



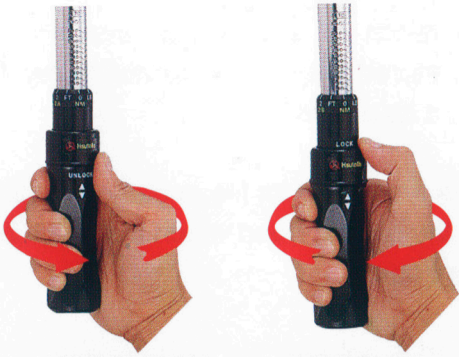
MICRO-ADJUSTING TORQUE WRENCH

OPERATING INSTRUCTIONS

1. Study this booklet carefully before operating this wrench
2. Never apply more torque than the maximum scale reading.
3. This torque wrench is designed for manual tightening of threaded fasteners only. **DO NOT USE IT AS A NUT-BREAKER OR FOR ANY OTHER PURPOSE.**
4. Always use approved eye protection when using tools.
5. This wrench will not prevent you from applying more torque than set. It is not a torque limiting tool. Learn how different amounts of torque “feel” so you will reduce the possibility of damage and/or injury due to accidental overtorquing.
6. There are no user-serviceable components inside the wrench. Disassembling the wrench or making any adjustments will result in the loss of accuracy.
7. This is a precision measuring instrument. Calibration and servicing must be done regularly and is the owner’s responsibility.



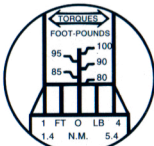
TORQUE SETTING



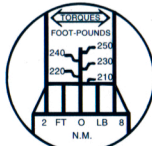
1. Hold handle and twist collar to the right to "UNLOCK".
2. Turn the handle clockwise or counter-clockwise (Right or Left) to set the desired torque.
- 3 Hold handle and twist collar to the left to "LOCK".

EXAMPLES OF TORQUE SETTINGS

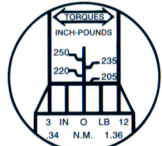
To set torque to 83 ft.lbs. turn the handle clockwise until the edge of the minor scale is even with the line marking "80" on the major scale and the "0 ft.lb." mark on the minor scale is centered as shown in fig. 1 below. Then, continue turning the handle clockwise until the "3 ft.lb." mark is centered as shown in fig.2.



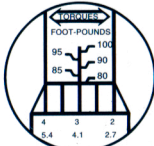
80 FT-LBS
(100 FT-LBS WRENCH)
Fig 1



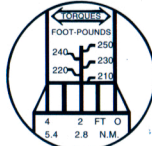
210 FT-LBS
(250 FT-LBS WRENCH)



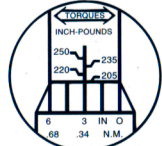
205 IN-LBS
(250 IN-LBS WRENCH)



83 FT-LBS
(100 FT-LBS WRENCH)
Fig 2



212 FT-LBS
(250 FT-LBS WRENCH)



208 IN-LBS
(250 IN-LBS WRENCH)

- * Various models and capacities of wrenches are illustrated. Though they might be different from your particular wrench, the principle of obtaining scale reading is the same.
- ** By necessity, metric scales are not calibrated in even numbers. Consequently, when using Metric scales, set the wrench at a reading closest to the desired torque.

CARE AND MAINTENANCE

1. A Torque Wrench is a precision instrument and should be handled and stored with care. Do not throw it around, hammer with it, or use it as a prybar.
2. The wrench is lubricated for life and should not be oiled. The only exception is the ratchet head which may be lubricated as needed for smooth operation.
3. The plastic grip is not affected by petroleum products but may be damaged by some industrial solvents. Clean with a clean cloth soaked in mineral spirits or denatured alcohol. NEVER IMMERSER THE WRENCH OR ANY PORTION OF IT IN ANY LIQUID!
4. This is a precision measuring instrument. Calibration and servicing must be done regularly and is the owner's RESPONSIBILITY.

TORQUE UNIT CONVERSION

MULTIPLY NUMBER OF TO OBTAIN	Inch Ounces	Inch Pounds	Foot Pounds	Newton Meters
Inch Ounces	1	16	192	141.6
Inch Pounds	.0625¹	1	12	8.851
Foot Pounds	.005208	.08333²	1	.7376
Newton- Meters	.007061	.1130	1.356	1

¹ or divide by 16

² or divide by 12

CERTIFICATION

This torque wrench is certified to have been calibrated prior to shipment to the accuracy off $\pm 4\%$ in the right hand direction, and $\pm 6\%$ in the left hand direction on readings 20% to 100% of capacity. On readings below 20% of capacity, the accuracy is \pm two minor scale increments.

GENERAL TORQUE SPECIFICATION CHART FOR ENGLISH FASTENERS (in Foot Pounds)*

MATERIAL OR GRADE BOLT SIZE	SAE 2 (Mild Steel)	SAE 5	SAE 8	SOCKET HEAD CAP SCREWS	BRASS	Stainless AISI TYPE 303
1/4-20	6	11	12	13	5	5
1/4-28	7	13	15	16	6	7
5/16-18	13	21	25	27	8	9
5/16-24	14	23	30	33	9	10
3/8-16	23	38	50	52	15	17
3/8-24	26	40	60	60	16	18
7/16-14	37	55	85	86	23	25
7/16-20	41	60	95	95	25	28
1/2-13	57	85	125	130	32	37
1/2-20	64	95	140	145	34	40
9/16-12	80	125	175	180	44	50
9/16-18	91	140	195	210	48	54
5/8-11	111	175	245	255	68	75
5/8-18	128	210	270	290	73	80
3/4-10	180	300	425	410	104	115
3/4-16	200	330	460	445	115	125
7/8-9	275	450	660	580	155	170
7/8-14	300	490	700	615	170	185
1"-8	415	680	990	830	235	260
1"-14	435	715	1050	880	250	270

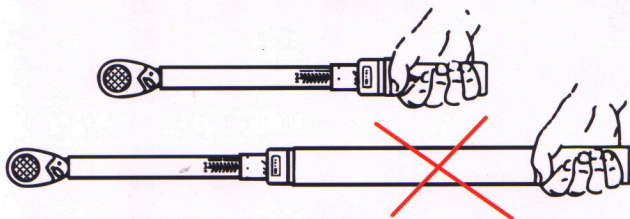
GENERAL TORQUE SPECIFICATION CHART FOR METRIC FASTENERS (in Newton Meters)*

MATERIAL CLASS		4.6	4.8	5.8	8.8	9.8	10.9	12.9
BOLT MM	DIAM INCH							
5	.197	3	4	5	7	8	11	12
6	.236	5	6	8	12.5	14	17	20
6.3	.248	5.5	8	9.5	14	16	21	24
8	.315	12	16	20	30	34	44	50
10	.394	23	32	40	60	70	85	100
12	.472	40	56	70	103	120	150	180
14	.551	65	90	110	167	190	240	280
16	.630	100	140	170	270	290	380	440
18	.709	137	177	225	350	-	480	580
20	.787	200	-	330	520	-	740	860

*These torque values are approximate and should not be accepted as accurate limits. Indeterminant factors (surface finish, type of plating and lubrication in specific applications preclude the publication of accurate values for universal use. Manufacturers of various types of equipment usually provide specific tightening instructions which should be followed. **DO NOT USE** the above values for gasketed joints or joints of soft materials. **DO NOT USE** your torque wrench for values greater than its maximum scale reading.

APPLYING TORQUE

1. Set desired torque
2. Attach socket to ratchet head. Set directional switch.
3. Apply the load at the center of the handle until you hear a "CLICK", IMMEDIATELY RELEASE THE LOAD. The torque wrench will reset itself for the next operation.



⚠ WARNING

1. Do not set torque below lowest scale.
2. Do not apply more torque than max. scale.
3. Do not continue applying torque when preset torque has been reached (audible "Click").

⚠ CAUTION

1. Threads on bolts, nuts and other mating components should be clean and smooth. A lubricant applied to the threads and under the head of bolts will produce more accurate and consistent results.
2. Never torque a fastener that is already tightened. Loosen it first, then re-torque to the desired value. The same applies to fasteners that are overtorqued.
3. When tightening many fasteners holding one component (engine head, pipe flanges, etc.) follow manufacturer's recommended procedures. If such procedures are not available, torque in a criss-cross manner first 60-70% of the desired torque, then the final torque.
4. DO NOT apply more torque than the rated capacity of the torque wrench. Do not use it as a nut-breaker!!

EXTENSIONS

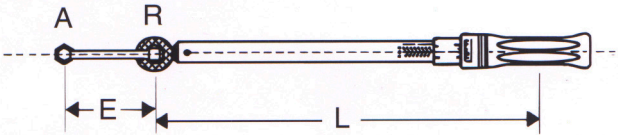
When attaching an adaptor, the torque applied by the extension to the fastener is always more than the torque setting on the wrench. Follow the formulas below to correct torque settings.

A - Torque applied by extension to the fastener.

R - Torque Set on the wrench.

L - Lever length (from center of handle to center of ratchet head drive).

E - Extension length (from center Ratchet head drive to center of socket or fastener).



Example:

If you desire 50 ft.lbs at the end of the adaptor (A) then the torque setting on the wrench (R) is calculated as follows:

$$R = A \left[\frac{L}{L+E} \right]$$

$$R = 50 (16 / (16 + 2))$$

$$R = 50 (16 / 18)$$

$$R = 50 \times 0.8888$$

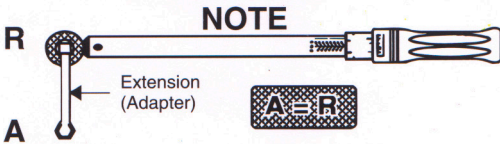
$$R = 44.44 \text{ ft. lbs}$$

Where: L = 16 inches

E = 2 inches

Torque set on the wrench is 44.44 ft-lbs

(the formula above is applicable for in-line adapter only)



Any length of extension can be used. When the adaptor is attached perpendicular to the axis of the wrench the torque setting on the wrench is equal to the torque on the fastener.

NOTE:

1. Regular (concentric) socket extensions which extend directly under the drive head along the axis of the drive do not affect the calibration of the Torque Wrench.
2. A handle extension (a piece of pipe extending the handle's length) **MUST NOT BE USED** under any circumstance. Their use will result in erroneous torque readings and may damage the grip or the adjusting mechanism. While applying torque, the wrench should be held **ONLY BY THE GRIP**. At high torque readings, if both hands are necessary to apply enough pressure to operate the wrench, hold the grip in one hand, and put the other hand on the top of the first hand, never on the wrench body.

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