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Norbar® Torque Tools

History

In 1942 the 'North Bar Tool Co.' (as Norbar was then known) became the first company in Britain to commercially manufacture a torque wrench. The initial demand was driven by the need for the gasket-less cylinder head of the Rolls Royce Merlin engine to be accurately tightened. Bill Brodey and his partner Ernest Thornitt obtained a license from Britain's war-time Government to begin manufacture of torque wrenches and Norbar was born.

Since then, Norbar has continued 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 equipment.

The company has grown from strength to strength and now has one of the largest and most modern plants in the World devoted exclusively to the design, development and production of torque tightening and measuring equipment.

Norbar is owned solely by the descendants of the founder, Bill Brodey, and they remain every bit as passionate about providing customers with high quality, value for money products and services.



Global Service

Norbar is the only torque equipment manufacturer to be able to offer tool and instrument recalibration services to the original factory standard at five locations on four continents. The accredited laboratories in Australia, USA and Singapore use the same equipment and procedures as the factory's UKAS accredited laboratory in the UK. A further Norbar laboratory is now in operation in Shanghai, China.

In addition to this, most of Norbar's distributors offer repair and recalibration services and several have calibration accreditation by their local standards organisations.

Please see the web site for further detail of Norbar's global distributor network: www.norbar.com.

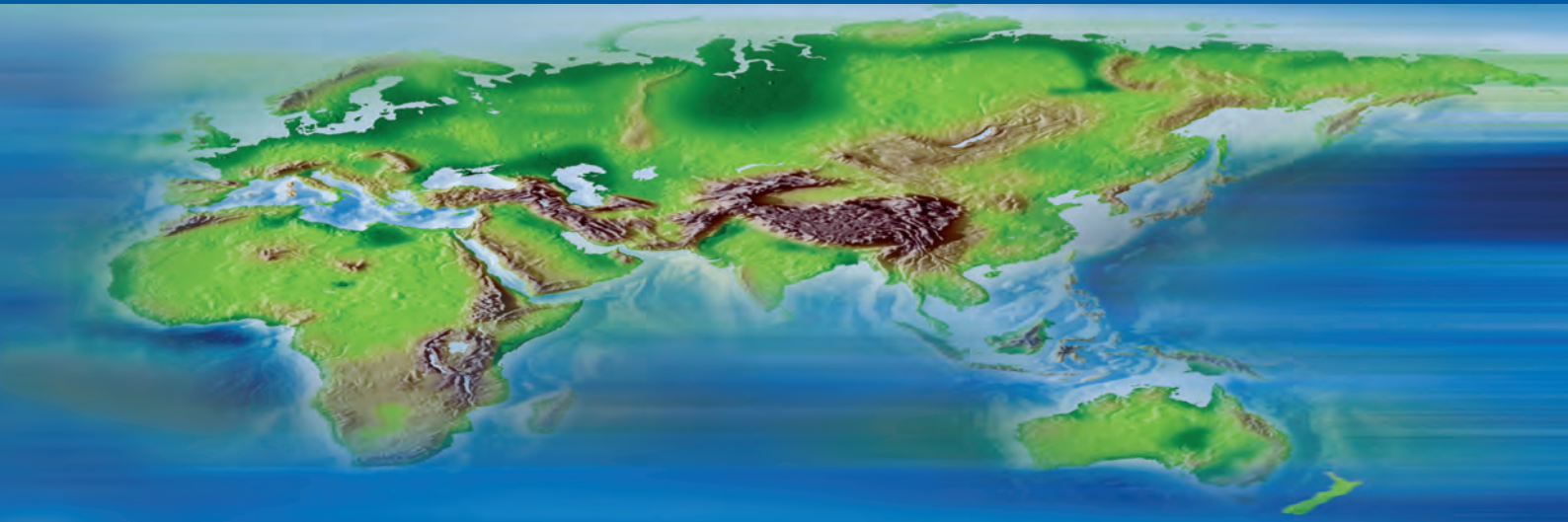


Norbar Torque Tools Ltd, Banbury, United Kingdom

Norbar's UK facility is the head office for the group, the primary manufacturing site and location of the UKAS accredited torque calibration laboratory. For full details of services offered from this location, see pages 94 and 95.



0256



Norbar Banbury



Norbar Adelaide



Norbar Willoughby, Ohio

Norbar Torque Tools Pty Ltd, Adelaide, South Australia

The regional head office in Adelaide not only stocks and services the extensive range of products in this catalogue but also offers and supports a full range of complementary bolting products and services via a network of branches throughout Australia. Adelaide is the location of our NATA accredited torque calibration laboratory. For full details, see pages 96 and 97.



NATA Accredited Laboratory
Number: 3800

Norbar Torque Tools Inc., Willoughby, Ohio, USA

The regional head office in the United States has a wealth of experience in the supply and service of Norbar products and has expertise in the customisation of products for particular applications. Willoughby is the location of our NVLAP accredited torque calibration laboratory. For full details, see pages 98 and 99.



NVLAP Lab Code 200596-0

Norbar Torque Tools (Shanghai) Ltd, China

Shanghai is Norbar's base for factory trained technical support personnel covering distributors throughout China. The facility offers spares and service for Norbar torque wrenches, Handtorque Multipliers and Pneumtorque pneumatic torque wrenches, ensuring that tools can be serviced back to original Norbar standards without leaving China. The calibration laboratory is now accredited to ISO 17025 by the Taiwan Accreditation Foundation (TAF) and is the only foreign company to have government certification to produce calibration certificates for torque wrench testers up to 1000 N.m.



Calibration Laboratory
2054

Norbar Torque Tools (NZ) Ltd, Auckland, New Zealand

The New Zealand office provides stock of most of the popular items along with product and application advice from our experienced staff. Additional stock and technical expertise is provided by the Adelaide office.

Norbar Torque Tools Pte Ltd, Singapore

Norbar's facility in Singapore holds extensive stock to serve distributors in South East Asia. Experienced sales personnel are based in this office and additional support is provided by Norbar Australia. Our fourth calibration laboratory, duplicating facilities in the UK, USA and Australia, opened in Singapore in the Autumn of 2004 and achieved SAC-SINGLAS accreditation in April 2005.



Cert No: LA-2005-0322-C

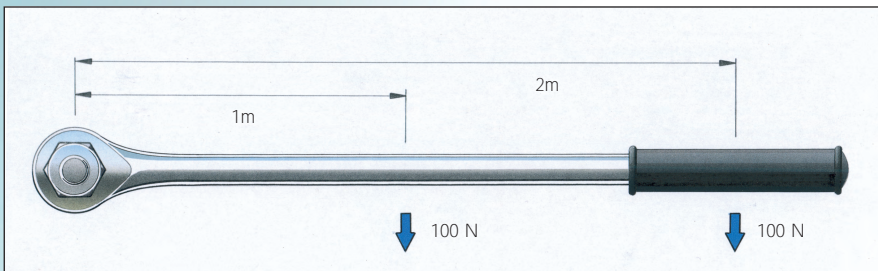
What is Torque?

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 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 $\times 9.807$ so the person is applying 98.07 N.m of torque.



Torque = Force x Distance

Example 1: Distance = 1 m, Force = 100 N, Torque = 100 N.m.

Example 2: Distance = 2 m, Force = 100 N, Torque = 200 N.m.

Example 3: Distance = 1 ft, Force = 100 lbf, Torque = 100 lbf.ft (or 100 ft.lb)

The Importance of Torque Control

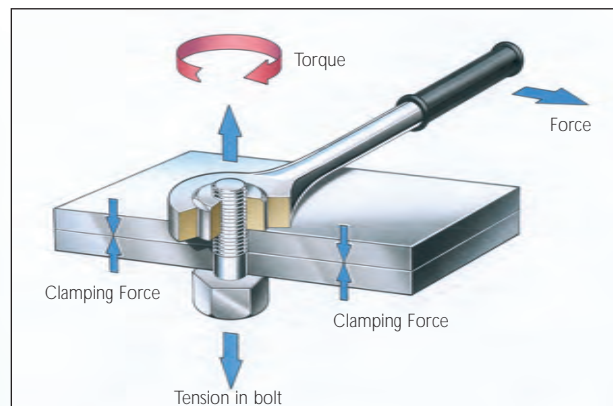
Although many methods exist to join two or more parts together, the ease of assembly and disassembly provided by threaded fasteners make them the ideal choice for many applications.

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

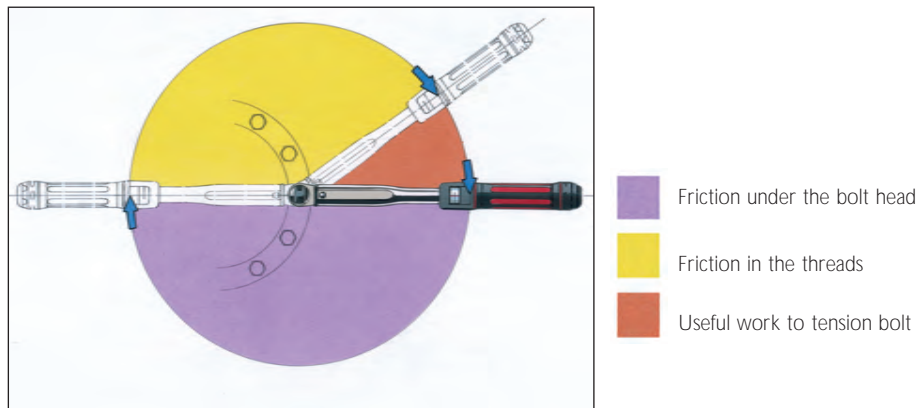
When an assembly is clamped by tightening a nut and bolt, the induced tension causes the bolt to stretch. An equal force acts to compress the parts which are thus clamped.

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.



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 opposite according to surface treatment and lubrication.

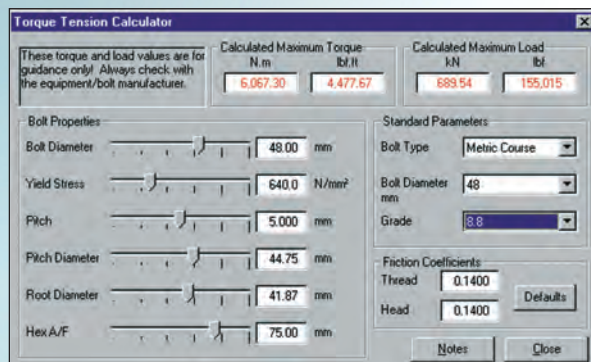
		Surface condition of bolt			
		Untreated	Zinc	Cadmium	Phosphate
Surface condition of nut	Untreated	1.00	1.00	0.80	0.90
	Zinc	1.15	1.20	1.35	1.15
	Cadmium	0.85	0.90	1.20	1.00
	Phosphate and oil	0.70	0.65	0.70	0.75
	Zinc with wax	0.60	0.55	0.65	0.55

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.

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



Torque Tension Calculator

These torque and load values are for guidance only! Always check with the equipment/bolt manufacturer.

Calculated Maximum Torque		Calculated Maximum Load	
N.m	lbf.ft	kN	lbf
6,067.30	4,477.67	689.54	155,015

Bolt Properties:

- Bolt Diameter: 48.00 mm
- Yield Stress: 640.0 N/mm²
- Pitch: 5.000 mm
- Pitch Diameter: 44.75 mm
- Root Diameter: 41.87 mm
- Hex A/F: 75.00 mm

Standard Parameters:

- Bolt Type: Metric Course
- Bolt Diameter: 48 mm
- Grade: 8.8

Fricion Coefficients:

- Thread: 0.1400
- Head: 0.1400

Buttons: Notes, Close

Torque Tension Calculator

For further information and guidance on establishing the correct tightening torque for a fastener, see Norbar's web site, www.norbar.com.

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 but, 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 Norbar's web site: www.norbar.com.





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 7. Alternatively, use the Torque/Tension Calculator on the Norbar website which enables fastener and friction conditions to be modified with ease.

	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	97.7	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

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



See our "Torque Unit Converter" on the Norbar website and "apps" for iPhone and Android smart phones.

Force

lbf x 4.45 = N
N x 0.225 = lbf

Flow

l/s x 2.119 = cu.ft/min
cu.ft/min x 0.472 = l/s

Pressure

lbf/in² x 0.069 = bar
bar x 14.504 = lbf/in²

Power

hp x 0.746 = kW
kW = $\frac{\text{N.m} \times \text{rev/min}}{9546}$

Formulae

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

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

M = torque lbf.ft
P = bolt tension lbf
D = bolt dia.ins

or for metric sizes:-

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

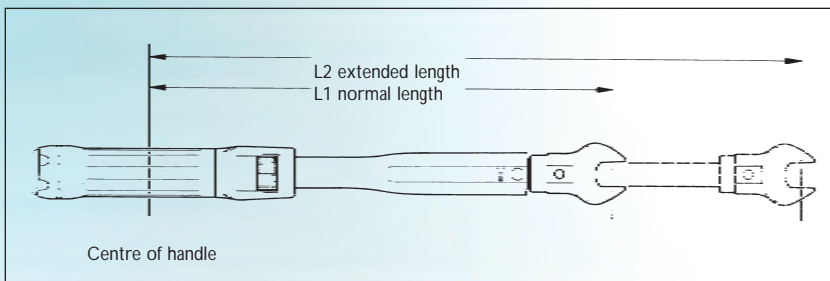
M = torque N.m
P = bolt tension Newtons
D = bolt dia. mm

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?

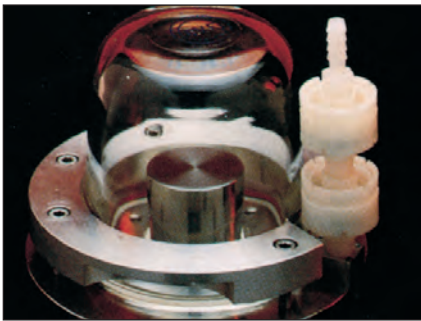
L1 = 500 L2 = 650

(units of length not important, this is a ratio)

M1 = 130 x 500/650

M1 = 100

Torque Wrench Traceable Calibration



Beams and Weights are traceable to International standards for length and mass

Photo courtesy of National Physical Laboratory



Production Line calibration equipment itself calibrated in Norbar's UKAS laboratory every four months.



Certificate generated on the production line during calibration



Certificate Key

1. Torque Wrench Model.
2. Torque Wrench individual serial number.
3. Torque settings to which the wrench is calibrated.
4. Upper and lower tolerance as defined by the standard stated below.
5. The actual torque readings achieved by the wrench.
6. The standard against which the wrench is being tested.
7. Details of the test equipment and calibration certificate number. This information provides the traceability to our UKAS laboratory and hence to National Standards.

Set Torque		Min	Max	Actual Readings				
10.0	9.62	10.42	9.94	9.92	9.93	9.93	9.92	
30.0	28.86	31.26	29.63	29.62	29.61	29.69	29.68	
54.0	51.92	56.26	54.66	54.64	54.60	54.52	54.51	

1 Model: SL1, 3/8"
2 Serial No.: 2007/206474
 Maximum Capacity: 54.0 Units: N.m.
 Inspector: rjm Ambient Temperature: 20°C

3 The limits shown **4** and the test equipment used for this calibration comply with the requirements of **6** ISO 6789 : 2003

The uncertainty of the test equipment at 20°C is $\pm 1\% k = 2$.

The test equipment used in the performance of the above calibration has international traceability through the following calibration laboratory which is UKAS accredited to ISO 17025:2005.
 UKAS Laboratory No.: 0256
 Tester Model: 50028, Dedicated Transducer System
 Serial No.: 28635
 Cert No.: 124987

7

Date of Calibration
8 Jun 2007
Quality Manager
J.Source

TruTorque™ Screwdriver Models 1.5 N.m to 6 N.m (13 lbf.in to 53 lbf.in)

Norbar's new range of Torque Screwdrivers embodies the values of the TruTorque brand: accuracy, ease of use and comfort in use. With an accuracy that exceeds the requirement of ISO6789 (+/-6% for tools up to 10 N.m). Furthermore, they are engineered to retain this accuracy over many thousands of tightened cycles.

- Supplied with a 1/4" hexagon bit holder designed using a 4mm hexagon stem.
- For maximum versatility and particularly for applications with limited access, the bit holder can be removed and replaced with widely available screwdriver blades.
- Easy torque adjustment without the need of additional specialist tools.
- All tools feature a lock to prevent accidental adjustment of the set torque.
- Accuracy exceeds the requirements of ISO6789.
- Traceable calibration certificate for the clockwise direction supplied with all adjustable tools. (not 'P' Types).
- Tool 'slips' when torque is achieved removing the possibility of 'over-tightening'.
- Comfortable, durable handle. The handle is constructed using two materials; a base material for strength overlaid with a soft feel grip for comfort and slip resistance.



Adjustables - N.m

Model	Part No.	Range	Length	Weight
		N.m	mm	Kg
TTs1.5 N.m	13475	0.3 - 1.5	155	0.235
TTs3.0 N.m	13476	0.6 - 3	155	0.235
TTs6.0 N.m	13509	1.2 - 6	155	0.235



Bit holder can be removed and replaced with widely available screwdriver blades.

Adjustables - lbf.in

Model	Part No.	Range	Length	Weight
		lbf.in	mm	Kg
TTs13 in.lb	13515	2.5 - 13	155	0.235
TTs26 in.lb	13516	5 - 26	155	0.235
TTs53 in.lb	13517	10 - 53	155	0.235



Production 'P' Type

Model	Part No.	Range		Length	Weight
		N.m	lbf.in	mm	Kg
TTs1.5	13510	0.3 - 1.5	2.5 - 13	155	0.235
TTs3.0	13511	0.6 - 3	5 - 26	155	0.235
TTs6.0	13512	1.2 - 6	10 - 53	155	0.235



TruTorque™ Wrench Models 20 N.m and 50 N.m (180 lbf.in and 35 lbf.ft)

Durability has been a primary development goal – both in terms of the lifetime of components and longevity of calibration accuracy. Cycle testing of wrenches at full torque was a key element of the development process and, in total, several million tightening cycles were accumulated. The result is a product that you can use with complete confidence that you have the best tool for the job.

- Accuracy: +/-3% of reading exceeds all international standards for torque wrenches. Each wrench is supplied with a traceable calibration certificate.
- Micrometer Scale for simple and error free setting. (On dual scale wrenches, the micrometer increment applies to the N.m scale.)
- Quick and Light Adjustment: adjustment over the entire scale can quickly be achieved and with minimal effort in approximately ten complete turns (exact number varies by model).
- Adjustment Lock: all models feature a lock to prevent accidental adjustment of the set torque.
- Versatile Ratchets: the tough ratchets are reversible and have a narrow engagement angle of 5° to allow easy positioning of the tool in the tight confines of today's vehicles and machines.
- Comfortable, Durable Handle: the handle is constructed using two materials: a base material for strength overlaid with a soft feel grip for comfort and slip resistance. The handle material and lens resist chemicals in common usage in the automotive, aviation and industrial environments.



Norbar Non-Magnetic torque wrenches are designed primarily for the medical MRI scanner market. However, they will prove invaluable wherever a torque wrench has to be used in the presence of a strong magnetic field. There are currently two models: 1 - 20 N.m, Part Number 13292 and 8 - 50 N.m, Part No. 13293.



Ratchet Adjustables - Dual Scale

Model	Square Drive	Part No.	Range		Resolution	Ratchet Diameter	Engagements per revolution	Length	Weight
	in		N.m	lbf.ft	N.m	mm		mm	Kg
TT20	¼	13262	1 – 20	10 – 180*	0.05	30	72	230	0.4
TT20	⅜	13263	1 – 20	10 – 180*	0.05	30	72	230	0.4
TT50	⅜	13264	8 – 50	6 – 35	0.1	30	72	278	0.5
TT50	½	13265	8 – 50	6 – 35	0.1	30	72	278	0.5

* lbf.in

N.m only and lbf.ft only versions are available, contact Norbar for details.

TruTorque™ Wrench

Models 100 N.m to 300 N.m (75 lbf.ft to 250 lbf.ft)

In engineering this range, Norbar has paid close attention to accuracy, ease of setting and comfort in use.

Durability has been a primary development goal – both in terms of the lifetime of components and longevity of calibration accuracy. Cycle testing of wrenches at full torque was a key element of the development process and, in total, several million tightening cycles were accumulated. The result is a product that you can use with complete confidence that you have the best tool for the job.

- Accuracy: +/-3% of reading exceeds all international standards for torque wrenches. Each wrench is supplied with a traceable calibration certificate.
- Micrometer Scale for simple and error free setting. (On dual scale wrenches, the micrometer increment applies to the N.m scale.)
- Quick and Light Adjustment: adjustment over the entire scale can quickly be achieved and with minimal effort in approximately ten complete turns (exact number varies by model).
- Adjustment Lock: all models feature a lock to prevent accidental adjustment of the set torque.
- Versatile Ratchets: the tough ratchets are reversible and a narrow engagement angle of 6° to allow easy positioning of the tool in the tight confines of today's vehicles and machines.
- Bi-directional Torque: the ratchets are also 'push through' meaning that these wrenches will provide torque control in both the clockwise and anticlockwise directions.
- Comfortable, Durable Handle: the handle is constructed using two materials: a base material for strength overlaid with a soft feel grip for comfort and slip resistance. The handle material and lens resist chemicals in common usage in the automotive, aviation and industrial environments.



TruTorque is available with either dual scale (N.m and lbf.ft) or single scale (N.m or lbf.ft)



Ratchet Adjustables - Dual Scale

Model	Square Drive	Part No.	Range		Resolution	Ratchet Diameter	Engagements per revolution	Length	Weight
	in		N.m	lbf.ft	N.m	mm		mm	Kg
TT100	3/8	13266	20 – 100	15 – 75	0.5	38	60	405	1.0
TT100	1/2	13267	20 – 100	15 – 75	0.5	38	60	405	1.0
TT150	1/2	13268	30 – 150	20 – 110	0.5	38	60	455	1.1
TT200	1/2	13269	40 – 200	30 – 150	1.0	46	60	505	1.2
TT250	1/2	13270	50 – 250	40 – 185	1.0	46	60	560	1.4
TT300	1/2	13271	60 – 300	45 – 220	1.0	46	60	610	1.6

N.m only and lbf.ft only versions are available, contact Norbar for details.

TruTorque™ TTi Wrench Models 50 N.m to 300 N.m (35 lbf.ft to 220 lbf.ft)

TruTorque TTi wrenches feature the same accuracy, ease of setting and comfort in use as the regular TruTorque models. They add to this formula non-reversible push through ratchets which are ultra robust and very simple to use. Body tubes and ratchets are finished in an attractive and durable satin chrome plate.

- Accuracy: +/-3% of reading exceeds all international standards for torque wrenches. Each wrench is supplied with a traceable calibration certificate.
- Micrometer Scale for simple and error free setting. (On dual scale wrenches, the micrometer increment applies to the N.m scale.)
- Quick and Light Adjustment: adjustment over the entire scale can quickly be achieved and with minimal effort in approximately ten complete turns (exact number varies by model).
- Adjustment Lock: all models feature a lock to prevent accidental adjustment of the set torque.
- Versatile Ratchets: the tough ratchets have a narrow engagement angle of 5° on the TTi50 and 6° on all other models allowing easy positioning of the tool in the tight confines of today's vehicles and machines.
- Bi-directional Torque: the ratchets are 'push through' meaning that these wrenches will provide torque control in both the clockwise and anticlockwise directions.
- Comfortable, Durable Handle: the handle is constructed using two materials: a base material for strength overlaid with a soft feel grip for comfort and slip resistance. The handle material and lens resist chemicals in common usage in the automotive, aviation and industrial environments.



Adjustment is achieved by rotating the end knob. The centre ring provides the lock feature.



Ratchet Adjustables - Dual Scale

Model	Square Drive	Part No.	Range		Resolution	Ratchet Diameter	Engagements per revolution	Length	Weight
	in		N.m	lbf.ft	N.m	mm		mm	Kg
TTi50	3/8	13438	8 – 50	6 – 35	0.1	30	72	278	0.5
TTi50	1/2	13439	8 – 50	6 – 35	0.1	30	72	278	0.5
TTi100	3/8	13440	20 – 100	15 – 75	0.5	38	60	405	1.0
TTi100	1/2	13441	20 – 100	15 – 75	0.5	38	60	405	1.0
TTi150	1/2	13442	30 – 150	20 – 110	0.5	38	60	455	1.1
TTi200	1/2	13443	40 – 200	30 – 150	1.0	46	60	505	1.2
TTi250	1/2	13444	50 – 250	40 – 185	1.0	46	60	560	1.4
TTi300	1/2	13445	60 – 300	45 – 220	1.0	46	60	610	1.6

N.m only and lbf.ft only versions are available, contact Norbar for details.

Professional Torque Wrench Model 5

The Model 5 is a torque wrench that offers high accuracy and the convenience of interchangeable 1/4 in. hexagon bits. (ISO 1173:1988 Form C drive bits).

- Accuracy of $\pm 3\%$ of reading exceeds all torque wrench standards.
- Traceable calibration certificate supplied, to satisfy ISO9000:2000 quality systems.
- Non Length dependent. The Model 5 remains accurate regardless of hand position.
- Supplied in a storage case. The case allows space for the storage of additional drive bits and optional stepless ratchet.



Production 'P' Types

The 'P' type version prevents unauthorised alteration of torque setting. No external calibration equipment is required to set the Model 5 'P' Type.

Coloured end seals are provided to identify the wrench to a particular operator, torque setting or calibration period.



Model 5 'P' Type



Adjustable Torque Wrenches

Model	Units	Square Drive	Part No.	Range	Length	Weight
		in			mm	kg
5	N.m	3/8	13001	1-5 N.m	170	0.12
5	lbf.in	3/8	13002	10-50 lbf.in	170	0.12
5	kgf.cm	3/8	13003	10-50 kgf.cm	170	0.12



Optional stepless ratchet (Part No. 13122)

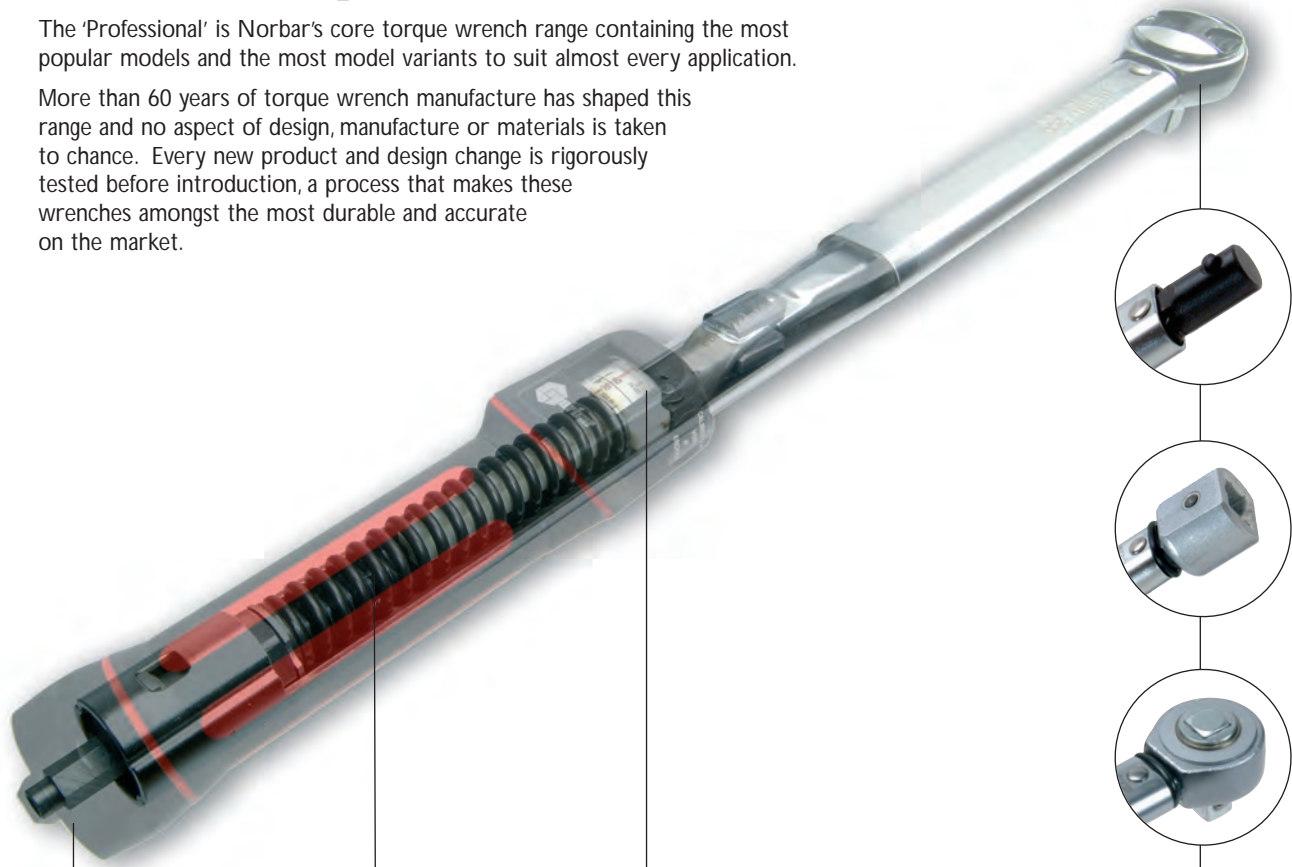
'P' Type Torque Wrenches

Model	Units	Square Drive	Part No.	Range	Length	Weight
		in			mm	kg
5 'P'	N.m	3/8	13004	1-5 N.m	154	0.12
5 'P'	lbf.in	3/8	13005	10-50 lbf.in	154	0.12
5 'P'	kgf.cm	3/8	13006	10-50 kgf.cm	154	0.12

Professional Torque Wrench

The 'Professional' is Norbar's core torque wrench range containing the most popular models and the most model variants to suit almost every application.

More than 60 years of torque wrench manufacture has shaped this range and no aspect of design, manufacture or materials is taken to chance. Every new product and design change is rigorously tested before introduction, a process that makes these wrenches amongst the most durable and accurate on the market.



Adjustment Lock

A robust lock prevents accidental adjustment of the wrench during use. Finger tip light adjustment comes from the best design and materials.

Torque Mechanism

Norbar's accurate mechanism has been developed and enhanced over a 40 year period and several million examples have been produced. Less parts to maintain than 'pivot block' mechanisms. Simple calibration adjustments without disassembly.

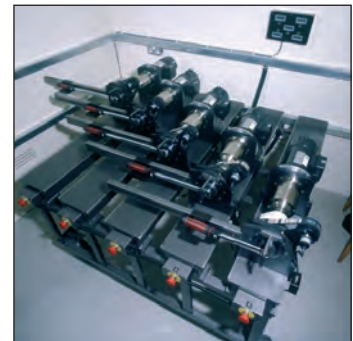
Torque Scale

Unique 'harmonic drive' scale mechanism allows a long scale length and therefore accurate and error free setting.

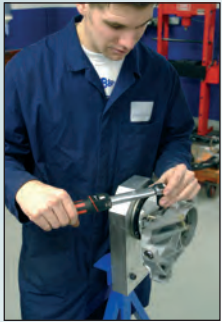


Ratchets

The Professional torque wrench is available with a choice of ratchets and as a 'Torque Handle' for interchangeable fittings.



Norbar 5 station tester is used for durability and benchmark testing.



Professional Torque Wrench 'Automotive' Ratchet Models

The Professional torque wrench offers an ideal combination of accuracy, robust construction, comfort and ease of use.

The reversible ratchets on these models are designed with compact dimensions and a narrow engagement angle resulting from the 72 tooth pattern. These features make the wrench ideal for use in the confined spaces of modern motor vehicles and many other applications.

- Accuracy of $\pm 3\%$ of reading exceeds all international standards for torque wrenches.
- Every wrench is supplied with a calibration certificate to satisfy the requirements of ISO 9000:2000.
- Soft feel handle provides excellent grip even in oily conditions.
- Handle material and lens resist all chemicals in common automotive, industrial and aviation use.
- Locking mechanism prevents accidental adjustment of the wrench during operation.
- Long scale graduated in N.m and lbf.ft allows for foolproof and accurate setting.
- Supplied in moulded box for storage and protection.



Ratchet Adjustables - Automotive Ratchet

Model	Square Drive	Part No.	Range		Ratchet Diameter	Engagements per revolution	Length	Weight
	in		N.m	lbf.ft	mm		mm	Kg
60	$\frac{3}{8}$	13010	8 – 60	5 – 45	31	72	307	0.6
60	$\frac{1}{2}$	13011	8 – 60	5 – 45	31	72	307	0.6
100	$\frac{3}{8}$	13012	20 – 100	15 – 80	31	72	347	0.7
100	$\frac{1}{2}$	13013	20 – 100	15 – 80	31	72	347	0.7
200	$\frac{1}{2}$	13014	40 – 200	30 – 150	41	72	443	1.0

Professional Torque Wrench 'Industrial' Ratchet Models

These wrenches offer the same outstanding features as those on the previous page but with a wider model range – up to 400 N.m – and a different ratchet concept.

The push-through ratchets on these models are robustly engineered for strength and durability. The strength and high wear resistance comes from the design of the tooth pattern while a principle of offset ratchet pawls gives a narrow engagement angle of 5° on wrenches up to and including Model 200 and 6° on Models 300 to 400.

The push through square drive is not only a robust design but allows the wrench to be used for torque control in both the clockwise and anti clockwise directions. Please note that the 3/4" square drive of the Model 400 has to be removed and re-inserted on the other side of the ratchet head rather than pushed through.



Ratchet Adjustables - Industrial Ratchet N.m/lbf.ft Models

Model	Square Drive	Part No.	Range		Ratchet Diameter	Length	Weight
	in		N.m	lbf.ft	mm	mm	Kg
60	3/8	13042	8 – 60	5 – 45	35	312	0.66
60	1/2	13043	8 – 60	5 – 45	40	320	0.74
100	3/8	13044	20 – 100	15 – 80	35	353	0.73
100	1/2	13045	20 – 100	15 – 80	40	359	0.80
200	1/2	13046	40 – 200	30 – 150	42	442	1.01
300	1/2	13047	60 – 300	45 – 220	49	570	1.38
330	1/2	13049	60 – 330	45 – 250	49	683	1.50
400	3/4	13050	80 – 400	60 – 300	49	683	2.09

lbf.in Models

Model	Range
	lbf.in
13075	70 - 530
13076	70 - 530
13077	100 - 800
13078	100 - 800
13079	400 - 1800
13080	500 - 2500
13082	500 - 3000
13083	700 - 3500

All other features as table to the left.



Adjustable - 16mm Spigot

Model	Part No.	Range		Length mm	Weight Kg
		N.m	lbf.ft		
60 TH	13018	8 – 60	5 – 45	301	0.55
100 TH	13019	20 – 100	15 – 80	340	0.6
200 TH	13020	40 – 200	30 – 150	423	0.78
300 TH	13021	60 – 300	45 – 220	548	1.13



Female Ended Adjustable - 9 x 12mm and 14 x 18mm

Model	Part No.		Range		Length mm	Weight Kg
	9x12	14x18	N.m	lbf.ft		
60 TH	13022	-	8 – 60	5 – 45	300	0.55
100 TH	13023	-	20 – 100	15 – 80	340	0.6
200 TH	13024	13025	40 – 200	30 – 150	421/431	0.78
300 TH	-	13026	60 – 300	45 – 220	546.5	1.13
400 TH	-	13028	80 – 400	60 – 300	658	1.78

Professional Torque Wrench Torque Handles

Norbar Torque Handles are based on the 'Professional' wrench range and share the same high precision engineering.

Two end fitting styles are catered for: 16mm diameter spigot type and the 9 x 12mm and 14 x 18mm rectangular type.

For many applications a spanner end fitting rather than a socket is the best or, often, the only solution. Typically this will be because the joint is a pipe union (such as a brake pipe).

Production 'P' Type - 16mm Spigot

Model	Part No.	Range		Length mm	Weight Kg
		N.m	lbf.ft		
60 THP	11167	8 – 60	5 – 45	280	0.55
100 THP	11143	20 – 100	15 – 80	320	0.6
200 THP	11144	40 – 200	30 – 150	402	0.78
300 THP	11117	60 – 300	45 – 220	640	1.13

Female Ended Production 'P' Type - 9 x 12mm & 14 x 18mm

Model	Part No.		Range		Length mm	Weight Kg
	9x12	14x18	N.m	lbf.ft		
60 THP	11170	-	8 – 60	5 – 45	280	0.55
100 THP	11150	-	20 – 100	15 – 80	319	0.6
200 THP	11151	11152	40 – 200	30 – 150	400/410	0.78
300 THP	-	11153	60 – 300	45 – 220	528	1.13
400 THP	-	13068	80 – 400	60 – 300	640	1.75

Available Fittings

See pages 28 & 29





End Cap Kit and Locking Tool
Part No. 11698



'P' Type wrenches have no scale. They must be set against a torque testing device such as Norbar's Professional Torque Tester (see page 68).



Professional Torque Wrench Production 'P' Types

'P' Type wrenches are designed for the production environment where they will be set and then dedicated to a particular application. There is no scale, the wrench must be set against a torque testing device such as Norbar's Professional Torque Tester (see page 68).

'P' Type wrenches are available with two ratchet types – 'Industrial' and 'Automotive' (see explanation on pages 18 and 19) and as 'Torque Handles' for interchangeable end fittings.

Ratchet Torque Wrench Production 'P' Type - Automotive Ratchet

Model	Square Drive	Part No.	Range		Ratchet Diameter	Engagements per revolution	Length	Weight
	in		N.m	lbf.ft	mm		mm	Kg
60 'P'	$\frac{3}{8}$	11164	8 – 60	5 – 45	31	72	286	0.6
60 'P'	$\frac{1}{2}$	11171	8 – 60	5 – 45	31	72	286	0.6
100 'P'	$\frac{3}{8}$	11138	20 – 100	15 – 80	31	72	326	0.69
100 'P'	$\frac{1}{2}$	11139	20 – 100	15 – 80	31	72	326	0.69
200 'P'	$\frac{1}{2}$	11140	40 – 200	30 – 150	41	72	423	1.0

Ratchet Torque Wrench Production 'P' Type - Industrial Ratchet

Model	Square Drive	Part No.	Range		Ratchet Diameter	Engagements per revolution	Length	Weight
	in		N.m	lbf.ft	mm		mm	Kg
60 'P'	$\frac{3}{8}$	13051	8 – 60	5 – 45	35	72	291	0.62
60 'P'	$\frac{1}{2}$	13052	8 – 60	5 – 45	40	72	299	0.69
100 'P'	$\frac{3}{8}$	13053	20 – 100	15 – 80	35	72	332	0.68
100 'P'	$\frac{1}{2}$	13054	20 – 100	15 – 80	40	72	338	0.74
200 'P'	$\frac{1}{2}$	13055	40 – 200	30 – 150	42	72	422	0.96
300 'P'	$\frac{1}{2}$	13057	60 – 300	45 – 220	49	60	663	1.45
400 'P'	$\frac{3}{4}$	13056	80 – 400	60 – 300	49	60	663	2.04



Professional Torque Wrench Models 550 - 1500

- Accuracy of $\pm 3\%$ of reading.
- Traceable calibration certificate supplied.
- Non length dependent. Extension handle can be used to reduce operator effort (handle supplied as standard with Model 800, 1000 and 1500).
- Positive 'click' can be heard, seen and felt.
- Low weight - Model 1000 just 5.8kg.
- Long scale length in N.m and lbf.ft allows error free setting.
- Fine 60 tooth ratchet allows the wrench to be used in confined areas.
- Supplied in carry case for storage and protection.



Extension Handle Part No. 14142 - supplied as standard with Models 800 to 1500

Ratchet Adjustables

Model	Square Drive	Part No.	Range		Ratchet Diameter	Engagements per revolution	Length	Length	Weight*
	in		N.m	lbf.ft	mm		mm	inc ext handle mm	
550	3/4	14001	110 – 550	80 – 400	61	60	845	-	4.0
800	3/4	14015	200 – 800	150 – 600	75	60	1035	1535	5.2
800	1	14016	200 – 800	150 – 600	75	60	1035	1535	5.2
1000	3/4	14002	300 – 1000	220 – 750	75	60	1250	1750	5.8
1000	1	14003	300 – 1000	220 – 750	75	60	1250	1750	5.8
1500	3/4	14004	500 – 1500	370 – 1100	75	60	1570	2070	6.7
1500	1	14005	500 – 1500	370 – 1100	75	60	1570	2070	6.7

* Weight excluding extension handle. Extension handle, length 700 mm, weight 1.6 kg



Adjustable Torque Handles

Model	End Fitting	Part No.	Range		Length mm	Weight Kg
			N.m	lbf.ft		
550 TH	14x18mm Female	14011	110 – 550	80 – 400	790	3.6
550 TH	22mm Male	14012	110 – 550	80 – 400	780	3.6

Available Fittings

See page 29



Torque Handles Production 'P' Type

Model	End Fitting	Part No.	Range		Length mm	Weight Kg
			N.m	lbf.ft		
550 THP	14x18mm Female	14013	110 – 550	80 – 400	790	3.6
550 THP	22mm Male	14014	110 – 550	80 – 400	780	3.6



End Cap Kit and Locking Tool
Part No. 14166

Ratchet Torque Wrench Production 'P' Type

Model	Square Drive	Part No.	Range		Ratchet Diameter	Engagements per revolution	Length	Length inc ext handle	Weight*
	in		N.m	lbf.ft	mm		mm	mm	
550 'P'	3/8	14006	110 – 550	80 – 400	61	60	845	-	4.0
800 'P'	3/8	14017	200 – 800	150 – 600	75	60	1035	1535	5.2
800 'P'	1	14018	200 – 800	150 – 600	75	60	1035	1535	5.2
1000 'P'	3/8	14007	300 – 1000	220 – 750	75	60	1250	1750	5.8
1000 'P'	1	14008	300 – 1000	220 – 750	75	60	1250	1750	5.8
1500 'P'	3/8	14009	500 – 1500	370 – 1100	75	60	1570	2070	6.7
1500 'P'	1	14010	500 – 1500	370 – 1100	75	60	1570	2070	6.7

* Weight excluding extension handle. Extension handle, length 700 mm, weight 1.6 kg

Slimline™ Torque Wrench Model SLO Fixed Head and Torque Handles

- Accuracy exceeds all international standards.
- Unmistakable signal when set torque is reached.
- Traceable calibration certificate supplied to satisfy ISO 9000:2000 quality systems.
- High quality 72 tooth ratchet allows use in confined spaces.
- Fixed head version has a push through square for left and right handed torque tightening.
- Moulded grip aids correct handle location and operator comfort.

For 1 - 20 N.m ratchet torque wrenches, see the TruTorque range on page 13.



Adjustable Wrenches - Fixed Head

Model	Square Drive	Part No.	Range		Ratchet Diameter	Engagements per revolution	Length	Weight
	in		N.m	lbf.in	mm		mm	Kg
SLO Fixed	3/8	11035	1 – 20	10 – 180	-	-	211	0.4
SLO Fixed	3/8	11125	4 – 20	40 – 180	-	-	213	0.4

Adjustable Torque Handles

Model	End Fitting	Part No.	Range		Length	Weight
			N.m	lbf.in	mm	Kg
SLO TH	16mm Spigot	11036	1 – 20	10 – 180	207	0.4
SLO TH	16mm Spigot	11126	4 – 20	40 – 180	210	0.4
SLO TH	9x12mm Female	11122	4 – 20	40 – 180	205	0.4

Slimline™ Torque Wrench Model SLO 'P' Type

- Torque Handle versions are available for both 16mm spigot and 9 x 12mm fittings.
- Production 'P' type versions are designed to discourage unauthorised alteration.
- 'P' Type versions have no scale. These wrenches must be set against a torque testing device such as Norbar's Professional Torque Tester (see page 68).



Torque Handles Production 'P' Types

Model	End Fitting	Part No.	Range		Length	Weight
			N.m	lbf.in	mm	Kg
SLO THP	16mm Spigot	11090	1 – 20	10 – 180	207	0.4
SLO THP	9x12mm Female	11088	1 – 20	10 – 180	203	0.4



16mm Spigot



9x12mm Female

Available Fittings

See pages 28 & 29



Fixed Head



Ratchet Head

Ratchet and Fixed Head - Production 'P' Types

Model	Square Drive	Part No.	Range		Ratchet Diameter	Engagements per revolution	Length	Weight
			N.m	lbf.in	mm		mm	Kg
SLO 'P'	¼	11085	1 – 20	10 – 180	29	72	218	0.4
SLO 'P'	⅜	11086	1 – 20	10 – 180	29	72	218	0.4
SLO Fixed	⅜	11089	1 – 20	10 – 180	-	-	211	0.4

Industrial Torque Wrench Adjustable Models

- Robust construction gives accurate results, to $\pm 4\%$, even in arduous working conditions.
- Every wrench supplied with a calibration certificate to satisfy requirements of ISO 9000:2000.
- The large break angle improves accuracy by reducing the possibility of over torquing.
- Cam control of the mechanism gives a controlled break which will not throw the operator off balance.
- Dual scaled, N.m and lbf.ft.
- Supplied in a carry case for storage and protection.
- If storage space is limited, for example in vehicle tool kits, models 4R to 5R can be supplied in two piece form where the longer of the pieces is 900mm (see page 27).
- For 2000 N.m, see 6R Split Industrial on page 27



Carry case standard (except 4 TH and 4 THP)



Adjusting Scale



Ratchet Adjustables

Model	Part No.		Range		Ratchet Diameter mm	Engagements per revolution	Length †		Weight Kg
	3/4"	1"	N.m	lbf.ft			mm	Kg	
3AR	12001	12001.01	100 – 500	70 – 350	70	36	910	5.2	
4R	12006	12006.01	150 – 700	100 – 500	70	36	1150	6.3	
4AR	12007	12007.01	200 – 800	150 – 600	70	36	1250	6.4	
5R	12009	12009.01	300 – 1000	200 – 750	70	36	1475	7.3	
5AR	12012	12012.01	700 – 1500	500 – 1000	70	36	1475	10.4	

† Length with adjusting nut set to minimum torque.

Industrial Torque Wrench Torque Handles, Production 'P' Type and Split Models

- Robust construction gives accurate results, to $\pm 4\%$, even in arduous working conditions.
- Every adjustable wrench supplied with a calibration certificate to satisfy requirements of ISO 9000:2000.
- The break angle improves accuracy by reducing the possibility of over torquing.
- All models listed are also available as Production 'P' types with no setting scale. These must be set against a torque testing device such as Norbar's Professional Torque Tester. See page 68.
- 'P' Type Wrenches can be set by the factory or distributor on request. Part code SQ2222.
- Supplied in a carry case for storage and protection (except 4TH and 4THP).



Split Industrial in Box.



Adjustable and Production 'P' Type Torque Handles

Model	End Fitting	Part No.	Range		Length †	Weight
			N.m	lbf.ft		
4 TH	22mm Spigot	12003	130 – 550	100 – 400	935	4.6
4 THP	22mm Spigot	12017	130 – 550	100 – 400	835	4.6

† Length with adjusting nut set to minimum torque.

Available Fittings

See page 29



Ratchet Torque Wrench Split Adjustables

Model	Part No.		Range		Ratchet Diameter	Engagements per revolution	Length †	Weight
	3/4"	1"	N.m	lbf.ft				
4R	12102	12102.01	150 – 700	100 – 500	70	36	1150	6.3
5R	12101	12101.01	300 – 1000	200 – 750	70	36	1475	7.3
6R	-	12100	900 – 2000	600 – 1500	70	36	1920	13

† Length with adjusting nut set to minimum torque.

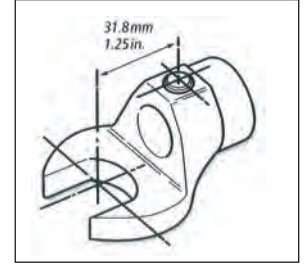


'P' Type - Sealed Adjustment

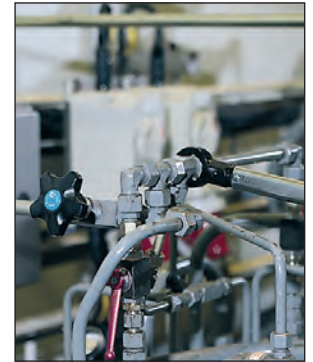
A/F Size mm	Open Ends		Ring Ends		Flare Ends	
	Part No.	Max Torque* (N.m)	Part No.	Max Torque* (N.m)	Part No.	Max Torque* (N.m)
7	29841	9	29881	25	29921	4
8	29842	13	29882	35	29922	7
9	29843	19	29883	45	29923	9
10	29844	25	29884	52	29924	12
11	29845	32	29885	73	29925	16
12	29846	41	29886	89	29926	25
13	29847	51	29887	107	29927	28
14	29848	63	29888	128	29928	31
15	29849	77	29889	150	29929	38
16	29850	92	29890	175	29930	46
17	29851	107	29891	201	29931	53
18	29876	128	29913	230	29953	65
19	29877	149	29914	261	29954	74
20	29852	172	29892	294	29932	86
21	29853	198	29893	330	29933	100
22	29854	225	29894	330	29934	112
23	29855	255	29895	330	29935	123
24	29856	287	29896	330	29936	143
25	29857	322	29897	330	-	-
26	29858	330	29202.M26	330	-	-
27	29878	330	29915	330	29955	150
30	29861	330	29202.M30	330	29204.M30	200
32	29863	330	29202.M32	330	29204.M32	200
Imperial - in						
¼	29701	7	29726	25	-	-
⅜	29702	13	29727	35	29752	7
½	29703	21	29728	42	29753	9
⅝	29704	32	29729	73	29754	15
¾	29705	48	29730	115	29755	23
⅞	29706	67	29731	170	29756	32
1	29707	90	29732	226	29757	44
1 ⅛	29708	118	29733	260	29758	58
1 ¼	29709	150	29734	305	29759	74
1 ⅜	29710	187	29735	330	29760	93
1 ½	29711	230	29736	330	29761	114
1 ⅝	29712	281	29737	330	29762	140
1	29713	330	29738	330	29763	166
1 ⅛	29714	330	29739	330	29764	166
1 ¼	29715	330	29202.I18	330	-	-
1 ⅜	29716	330	29202.I19	330	-	-
1 ½	29717	330	29202.I20	330	-	-
1 ⅝	29718	330	29202.I21	330	-	-

*Max torque values listed are proof torques quoted in BS 192:1982 & BS 3555:1988 (tested on hardened hexagon test stud).

For other available sizes contact Norbar



Where the distance between centres differs from 1.25 in (31.8mm) the torque applied will not be as set on the wrench (see page 10)

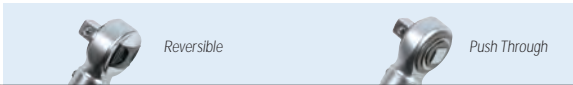


Torque Handle Fittings Fittings for 16mm Spigot



Square Drive	Part No.	Diameter	
		mm	in
in			
3/8	29828	19	0.75
1/2	29827	25	1.0

Ratchet Heads



Square Drive	Part No.	Diameter		No. Teeth	Ratchet Type
		mm	in		
in					
3/8	29826	34	1.3	36	Push Through
3/8	29829	30.5	1.2	72	Reversible
1/2	29825	40	1.6	72	Push Through
1/2	29830	40	1.6	72	Reversible

Accessories for 16mm Spigot

Part No.	Description
29832	Blank End Fitting for In-line Open End
85242	Blank End Fitting for Open End
11343	Blank End Fitting for Ring End
72000	Spigot Adaptor 16mm to 22mm



Part No. 29832



Part No. 85242



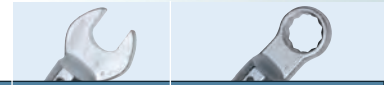
Part No. 11343



Part No. 72000

Fittings for 22mm Spigot

Spanner End Fittings



A/F Size mm	Open End Part No.	Ring End Part No.
22	29963.22	29960.22
24	29963.24	29960.24
27	29963.27	29960.27
30	29963.30	29960.30
32	29963.32	29960.32
36	29963.36	29960.36
41	29963.41	29960.41
46	29963.46	29960.46
Imperial - in		
1 1/8	-	29962.18
1 3/8	-	29962.19
1 1/4	-	29962.20
1 5/8	-	29962.21
1 7/8	29964.23	29962.23
1 1/2	29964.24	-

Accessories for 22mm Spigot

Part No.	Description
29969	3/4" Fixed Head
29972	3/4" Ratchet
85719	Blank End Fitting for Open End
85720	Blank End Fitting for Ring End



Part No. 29969



Part No. 29972



Part No. 85719



Part No. 85720

Ratchet Repair Kits and Square Drives

Ratchet Repair Kits

Part No.	Square Drive	Description	No. of Teeth*	To Suit Torque Wrench
	in			
13407	$\frac{3}{8}$	Reversible/Push Through	60	TruTorque 100 N.m, 75 lbf.ft
13409	$\frac{1}{2}$	Reversible/Push Through	60	TruTorque 100/150 N.m, 75/110 lbf.ft
13408	$\frac{1}{2}$	Reversible/Push Through	60	TruTorque 200 - 300 N.m, 150 - 250 lbf.ft
13491	$\frac{3}{8}$	Ratchet Replacement Kit	24	TTi 50/100 N.m, 75 ft.lb
13492	$\frac{1}{2}$	Ratchet Replacement Kit	24	TTi 50 - 300 N.m & 75 - 220 ft.lb
13493	$\frac{1}{2}$	Heavy Duty Ratchet Replacement Kit	30	TTi (over 250 N.m/185 lbf.ft)
11598	$\frac{3}{8}$	'Automotive Ratchet' - Beta Reversible	72	Model 60 & 100
13212	$\frac{3}{8}$	'Industrial Ratchet' - Push Through	24	Model 60 & 100 / TTI 50/100 N.m, 75 ft.lb
11618	$\frac{1}{2}$	'Automotive Ratchet' - Beta Reversible	72	Model 60 & 100
13213	$\frac{1}{2}$	'Industrial Ratchet' - Push Through	24	Model 60 & 100
11622	$\frac{1}{2}$	'Automotive Ratchet' - Beta Reversible	72	Model 200 & 300
11623	$\frac{1}{2}$	'Automotive Ratchet' - Beta Push Through	72	Model 200 & 300
13214	$\frac{1}{2}$	'Industrial Ratchet' - Push Through	24	Model 200 / TTI50 - 300 N.m & 75 - 220 ft.lb
13215	$\frac{1}{2}$	'Industrial Ratchet' - Push Through	30	Model 300 & 330 (13047, 13049 & 13057)
13216	$\frac{3}{4}$	'Industrial Ratchet' - Push Through	30	Model 400 (13050 & 13056)
11691	$\frac{1}{2}$	Push Through	24	Model 330
14195	$\frac{3}{4}$	Push Through	60	Model 550
14196	$\frac{3}{4}$	Push Through	60	Model 800 - 1500
14197	1	Push Through	60	Model 800 - 1500
11811	$\frac{1}{4}$	Reversible	72	SL0
11812	$\frac{3}{8}$	Reversible	72	SL0
11801	$\frac{3}{8}$	Push Through	24	SL1
11905	$\frac{1}{2}$	Narrow (13mm) - Push Through	24	SL1 & SL2
11906	$\frac{1}{2}$	Wide (19mm) - Push Through	24	SL3
12307	-	Does not include square drive 12297	36	Industrial (except 6R)
12373	1	Ratchet Repair Kit	36	6R

* Please count the teeth in the ratchet annulus. Please note: this does not always correspond with the number of 'clicks' per revolution.

Square Drive Assemblies

Part No.	Square Drive	To Suit Torque Wrench
	in	
11914	$\frac{3}{8}$	SL0 Fixed Head
11941	$\frac{3}{8}$	SL1
29682	$\frac{1}{2}$ to $\frac{3}{8}$	SL1
29684	$\frac{1}{2}$	SL1 and SL2
29683	$\frac{1}{2}$	SL3
12297	$\frac{3}{4}$	Industrials and Professional Model 550
12299	1	Industrials and Professional Model 550
14157	$\frac{3}{4}$	Professionals Models 800 - 1500
14165	1	Professionals Models 800 - 1500

Electrode Wrenches

The correct tightening of carbon/graphite electrodes is known to increase the energy efficiency of electric arc furnaces and prevents electrode sections from being lost in the furnace.

Norbar Electrode Wrenches are based on two well proven torque wrench designs: electrodes up to 8 inches use the 'Professional' type, 9 inches and upwards are based on the 'Industrial' wrench.

- Positive torque control increases energy efficiency.
- Self-clamping action speeds the tightening operation.
- Unmistakable signal when the set torque is reached.
- A wide range of electrode sizes, 8 to 24 inches, can be tightened.



200mm to 300mm Electrodes

Diameter		Part No.	Max Torque		Length	Torque Radius	Weight
mm	in		N.m	lbf.ft			
200	8	12506	312	230	928	723	3.2
250	10	12530	542	400	1140	890	6.8
300	12	12531	780	575	1280	990	8.4

350mm to 600mm Electrodes - High Range Torques

Diameter		Part No.	Max Torque		Length	Torque Radius	Weight
mm	in		N.m	lbf.ft			
350	14	12532	1140	840	1767	1451	13.8
400	16	12533	1300	950	1810	1480	14.3
450	18	12535	1500	1110	1720	1355	16.5
500	20	12536	2000	1475	2200	1805	20
550	22	12537	2370	1750	2555	2135	25.4
600	24	12538	2370	1750	2590	2135	26.1
600.HD	24	12538.HD	3200	2360	3335	2880	31.7