES 100 N-m/75 lbf-ft TO 300 N-m/250 lbf-ft
13410.100NLF	Handle Repair Kit, 100 N-m/lbf-ft Scale
13410.100NM	Handle Repair Kit, 100 N-m Scale
13410.075LBF	Handle Repair Kit, 75 lbf-ft Scale
13410.150NLF	Handle Repair Kit, 150 N-m/lbf-ft Scale
13410.150NM	Handle Repair Kit, 150 N-m Scale
13410.110LBF	Handle Repair Kit, 110 lbf-ft Scale
13410.200NLF	Handle Repair Kit, 200 N-m/lbf-ft Scale
13410.200NM	Handle Repair Kit, 200 N-m Scale
13410.150LBF	Handle Repair Kit, 150 lbf-ft Scale
13410.250NLF	Handle Repair Kit, 250 N-m/lbf-ft Scale
13410.250NM	Handle Repair Kit, 250 N-m Scale
13410.185LBF	Handle Repair Kit, 185 lbf-ft Scale
13410.300NLF	Handle Repair Kit, 300 N-m/lbf-ft Scale
13410.300NM	Handle Repair Kit, 300 N-m Scale
13410.220LBF	Handle Repair Kit, 220 lbf-ft Scale
13410.250LBF	Handle Repair Kit, 250 lbf-ft Scale

8	TT WRENCHES 100 N-m/75 lbf-ft TO 300 N-m/250 lbf-ft
13411	Adjusting Knob Repair Kit
13415	Thrust Washer Repair Kit
13414	Rivet Repair Kit

8	TTi WRENCHES
13693	TTi20 ¼" Ratchet Lever Arm Assemblies
13694	TTi20 ⅜" Ratchet Lever Arm Assemblies
13690	TTi50 ⅜" Ratchet Lever Arm Assemblies
13691	TTi50 ½" Ratchet Lever Arm Assemblies
13212	Ratchet Repair Kit, ⅜" sq. dr. 60/100
13214	Ratchet Repair Kit, ½" sq. dr. 200
13215	Ratchet Repair Kit, ½" sq. dr. Mdl 250/300 N-m, 185/220 lbf-ft
13491	Ratchet Replacement Kit, ⅜" sq. dr. 60/100
13492	Ratchet Replacement Kit, ½" sq. dr. 50-200
13493	Ratchet Replacement Kit, ½" sq. dr. Mdl 250/300 N-m, 185/220 lbf-ft)

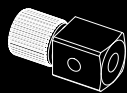
For Handle Repair Kits please see TT section to the left.

8	TTfth WRENCHES
13695	TTfth20 9x12mm Female End Repair Kit
13692	TTfth50 9x12mm Female End Repair Kit

8	NON-MAGNETIC RATCHET REPAIR KITS
13769	Ratchet repair Kit for 13292 & 13294
13770	Ratchet repair Kit for 13585 & 13295

8	MODEL 5
13123	Spares Kit Model 5 Adjustable
13125	Spares Kit Model 5 'P' Type
13124	Calibration Kit Model 5 'P' Type

8	PROFESSIONAL TORQUE WRENCHES MODELS 60 - 400 (pre March 2015)
11598	'Automotive Ratchet' Repair Kit ⅜" Beta (Mdl 60 & 100)
11618	'Automotive Ratchet' Repair Kit ½" Beta (Mdl 60 & 100)
11622	'Automotive Ratchet' Repair Kit ½" Rev Beta (Mdl 200 & 300)
11623	Push-Through Beta 72 Tooth Repair Kit ½"
13212	'Industrial Ratchet' Repair Kit ⅜" (Mdl 60/100)
13213	'Industrial Ratchet' Repair Kit ½" (Mdl 60/100)
13214	'Industrial Ratchet' Repair Kit ½" (Mdl 200)
13215	'Industrial Ratchet' Repair Kit Mdl 300/330 ½" for 13047, 13049 & 13057
13216	'Industrial Ratchet' Repair Kit Mdl 400 ¾" for 13050 & 13056
13190	Mdl 400 ¾" sq. dr.
13235	Sq. Dr. Repair Kit ⅜" (Mdl 60/100)
13236	Sq. Dr. Repair Kit ½" (Mdl 60/100)
13237	Sq. Dr. Repair Kit ½" Mdl 200/300/330
11824	Spares Kit Mdl 60 Handle (pre 1 st Jan 2001)
11825	Spares Kit Mdl 100 Handle (pre 1 st Jan 2001)
11826	Spares Kit Mdl 200 Handle (pre 1 st Jan 2001)
11827	Spares Kit Mdl 300 Handle (pre 1 st Jan 2001)
11828	Spares Kit Mdl 330 Handle (pre 1 st Jan 2001)
13157	Spares Kit Prof. Handle (Post 1 st Jan 2001)



SPARES KITS

8	PROFESSIONAL TORQUE WRENCHES SPARES KITS
150100.K	Handle Repair Kit
150101.K	Scale Mechanism Repair Kit
150102.K	Locking Knob Repair Kit
150103.K	Thrust Washer and Screw Kit
150104.K	Spring Repair Kit
150105.K	½" sq. dr. Mushroom Kit
150106.K	¾" sq. dr. Mushroom Kit
150112.K	'Industrial Ratchet' Repair Kit, ⅜" sq. dr. (Mdl 50)
254100.PK	SKT Grub M5 x 8 LG Oval Point - Pack of 50
150113.K	'Industrial Ratchet' Repair Kit, ½" sq. dr. (Mdl 100-200)
150114.K	'Industrial Ratchet' Repair Kit, ½" sq. dr. (Mdl 300-340)
150115.K	'Industrial Ratchet' Repair Kit, ¾" sq. dr. (Mdl 400)
11598	'Automotive Ratchet' Repair Kit ⅜" sq. dr. (Mdl 50 & 100)
11618	'Automotive Ratchet' Repair Kit ½" sq. dr. (Mdl 50 & 100)
150111.K	'Automotive Ratchet' Repair Kit, ½" sq. dr. (Mdl 200)

8	PROFESSIONAL TORQUE WRENCHES SPARES PACKS
10628.PK	Label TimeStrip - Pack of 50
10640.PK	TimeStrip Adhesive Gasket - Pack of 50
11521.PK	Shaped Washer - Pack of 20
11522.PK	End Stop - Pack of 10
15312.PK	End Cap - Pack of 25
25496.PK	SCR:SKT Grub M5 x 6 LG Oval - Pack of 50
25497.PK	SCR:SKT Grub M5 x 5 LG Dog Point - Pack of 50
254100.PK	SCR:SKT Grub M5 x 8 LG Oval Point - Pack of 50
25746.PK	M3 Dog Point Grub SCR - Pack of 50
25938.PK	Washer M4 STD.Flat - Pack of 100
26033.PK	Pivot Pin - Pack of 20
27029.PK	Steel Ball 3.8mm Dia - Pack of 50
25351.10.PK	SHCS M4 x 10 LG - Pack of 50

8	CLICKTRONIC® TORQUE WRENCHES SPARES KITS
150104.K	Spring Repair Kit
150105.K	½" sq. dr. Mushroom Kit
150106.K	¾" sq. dr. Mushroom Kit
150107.K	Adjusting Screw and Wiper Kit
150108.K	Locking Knob Kit
150109.K	Lower Handle Kit
150110.K	Complete Handle Kit

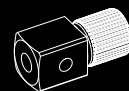
8	CLICKTRONIC® TORQUE WRENCHES SPARES PACKS
15524.PK	USB Bung - Pack of 5
39721.PK	Wiper 1-3 N - Pack of 5
25742.PK	M2.5 x 12 LG Torx Pan Screw - Pack of 80
25743.PK	M4 x 8 LG Torx CSK Screw - Pack of 50

8	PROFESSIONAL TORQUE WRENCHES MODELS 550 - 1500
14195	Ratchet Repair Kit Mdl 550/650 ¼"
14196	Ratchet Repair Kit Mdl 800/1000/1500 ¼"
14197	Ratchet Repair Kit Mdl 800/1000/1500 1"
14162	Ratchet Assembly Mdl 550/650
14163	Ratchet Assembly Mdl 1000
12297	Replacement Square Drive Mdl 550/650 ¾"
12299	Replacement Square Drive Mdl 550 1"
14157	Replacement Square Drive Mdl 800-1500 ¾"
14165	Replacement Square Drive Mdl 800-1500 1"
14185	Cover Kit for all Models
14218	Secondary Lever and Support Block Assy Upgrade kit for all Models pre 2004/169391
14217	Secondary Lever and Support Block Assy for all Models post 2004/169391
14220	Secondary Lever Assembly
14187	Screw Adjustable Kit for all Models
14166	Calibration Kit 'P' Type for all Models
13217	Replacement Professional Handle Kit
11807	Handle Spares Kit Professional 'P' Type
11698	Calibration Kit Professional 'P' Type
13242	Rivet Repair Kit

8	SLIMLINE TORQUE WRENCHES
11831	Ratchet Repair Kit SLO ¼" (Post Jan 2008)
11832	Ratchet Repair Kit SLO ⅜" (Post Jan 2008)
11806	Spares Kit - SLO Adj Knob
29683	Mushroom Head Sq. Dr. Assy ½" SL3
11914	⅜"sq.dr for SLO Fixed Head
11762	Rivet Repair Kit

8	INDUSTRIAL TORQUE WRENCHES
12307	Ratchet Repair Kit Industrial (except 6R)
12373	Ratchet Repair Kit 6R only
12297	¾" Square Drive Assy for 3AR - 5AR
12299	1" Square Drive Assy for 3AR - 5AR
18492	1" Square Drive Assy for 6R
12374	1" Square Drive Repair Kit, 6R only
12355	Ind Thrust Washer Spares Kit
12360	End Caps - Plastic 10 pack (Industrial)
12381	3AR Adjusting Nut
12382	No.4 Adjusting Nut
12383	4R Adjusting Nut
12384	4AR Adjusting Nut
12385	5R Adjusting Nut
12386	5AR Adjusting Nut
12387	6R Adjusting Nut

In order for Norbar to supply the correct adjusting nut, we need to know the correct scale length for the tool being repaired. The scale length is denoted by a number on the nut being replaced and will be of the form e.g. 159/60.



SPARES KITS

8	NORTORQUE® TORQUE WRENCHES HANDLE KITS
130501.060NLF	Handle Repair Kit, 60 N-m/lbf-ft Scale
130501.060NM	Handle Repair Kit, 60 N-m Scale
130501.100NLF	Handle Repair Kit, 100 N-m/lbf-ft Scale
130501.100NM	Handle Repair Kit, 100 N-m Scale
130501.200NLF	Handle Repair Kit, 200 N-m/lbf-ft Scale
130501.200NM	Handle Repair Kit, 200 N-m Scale
130501.300NLF	Handle Repair Kit, 300 N-m/lbf-ft Scale
130501.300NM	Handle Repair Kit, 300 N-m Scale
130501.340NLF	Handle Repair Kit, 340 N-m/lbf-ft Scale
130501.340NM	Handle Repair Kit, 340 N-m Scale



13235 Repair Kit

8	NORTORQUE® TORQUE WRENCHES SQUARE DRIVE REPAIR KITS
13235	Sq. Dr. Repair Kit 3/8" (Mdl60)
13236	Sq. Dr. Repair Kit 1/2" (Mdl100)
13237	Sq. Dr. Repair Kit 1/2" (Mdl200/300/340)



13212 Repair Kit

8	NORTORQUE® TORQUE WRENCHES RATCHET REPAIR KITS
13212	Ratchet Repair Kit 3/8" (Mdl60)
13213	Ratchet Repair Kit 1/2" (Mdl100)
13214	Ratchet Repair Kit 1/2" (Mdl200)
13215	Ratchet Repair Kit 1/2" (Mdl300/340)

8	NORTORQUE® TORQUE WRENCHES OTHER REPAIR KITS
130500.K	Locking Knob Kit
150103.K	Thrust Washer and Screw Kit



13212 Repair Kit

8	MULTIPLIER SPARES KIT
16831	Spares Kit No. 2 Output Carrier
16836	Spares Kit No. 5 Output Carrier
16832	Spares Kit No. 7 Output Carrier
16835	Spares Kit No. 9 Output Carrier
19348	HT3-1000 N-m Retention Pin
19349	HT3-1000 N-m Cranked Reaction
19347	HT3-1000 N-m Straight Reaction
77018.1	Sq. Drive HT3 3/4" (old style)
17185	Spares Kit HT3 3/4" Sq Dr (Pre May 1993 style with shoulder screw)
17676	Sq. Drive HT3 3/4" (to fit 17218, 17220 & all other models with square drive retained by rollpin)



77018.1



17676



17185

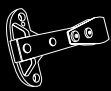
17223	Spares Kit HT3 Carriers
17224	Spares Kit HT3 1/2" Input Gear
17225	Spares Kit HT3 3/4" Input Gear
18365	Spares Kit 72mm Air Motor Handle
18374	Spares 72mm Remote Block
18544	Replacement 3/4" sq. dr. ET/PTS/PTM-52 Series
18545	Replacement 1" sq. dr. ET/PTS/PTM-52 Series
18779	Replacement 3/4" sq. dr. ET/PTS/PTM-72 Series
18492	Replacement 1" sq. dr. ET/PTS/PTM-72 Series
18221	Replacement 3/4" sq. dr. PT 72 Series
18220	Replacement 1" sq. dr. PT 72 Series
19260	Spares Kit for Fwd/Rev Gearbox Knob post Feb 2011 Tools
19077	Upgrade Kit for Fwd/Rev Gearbox for PTM

8	ET/PTS™/PTM-92 & ET/PTS™/PTM-119 SQUARE DRIVES
18934	1" for ET/PTS/PTM-92
18935	1 1/2" for ET/PTS/PTM-92
18959	1 1/2" for ET/PTS/PTM-119

8	VANE SETS FOR PNEUTORQUE® MULTIPLIERS
18631	For PTM Series (Pack of 5)
18278	For PT 72mm Series (Pack of 6)
16218	For PT Standard Series (Pack of 6)

8	SPARES FOR LUBRO CONTROL UNIT
28911	3m Hose*
28912	6m Hose*
28913	Pressure Gauge
28914	Filter Element for Filter/Regulator
28915	Bowl Assembly for Filter/Regulator
28916	Bowl Assembly for Lubricator
28917	Locking Collar
28918	1/2" BSP Taper Thread Adaptor

*Other lengths of Hose are available, please contact Norbar for details.



CALIBRATION SERVICES

Declaration of Conformance	114
UKAS Accredited Calibration Certification	114
Other Certification	118
General Notes	118

A calibration 'priority booking' service is available, please contact the Customer Relations Department a minimum of one month prior to the required recalibration due date.

- Tel: +44 (0)1295 753635
- Fax: +44 (0)1295 753636
- Email: repairs@norbar.com

CALIBRATION SERVICES

Devices sent in for UKAS accredited calibration certification will be calibrated and the 'As Found' readings recorded. The calibration will be performed to the appropriate standard as specified in our schedule of accreditation.

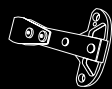
- Should the device be in specification 'As Found', a certificate will be raised and the device returned.
- Should the device be out of specification, but capable of adjustment, it will be adjusted, 'As Left' readings taken, and one certificate raised with 'As Found' and 'As Left' readings on it.
- Should the device require repair that is not covered by a combined calibration and service, we will do so where possible, after consultation with the customer.

Norbar are accredited by UKAS for torque measurements between 0.005 N·m and 108,500 N·m or the imperial equivalents. Our Schedule of Accreditation gives further details (please refer to www.norbar.com).

UKAS accredited calibration certificates are issued under the authority of the United Kingdom Accreditation Service.

Norbar can calibrate non-Norbar Torque products, please contact us with the details of your equipment.





DECLARATION OF CONFORMANCE

TORQUE WRENCH DECLARATION OF CONFORMANCE (DOC)



ONE DIRECTION

DOC1.CW	Up to 400 N·m / 300 lbf·ft
DOC2.CW	Up to 1000 N·m / 750 lbf·ft
DOC3.CW	Up to 3000 N·m / 2200 lbf·ft

ONE DIRECTION & REPAIR COMBO

RCD0C1.CW	NorTorque® and Professional wrenches up to 400 N·m
RCD0C2.CW	Industrial wrenches 2R - 5R
RCD0C3.CW	Industrial wrenches 5AR & 6R
RCD0C4.CW	Large Professional 550 & 650 N·m
RCD0C5.CW	Large Professional 800 - 1500 N·m

TWO DIRECTIONS

DOC1.CW+CCW	Up to 400 N·m / 300 lbf·ft
DOC2.CW+CCW	Up to 1000 N·m / 750 lbf·ft
DOC3.CW+CCW	Up to 3000 N·m / 2200 lbf·ft

TWO DIRECTIONS & REPAIR COMBO

RCD0C1.CW+CCW	NorTorque® and Professional wrenches up to 400 N·m
RCD0C2.CW+CCW	Industrial wrenches 2R - 5R
RCD0C3.CW+CCW	Industrial wrenches 5AR & 6R
RCD0C4.CW+CCW	Large Professional 550 & 650 N·m
RCD0C5.CW+CCW	Large Professional 800 - 1500 N·m

UKAS ACCREDITED CALIBRATION CERTIFICATION

TORQUE WRENCH, UKAS ACCREDITED CALIBRATION CERTIFICATION

On receipt an 'As Found' calibration certificate will be carried out where possible. If the results do not fall within specification the wrench will be adjusted and if the adjustment does not bring the wrench back within specification then it will either be repaired or a service replacement will be offered – see page 109 for further details.

Calibration certificates are in accordance with the current standard for hand torque tools BS ISO 6789-2:2017. The certificate shows the nominal torque applied and the measured torque readings.

For guidance on Norbar's procedure for wrenches sent in for repair, see page 109. If the same tool is required to be returned, i.e. if you do not want the tool to be service replaced, then this should be made clear on the purchase order which accompanies the tool.

ONE DIRECTION

TWCC1.CW	Up to 400 N·m / 300 lbf·ft
TWCC2.CW	Up to 1000 N·m / 750 lbf·ft
TWCC3.CW	Up to 3000 N·m / 2200 lbf·ft

TWO DIRECTIONS

TWCC1.CW+CCW	Up to 400 N·m / 300 lbf·ft
TWCC2.CW+CCW	Up to 1000 N·m / 750 lbf·ft
TWCC3.CW+CCW	Up to 3000 N·m / 2200 lbf·ft

NORTRONIC® UKAS ACCREDITED CALIBRATION CERTIFICATION



ONE DIRECTION & ANGLE

NTCC1.CW	NorTronic® all sizes
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TWO DIRECTIONS & ANGLE

NTCC1.CW+CCW	NorTronic® all sizes
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MANUAL TORQUE MULTIPLYING GEARBOXES, UKAS ACCREDITED CALIBRATION CERTIFICATION



The part numbers shown below are for Certification 'As Found',

ONE DIRECTION

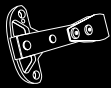
HTCC1.CW	Up to 6000 N·m / 5000 lbf·ft
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TWO DIRECTIONS

HTCC1.CW+CCW	Up to 6000 N·m / 5000 lbf·ft
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SWEENEY MULTIPLIER ONE DIRECTION

SWEENEY	Sweeney Multiplier Calibration
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UKAS ACCREDITED CALIBRATION CERTIFICATION

ELECTRONIC DEVICES

In accordance with the current standards for calibration of torque measurement devices, it is desirable to calibrate transducers with the display that is normally used. In this case the 'system' is calibrated. If it is not possible to supply the display unit, an equivalent calibrated display unit from the laboratory will be used. The calibration will then be valid for the transducer with the original display as long as the original display has been calibrated within the last 12 months.

Calibration certificates are in accordance with the current standard for torque measuring devices BS 7882:2017, and show the nominal torque applied, and the measured torque readings. Measured readings may be given in mV/V on request. Details of the standard are available on request.

It is not our intention to offer a full repair service for torque devices from other manufacturers. Where a device is in need of repair, the customer is advised to have this performed by an approved service agent or the manufacturer before submitting the device for UKAS accredited calibration. Some electronic transducer systems from other manufacturers may incur an additional calibration cost; the electronics department repair technicians will clarify this point if required. Occasionally it will be necessary to manufacture special adaptors to enable the calibration to be performed. This will of course affect the price and delivery, and will be discussed with the customer as the need arises.

CALIBRATION TO BS7882:2017 CLASS 0.1

Norbar's UKAS accredited laboratory performs standard calibrations on torque measuring devices to BS7882:2017 class 0.2 increasing torques only. However the laboratory is able to calibrate devices to class 0.1 at the customer's request. Class 0.1 requires calibration in four different mounting positions each rotated 90° about the measurement axis. Classification to class 0.1 is dependent on the devices performance. Calibrations including a decreasing series of torques can also be provided if required. A price for these services is available on request.

This section contains combined calibration and service fixed prices for Norbar products. Other manufacturers' equipment will be handled by individual quotation. Provided that the product is in serviceable condition*, we guarantee to carry out all calibration, function checks and repair work in order to bring the equipment back to its original functionality.

*Product would be regarded as unserviceable if either it or the components required for the repair are obsolete or unavailable. Serviceability also implies that the product is capable of repair without complete replacement.

Service replacements are available for some products.

ELECTRONIC TORQUE TRANSDUCERS, UKAS ACCREDITED CALIBRATION CERTIFICATION (WITH SQUARE DRIVE, FLANGE MOUNTED & PRE 2004 ROTARY)



The part numbers shown below are for Combined Calibration and Service, 'As Found' and 'As Left'

ONE DIRECTION

TDCCS1.CW	Up to 1500 N·m / 1000 lbf·ft
TDCCS5.CW@	From 1501 to 7000 N·m / 1001 - 5000 lbf·ft
TDCCS3.CW+	Square/Splined Drive From 7001 to 100000 N·m / 5001 to 100000 lbf·ft
TDCCS4.CW+	Flange Drive From 7001 to 100000 N·m / 5001 to 100000 lbf·ft
ADDCALPOINTS.CCS	Additional calibration steps below 10% of rated capacity to 2% for transducers up to 7000 N·m (5000 lbf·ft)

TWO DIRECTIONS

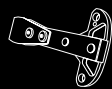
TDCCS1.CW+CCW	Up to 1500 N·m / 1000 lbf·ft
TDCCS5.CW+CCW@	From 1501 to 7000 N·m / 1001 - 5000 lbf·ft
TDCCS3.CW+CCW+	Square/Splined Drive From 7001 to 100000 N·m / 5001 to 100000 lbf·ft
TDCCS4.CW+CCW+	Flange Drive From 7001 to 100000 N·m / 5001 to 100000 lbf·ft

@ UKAS accredited calibration up to 6000 N·m. A non-accredited value at 7000 N·m is extrapolated and provided for reference only.

+ UKAS accredited calibration up to 80000 lbf·ft. A non-accredited value at 100000 lbf·ft is extrapolated and provided for reference only.

For part numbers TDCCS3.CW and TDCCS4.CW, static transducers with 2½" square drives and annular transducers to fit HT/PT9 & HT/PT11, a secondary calibration to extend the range below 10% of the rated capacity may be ordered using part number TDCCS5.CW

For part numbers TDCCS3.CW+CCW and TDCCS4.CW+CCW, static transducers with 2½" square drives and annular transducers to fit HT/PT9 & HT/PT11, a secondary calibration to extend the range below 10% of the rated capacity may be ordered using part number TDCCS5.CW+CCW



UKAS ACCREDITED CALIBRATION CERTIFICATION

ROTARY TRANSDUCERS (2004 ONWARDS), UKAS ACCREDITED CALIBRATION CERTIFICATION (PART CODE 50708.XXX-50724.XXX)



The part numbers shown below are for Combined Calibration and Service, 'As Found' and 'As Left'

ONE DIRECTION

TDCCS2.CW	Up to 1500 N·m / 1000 lbf·ft
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TWO DIRECTIONS

TDCCS2.CW+CCW	Up to 1500 N·m / 1000 lbf·ft
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TRUCHECK™



The part numbers shown below are for Combined Calibration and Service, 'As Found' and 'As Left'

ONE DIRECTION

TCCCS1.CW	TruCheck™ All Sizes (UKAS Accredited Calibration Certification)
TCCCS2.CW	TruCheck™ All Sizes *

TWO DIRECTIONS

TCCCS1.CW+CCW	TruCheck™ All Sizes (UKAS Accredited Calibration Certification)
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*Issued with traceable certification.

PRO-TEST, UKAS ACCREDITED CALIBRATION CERTIFICATION



The part numbers shown below are for Combined Calibration and Service, 'As Found' and 'As Left'

ONE DIRECTION

PROCCS.CW	Pro-Test All sizes
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TWO DIRECTIONS

PROCCS.CW+CCW	Pro-Test All Sizes
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PRO-LOG, TTT, T-BOX, T-BOX XL™ & TTL-HE, UKAS ACCREDITED CALIBRATION CERTIFICATION



The part numbers shown below are for Combined Calibration and Service, 'As Found' and 'As Left'

ONE DIRECTION

INSTCCS3.CW	Pro-Log or TTT
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TWO DIRECTIONS

INSTCCS3.CW+CCW	Pro-Log or TTT
INSTCCS4.CW+CCW	TTL-HE, T-Box or T-Box XL™
43217R	TTL-HE Service Replacement

TST, UKAS ACCREDITED CALIBRATION CERTIFICATION



The part numbers shown below are for Combined Calibration and Service, 'As Found' and 'As Left' This includes both an instrument and system calibration

ONE DIRECTION

TSTCCS.CW	TST
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TWO DIRECTIONS

TSTCCS.CW+CCW	TST
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Section with combined calibration & service ends here.

CALIBRATION BEAMS & WEIGHTS, UKAS ACCREDITED CALIBRATION CERTIFICATION



The part numbers shown below are for Length Certification, 'As Found' and 'As Left'

CBLC1	Disc or Beam up to 150 N·m / 100 lbf·ft
CBLC2	Disc or Beam up to 1500 N·m / 1000 lbf·ft
CBLC3	Disc or Beam up to 6800 N·m / 5000 lbf·ft
WEIGHT.CC1	Calibration of Weights up to 25 kgf / 245 N / 55 lbf



UKAS ACCREDITED CALIBRATION CERTIFICATION

MECHANICAL TORQUE TESTING DEVICES, UKAS ACCREDITED CALIBRATION CERTIFICATION



The part numbers shown below are for Combined Calibration and Service, 'As Found' and 'As Left'

ONE DIRECTION

MCCS1.CW | Up to 5000 N·m / 5000 lbf·ft

TWO DIRECTIONS

MCCS1.CW+CCW | Up to 5000 N·m / 5000 lbf·ft

TWA, UKAS ACCREDITED CALIBRATION CERTIFICATION



The part numbers shown below are for Combined Calibration and Service, 'As Found' and 'As Left'

ONE DIRECTION

TWACCS.CW | TWA All Sizes

TWO DIRECTIONS

TWACCS.CW+CCW | TWA All Sizes

ETS, UKAS ACCREDITED CALIBRATION CERTIFICATION



The part numbers shown below are for Combined Calibration and Service, 'As Found' and 'As Left'

INSTCCS1.CW | ETS

DTS, UKAS ACCREDITED CALIBRATION CERTIFICATION



ONE DIRECTION

DTSCCS1.CW@ | DTS up to 7000 N·m or 5000 lbf·ft

DTSCCS2.CW+ | DTS from 7001 to 100000 N·m / 5001 to 100000 lbf·ft Square and Spline drive

DTSCCS3.CW+ | DTS from 7001 to 100000 N·m / 5001 to 100000 lbf·ft Flange drive

TWO DIRECTIONS

DTSCCS1.CW+CCW@ | DTS up to 7000 N·m or 5000 lbf·ft

DTSCCS2.CW+CCW+ | DTS from 7001 to 100000 N·m / 5001 to 100000 lbf·ft Square and Spline drive

DTSCCS3.CW+CCW+ | DTS from 7001 to 100000 N·m / 5001 to 100000 lbf·ft Flange drive

- @ UKAS accredited calibration up to 6000 N·m. A non-accredited value at 7000 N·m is extrapolated and provided for reference only.
- + UKAS accredited calibration up to 80000 lbf·ft. A non-accredited value at 100000 lbf·ft is extrapolated and provided for reference only.

ETTA, UKAS ACCREDITED CALIBRATION CERTIFICATION

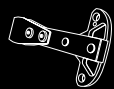


The part numbers shown below are for Combined Calibration and Service, 'As Found' and 'As Left'

ETTACCS.CW | ETTA

GENERAL DEVICES, UKAS ACCREDITED CALIBRATION CERTIFICATION

EMCC | Mechanical Enclosure Meter Calibration (CW + CCW)



OTHER CERTIFICATION

EVOTORQUE® AND PNEUTORQUE® CERTIFICATES



These devices are outside the scheduled accreditation issued by UKAS.

HTCERT	Compact Series Calibration
PTCERT	PneuTorque® Calibration
PTICEC	PTM IC/EC Certificate of air pressure vs torque
ETCERT	EvoTorque® Certificate of torque and angle

USM CERTIFICATES



These devices are outside the scheduled accreditation issued by UKAS.

USMCC	Ultrasonic Stress Meter certificate of calibration
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GENERAL DEVICES

These devices are outside the scheduled accreditation issued by UKAS.

Weight Set Certificates accredited by UKAS or other certified bodies

ETSDPFT	ETS Data Printer. Function Test
ETSBPUFT	ETS Battery Power Unit. Function Test
FWSUFT	ETS or ETTA 5 Way Switch Unit. Function Test
TWSUFT	ETS or ETTA 2 Way Switch Unit. Function Test

TRANSDUCER CONVERSIONS

SQ8888	ETS Transducer conversion to Smart Transducer (does not include calibration)
SQ2005	ETTA Transducer conversion to Smart Transducer (does not include calibration)

GLOBAL SERVICE

Norbar is the only torque equipment manufacturer capable of offering tool and instrument calibration services to the original factory standard on four continents.



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Accredited laboratories in Australia, USA, Singapore, China and India operate the same equipment and procedures as the UKAS accredited laboratory within our headquarters in the UK.



1. INTERPRETATION AND APPLICATION OF TERMS

1.1 In these Conditions the following words have the following meanings:

"Contract"	means the contract between Norbar and the Customer for the sale and purchase of the Goods and/or Services, incorporating these Conditions, the Order and the Order Acknowledgement;
"Customer"	means the person(s), firm or company who purchases Goods and/or Services from Norbar;
"Customer Equipment"	means equipment belonging to the Customer which is the subject of Services to be carried out under a Contract;
"Delivery Point"	means the address within the UK mainland which is notified to Norbar as the place for delivery of the Goods and/or Customer Equipment;
"Engineer to Order Goods"	means any non-standard Goods specifically designed, modified and/or made for the Customer or to the Customer's specification;
"Goods"	means the goods set out in the Order to be supplied by Norbar to the Customer (including any part or parts of them);
"Norbar"	means Norbar Torque Tools Limited (380480), whose registered office address is at Wildmere Road, Banbury, Oxon, OX16 3JU;
"Order"	means the order for the Goods and/or Services placed on Norbar by the Customer;
"Order Acknowledgement"	means the acknowledgement of Order issued by Norbar to the Customer;
"Services"	means the services set out in the Order to be performed by Norbar for the Customer.

- 1.2 Subject to any variation under Condition 1.4 the Contract will be on these Conditions, the Order and the Order Acknowledgement to the exclusion of all other terms and conditions. They supersede any previously issued terms and conditions of supply. If there is any discrepancy between these Conditions, the Order and the Order Acknowledgement, the latter will prevail to the extent necessary to resolve the inconsistency.
- 1.3 No terms or conditions endorsed upon, delivered with or contained in the Customer's Order, confirmation of order, specification or other document will form part of the Contract.
- 1.4 These Conditions apply to all of Norbar's sales and any variation to these Conditions and any representations about the Goods and/or Services will have no effect unless expressly agreed in writing and signed by an authorised representative of Norbar. The Customer acknowledges that it has not relied on and will have no remedy in respect of any statement, promise or representation made or given by or on behalf of Norbar which is not set out in the Contract. Nothing in this Condition will exclude or limit Norbar's liability for fraudulent misrepresentation.
- 1.5 Each Order or acceptance of a quotation for Goods or Services by the Customer from Norbar will be deemed to be an offer by the Customer to purchase Goods and/or Services subject to these Conditions and no Order will be deemed to be accepted by Norbar until a written Order Acknowledgement is issued by Norbar or Norbar delivers the Goods and/or Services to the Customer, whichever occurs first.
- 1.6 Any quotation is given on the basis that no Contract will come into existence until Norbar despatches an Order Acknowledgement or delivers the Goods and/or Services to the Customer. Any quotation is valid for a period of 30 days only from its date, provided that Norbar has not previously withdrawn or amended it.

2. DESCRIPTION

- 2.1 The description of the Goods will be as set out in Norbar's catalogue or other published specification current at the time that the relevant order is accepted by Norbar or, in the case of Services and Engineer to Order Goods, as specified in the relevant quotation or Order Acknowledgement. If there is any inconsistency between the published specification, the quotation and the Order Acknowledgement, the Order Acknowledgement will take precedence over the quotation which will take precedence over the published specification to the extent necessary to resolve the inconsistency.
- 2.2 Norbar reserves the right to make any changes to the specification of the Goods (including Engineer to Order Goods) and/or Services which are required to conform with any applicable statutory or regulatory requirements which do not materially affect their quality or performance. The Customer will not be permitted to reject Goods and/or Services and Norbar will have no liability to the Customer in respect of any failure of the Goods and/or Services to comply with any specification in these circumstances.
- 2.3 The Customer acknowledges that all intellectual property rights in the Goods (including Engineer to Order Goods) and in any novel combinations or applications of the Goods (whether as a kit, system or otherwise) or which arise in the course of conducting the Services belong solely to Norbar and, to the extent that any such rights do not automatically vest in Norbar by operation of law, hereby assigns to Norbar all such rights. The Customer will take any action and execute any document reasonably required by Norbar to give full effect to this Condition.

3. DELIVERY

- 3.1 In the case of sales of Goods within the UK mainland, delivery will take place:
- if the Goods are to be collected, on delivery to the Customer or to the Customer's named carrier at Norbar's premises at Wildmere Road, Banbury, Oxon OX16 3JU; and
 - in all other cases, on delivery to the Delivery Point.
- In the case of sales outside the UK mainland (including non-mainland UK) sales will be delivered FCA Norbar's premises at Wildmere Road, Banbury, Oxon OX16 3JU (INCOTERMS 2010 edition), except where otherwise agreed in writing.
- 3.2 All Services will be performed at Norbar's premises at Wildmere Road, Banbury, Oxon OX16 3JU unless otherwise agreed in writing and the Services will be deemed to be performed on completion of the performance of the Services as specified in the Order Acknowledgement.
- 3.3 Any dates specified by Norbar for delivery of the Goods or performance of the Services are intended to be an estimate and time for delivery will not be made of the essence by notice. If no dates are so specified, delivery will be within a reasonable time. The Goods and/or Services may be delivered by instalments.

- 3.4 If for any reason the Customer will not accept delivery of any of the Goods when they are ready for delivery, or Norbar is unable to deliver the Goods on time because the Customer has not provided appropriate instructions, documents, licences or authorisations then, without prejudice to any other right or remedy available to Norbar:
- risk in the Goods will pass to the Customer;
 - the Goods will be deemed to have been delivered; and
 - Norbar may store the Goods until delivery whereupon the Customer will be liable for all related costs and expenses (including, without limitation, storage and insurance).
- 3.5 Norbar may, at its discretion, accept returns of Goods ordered in error or no longer required, subject to the payment of a handling charge of 15% of the order value (excluding VAT), except that:
- Production 'P' type wrenches will not be accepted for return;
 - Goods supplied with a UKAS accredited calibration certificate will be subject to a recalibration charge in addition to the handling charge;
 - Engineer to Order Goods may be charged for up to 100% of full price.
- Goods returned for credit will only be accepted if they are returned in the original packaging, in a new, unused condition, carriage paid within 30 days after the despatch date.

4. NON DELIVERY

- 4.1 The quantity of any consignment of Goods as recorded by Norbar upon despatch from Norbar's place of business will be conclusive evidence of the quantity received by the Customer on delivery unless the Customer can provide conclusive evidence proving the contrary.
- 4.2 Norbar will not be liable for any non delivery of Goods (even if caused by Norbar's negligence) unless written notice is given to Norbar within 14 days of the date when the Goods would, in the ordinary course of events, have been received.
- 4.3 Any liability of Norbar for non delivery of the Goods will be limited to replacing the Goods within a reasonable time or issuing a credit note at the pro rata Contract rate against any invoice raised for such Goods.

5. RISK/TITLE

- 5.1 The Goods are at the risk of the Customer from the time of delivery.
- 5.2 Ownership of the Goods will not pass to the Customer until Norbar has received in full (in cash or cleared funds) all sums due to it in respect of the Goods and all other sums which are or which become due to Norbar from the Customer on any account.
- 5.3 Until ownership of the Goods has passed to the Customer, the Customer will hold all Goods on a fiduciary basis as Norbar's bailee and Norbar will be entitled at any time:
- to require (at no cost to Norbar) that the Goods are stored separately and clearly marked in such a way that they will readily be seen to be the property of Norbar; and/or
 - to require the Customer to deliver up the Goods or any part of them to Norbar and if the Customer refuses to do so, to immediately repossess them; and/or
 - to enter any premises or vehicle (by its employees or agents and in the case of premises, with or without vehicles) where Goods still owned by Norbar are stored or reasonably thought to be stored in order to inspect and/or repossess them.
- 5.4 Norbar will be entitled to recover payment for the Goods ordered notwithstanding that ownership of the Goods has not passed from Norbar.
- 5.5 The Customer may resell the Goods before ownership has passed to it providing that any such sale is made in the ordinary course of its business at full market value and the Customer is not aware that an event specified in Condition 5.6(a) has occurred or is likely to occur.
- 5.6 Until ownership of the Goods has passed to the Customer, the Customer's right to possession of the Goods will terminate immediately if:
- the Customer is made bankrupt or petitions for its own bankruptcy, or has a receiver, administrative receiver or administrator appointed over all or any of its assets or undertaking or, other than for the purposes of a solvent amalgamation or reconstruction, enters into liquidation, enters into any composition or arrangement with or for the benefit of its creditors or ceases to carry on business; or
 - the Customer fails to observe or perform any of its obligations under the Contract or any other contract between Norbar and the Customer; or
 - the Customer encumbers or in any way charges any of the Goods.
- 5.7 Ownership of all Customer Equipment will remain the property of the Customer throughout the provision of the Services. Subject to Condition 6.2, Norbar will take reasonable care to safeguard the Customer Equipment and no less care than it takes to safeguard its own similar property.
- 5.8 On termination of the Contract for any reason, Norbar's rights under this Condition 5 will remain in effect.

6. PRICE AND PAYMENT

- 6.1 Unless otherwise agreed by Norbar in writing the price for the Goods and/or Services will be the price set out in Norbar's price list current as at the date of delivery of the Goods or performance of the Services or will be as set out in any quotation provided by Norbar.
- 6.2 The price given in the current Norbar price list for calibration and repair services or in any quotation for such Services is subject to the returned Customer Equipment being of serviceable condition. If the Customer Equipment is not of serviceable condition or is out of specification and cannot be adjusted or is uneconomic to repair, either a new quotation will be provided or a service replacement tool will be offered to the Customer. If the Customer does not accept the revised quotation or service replacement within 30 days, Norbar will re-quote, revising the costs as necessary. If after a further 30 days instructions have still not been received, Norbar may (at its option) either return the Customer Equipment and invoice for costs incurred or dispose of the Customer Equipment.
- 6.3 The price for the Goods and/or Services will be exclusive of any value added tax which the Customer will pay in addition when it is due to pay for the Goods and/or Services. The price for Goods and Services includes the cost



of delivery (or return of Customer Equipment in the case of Services) if the order (i) is for delivery on Monday to Friday (inclusive) within the UK mainland to the Customer's usual Delivery Point using Norbar's usual delivery method and (ii) has a value of over £100.00 (excluding VAT). If delivery is to Northern Ireland, the price for Goods and Services includes the cost of delivery (or return of Customer Equipment in the case of Services) if the order (i) is for delivery on Monday to Friday (inclusive) to the Customer's usual Delivery Point using Norbar's usual delivery method and (ii) has a value of over £300.00 (excluding VAT). In all other cases, the cost of delivery of Goods or return of Customer Equipment will be charged in addition and will be due for payment at the same time as payment for the Goods is due.

- 6.4 If the Customer holds an account with Norbar, payment of the price for the Goods and/or Services is due within the agreed payment terms for that account. If any amount payable is not made within 30 days after the due date in accordance with the terms of the account, Norbar may withdraw credit facilities. If the Customer does not have an account with Norbar, or if credit facilities have been withdrawn from the Customer, payment is due either at the time the Order is placed or in accordance with any payment schedule set out in the quotation and may be tendered by cheque, credit card or bank transfer. In all cases, payment must be in pounds sterling (except where otherwise agreed in writing).
- 6.5 Time for payment will be of the essence.
- 6.6 No payment will be deemed to have been received until Norbar has received cleared funds.
- 6.7 All payments payable to Norbar under the Contract will become due immediately upon termination of this Contract notwithstanding any other Condition of the Contract or any other arrangement or agreement between the parties.
- 6.8 The Customer will make all payments due under the Contract without any deduction whether by way of set-off, counterclaim, discount, abatement or otherwise unless the Customer has a valid court order requiring an amount equal to such deduction to be paid by Norbar to the Customer.
- 6.9 If the Customer fails to pay Norbar any sum due pursuant to the Contract the Customer will be liable to pay interest to Norbar on such sum from the due date for payment at the annual rate of 4% above the base lending rate from time to time of HSBC Bank plc, accruing on a daily basis until payment is made, whether before or after any judgment.

7. WARRANTY AND LIABILITY

- 7.1 Norbar warrants that, subject to the other provisions of these Conditions upon delivery, and for a period of 12 months after the date of delivery, the Goods will:
 - a) be of satisfactory quality within the meaning of the Sale of Goods Act 1979; and
 - b) comply in all material respects with the specification for them as set out in Norbar's catalogue or other published specification current at the time that the order for the Goods was accepted by Norbar.
- 7.2 Norbar warrants that, subject to the other provisions of these Conditions all Services will:
 - a) be supplied with reasonable skill and care within the meaning of the Supply of Goods and Services Act 1982; and
 - b) conform in all material respects with the specification for them as set out in Norbar's catalogue or other published specification current at the time the order for the Services was accepted by Norbar (unless specifically varied in the quotation or Order Acknowledgement).
- 7.3 Norbar will not be liable for a breach of any of the warranties in Condition 7.1 unless:
 - a) the Customer gives written notice of the defect to Norbar within 14 days of the time when the Customer discovers or ought to have discovered the defect; and
 - b) the Customer returns the defective Goods properly packed, carriage paid to Norbar's premises at the address given in Condition 1.1 or otherwise specified by Norbar.
- 7.4 Norbar will not be liable for a breach of the warranties in Condition 7.1 if:
 - a) the Customer makes any further use of the Goods after giving notice of any defect; or
 - b) the Goods have been misused, mishandled, overloaded, amended, modified or repaired in any way by the Customer or its customers, or used for any purpose other than that for which they were designed; or
 - c) the defect is due to fair wear and tear or arises because the Goods have been subject to excessive use or used in an environment for which they were not designed; or
 - d) the Customer or its customer has failed to follow Norbar's oral or written instructions as to the storage, installation, commissioning, use, repair, calibration or maintenance of the Goods or the recommendations set out in any national or international standard applicable to the Goods or (if there are no applicable instructions or standards) good trade practice.
- 7.5 Norbar will not be liable for a breach of the warranties in Condition 7.2 unless:
 - a) the Customer gives written notice to Norbar identifying which Services are defective in sufficient detail within 14 days of the time when the Customer discovers or ought to have discovered the defect; and
 - b) if the claim relates to Customer Equipment, Norbar is given a reasonable opportunity to examine the Customer Equipment and to assess the claim of defective Services,
- 7.6 Subject to Conditions 7.3 and 7.4, if any of the Goods do not conform with any of the warranties in Condition 7.1, Norbar will at its option repair or replace such Goods (or the defective part of them) or refund the price of such Goods at the pro rata Contract rate. The provisions of these Conditions will apply to any Goods that are remedied or replaced.
- 7.7 Subject to Condition 7.5 if any of the Services do not conform with any of warranties in Condition 7.2, Norbar will at its option remedy, re-perform or refund the Services that do not comply at the pro rata Contract rate. The provisions of these Conditions will apply to any Services that are remedied or re-performed for a period of 90 days with effect from the date of performance of the remedied or re-performed Services. If any repair of Customer Equipment fails within 90 days after the date on which it was returned to the Customer by Norbar, Norbar will at its option remedy, re-perform or refund the Services that do not comply at the pro rata Contract rate.
- 7.8 If Norbar complies with Condition 7.6 or 7.7 (as applicable), it will have no further liability for a breach of any of the warranties in Condition 7.1 or 7.2 in respect of such Goods and/or Services.

- 7.9 Except as provided in Conditions 7.1 and 7.2, Norbar makes no representation or warranty, whether express or implied, as to the quality or fitness for purpose of the Goods or Services and all warranties, Conditions and other terms which may be implied by statute or common law are, to the fullest extent permitted by law, excluded from the Contract.
- 7.10 Nothing in this Contract excludes or limits the liability of Norbar for:
 - a) death or personal injury caused by Norbar's negligence; or
 - b) defective products under the Consumer Protection Act 1987; or
 - c) for fraud or fraudulent misrepresentation; or
 - d) any matter for which it would be unlawful for Norbar to exclude or restrict liability.

THE CUSTOMER'S ATTENTION IS DRAWN TO THE PROVISIONS OF CONDITION 7.11

- 7.11 Subject to 7.10:
 - a) Norbar's total liability in contract, tort (including negligence or breach of statutory duty), misrepresentation, restitution or otherwise arising in connection with the performance or contemplated performance of this Contract will be limited to the price of the Goods and/or Services; and
 - b) Norbar will not in any event be liable to the Customer for any loss of profit, loss of business or depletion of goodwill or loss of data, in each case whether direct, indirect or consequential, or any claims for consequential compensation whatsoever (howsoever caused) which arise out of or in connection with this Contract.
- 7.9 The Customer acknowledges that the price of the Goods and/or Services has been calculated on the basis that Norbar excludes and limits its liability in accordance with Condition 7.11.
- 7.10 Where the Goods and/or Services are sold under a consumer transaction the statutory rights of the Customer are not affected by these Conditions.

8. FORCE MAJEURE

Norbar reserves the right to defer the date of delivery or to cancel the Contract or reduce the volume of the Goods or Services ordered by the Customer (without liability to the Customer) if it is prevented from or delayed in the carrying on of its business due to circumstances beyond the reasonable control of Norbar including, without limitation, acts of God, governmental actions, war or national emergency, riot, civil commotion, fire, explosion, flood, epidemic, lock-outs, strikes or other labour disputes (whether or not relating to either party's workforce), or restraints or delays affecting carriers or inability or delay in obtaining supplies of adequate or suitable materials or components.

9. NOTICES

Any notice to be given under this Contract will be in writing and will be sent by first class mail within the UK, or by air mail, or by fax; in the case of Norbar to the address set out in Condition 1.1 and in the case of the Customer to the Delivery Point or such other address or fax number as the Customer may from time to time notify to Norbar for this purpose in accordance with this Condition. Notices sent as above will be deemed to have been received three working days after the date of posting (in the case of mail within the UK), or seven working days after the date of posting (in the case of air mail), or on the next working day after transmission (in the case of faxed messages) but only if a transmission report is generated by the sender's fax machine recording error free transmission of all pages to the correct fax number.

10. ANTI-BRIBERY

- 10.1 Both Norbar and the Customer will comply with the United Kingdom Bribery Act 2010 and associated guidance and all other applicable United Kingdom legislation, statutory instruments and regulations in relation to bribery or corruption and similar or equivalent legislation in any other relevant jurisdiction.
- 10.2 Without limitation to clause 10.1, neither party shall make or receive any bribe (as defined in the Bribery Act 2010) or other improper payment or allow any such to be made or received on its behalf either in the United Kingdom or elsewhere and shall implement and maintain adequate procedures to ensure that such bribes or payments are not made or received directly or indirectly on its behalf.

11. GENERAL

- 11.1 The parties to the Contract do not intend that any term of the Contract will be enforceable by virtue of the Contracts (Rights of Third Parties) Act 1999 by any person that is not a party to it, except that any Affiliate of Norbar may directly enforce any term of the Contract where "Affiliate" means any entity that directly or indirectly Controls, is Controlled by or is under common control with Norbar and "Control" means ownership of more than 50% of the issued share capital of a company.
- 11.2 Each right or remedy of Norbar under the Contract is without prejudice to any other right or remedy of Norbar whether under the Contract or not.
- 11.3 If any provision of the Contract is found by any court, tribunal or administrative body of competent jurisdiction to be wholly or partly illegal, invalid, void, voidable or unenforceable it will to the extent of such illegality, invalidity, voidness, voidability or unenforceability be deemed severable and the remaining provisions of the Contract and the remainder of such provision will continue in full force and effect.
- 11.4 The Customer will not be entitled to assign the Contract or any part of it without the prior written consent of Norbar. Norbar may assign the Contract or any part of it or sub-contract any or all of its obligations under the Contract to any person, firm or company.
- 11.5 Failure or delay by Norbar in enforcing or partially enforcing any provision of the Contract will not be construed as a waiver of any of its rights under the Contract.
- 11.6 Any waiver by Norbar of any breach of, or any default under, any provision of the Contract by the Customer will not be deemed a waiver of any subsequent breach or default and will in no way affect the other terms of the Contract.
- 11.7 The formation, existence, construction, performance, validity and all aspects of the Contract will be governed by English law and the parties submit to the non-exclusive jurisdiction of the English courts.

NORBAR PROMOTIONAL MATERIAL

CATALOGUES & LEAFLETS

07571	NorTorque® Leaflet
07536	ClickTronic® Leaflet
07563	New Professional Leaflet
07570	EvoTorque® 2 Leaflet
07560	T-Box XL™ Leaflet
07554	USM Leaflet
07557	Oil & Gas ETO Leaflet
07579	HandTorque® HT3-1000 Leaflet
07580	Industrial 2R & 2AR Leaflet
07581	PneuTorque® PTS™ Leaflet
07585	Right Angle Gearbox Leaflet

PROMOTIONAL ITEMS

07509	Norbar Oval Logo Sticker 156mm
07532	Norbar Torque Wrench Display Boards Contact Norbar for slat wall adaptors
07539	Norbar Branded Pens
07540	Norbar Branded Post-It Notes
07551	Norbar Branded A6 Notepads
07553	Norbar Branded Lanyards
07555	Norbar Branded Baseball Caps
07582	PTS Credit Card USB 16GB
07572	Set of 12 Posters
07573	Norbar Branded Construction Pen
07574	Norbar Branded 2 Ring White Ring Binder
07575	Norbar Branded 4 Ring Black Organisers
07576	Norbar Branded Screen Saver Cloth / Mouse Mat
07577	Norbar Branded Laptop Bag
07578	Norbar Branded A4 Grid Notepad

2018 NORBAR SHUTDOWN PERIODS

THE FACTORY WILL BE CLOSED ON THE FOLLOWING DATES (INCLUSIVE)

Monday 1st January
Friday 30th March to Monday 2nd April - Easter Bank Holiday
Monday 7th May - May Day Bank Holiday
Monday 28th May - Spring Bank Holiday
Monday 27th August - Late Summer Bank Holiday
Monday 24th December to Tuesday 1st January 2019 - Christmas Shutdown

Distributed by

CUSTOMER RELATIONS

OFFICE OPENING HOURS

Monday - Thursday	07:30 - 17:30
Friday	07:30 - 16:15

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