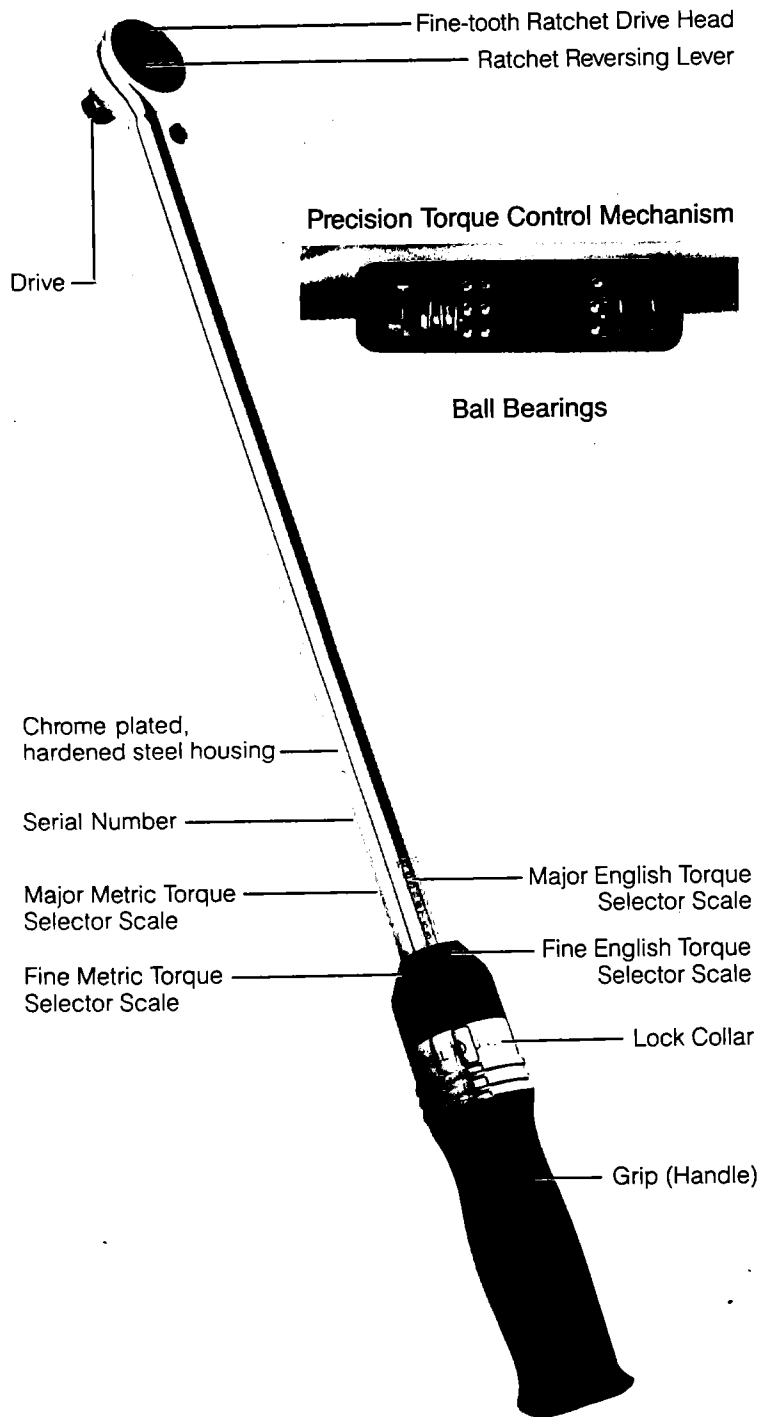


# **MICRO-ADJUSTING TORQUE WRENCH**

## **OPERATING INSTRUCTIONS**

1. STUDY THIS BOOKLET CAREFULLY BEFORE ATTEMPTING TO OPERATE 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. Overtorqued or defective fasteners and sockets may suddenly break. Ratchets or plain drives that are improperly engaged, worn out, damaged, or overtorqued may slip or break. TO PREVENT INJURY, KEEP PROPER FOOTING AND BALANCE AT ALL TIMES. DO NOT USE THE WRENCH IN PLACES FROM WHICH YOU MAY FALL OR SLIP, OR AROUND ROTATING MACHINERY.
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. APPLY FORCE TO THE GRIP ONLY. DO NOT USE "CHEATER BARS" (A piece of pipe placed over the hand grip).
7. There are no user-serviceable components inside the wrench. Disassembling the wrench or making any adjustments will result in the loss of accuracy, and will void the warranty.



Note: Above illustration applies to all models except 3/4" drive and plain (non-ratchet) drive.

## GENERAL DESCRIPTION

The Micrometer Adjusting Torque Wrench indicates when the preset torque value has been reached by releasing the handle for a few degrees of free travel. This release or "give" is usually accompanied by an audible "click" signal and tells the operator to stop applying pressure.

On all models except 3/4" drive, the torque is adjusted by unlocking and turning the grip. The amount of torque is shown on two separate micrometer scales — one in English units, and the other in Metric units.

On 3/4" drive models, the torque is adjusted by pulling back, and turning the adjusting knob. The amount of torque is shown directly in one of the two viewing windows — one for English settings, the other for Metric.

The wrench is equipped with a reversible ratchet head or a plain (non-ratcheting) head and may be used in both right and-left hand directions. The drive head accommodates sockets, extensions, crowfoot adapters, and other attachments to fit a multitude of fasteners in automotive, aircraft, marine, industrial, and other applications, both English and Metric.

The internal torque control mechanism is mounted on ball bearings and represents an improvement over the slide-cam arrangement employed in other makes of torque wrenches. Because of inconsistency and unreliability of lubrication of the slide-cam, other makes are often plagued by excessive accuracy variations between slow and fast loading, by short calibration life, and by the necessity of "breaking" the wrench in after storage to assure proper accuracy. The ball bearings help to reduce these problems thus giving you a torque wrench which is more accurate, more consistent, and which stays in calibration longer than other torque wrenches.

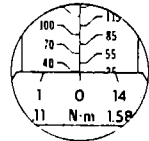
The wrench housing is made from precision drawn steel which is heat treated for hardness and strength, polished, and chrome plated for corrosion protection and superior appearance. On 1/2" and smaller drive size models molded plastic grip is contoured to fit comfortably and securely into the hand.

## TO SET TORQUE — ALL MODELS EXCEPT 3/4" DRIVE

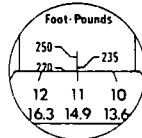
1. Pull the lock collar back to unlock the mechanism.
2. While holding the lock collar in an unlocked position, turn the grip clockwise to increase the torque, and counterclockwise to decrease the torque. Keep turning until the desired torque reading is indicated on the micrometer scale.
3. Lock the setting by releasing the lock collar.

### EXAMPLES OF TORQUE SETTINGS\*

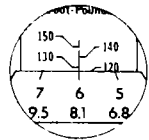
#### English Scales



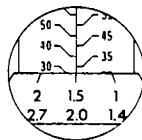
40 In.-Lbs.  
(250 In.-Lbs. Wrench)



231 Ft.-Lbs.  
(250 Ft.-Lbs. Wrench)

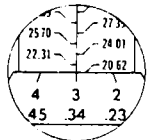


126 Ft.-Lbs.  
(150 Ft.-Lbs. Wrench)

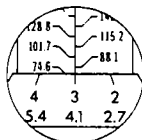


31.5 Ft.-Lbs.  
(100 Ft.-Lbs. Wrench)

#### Metric Scales\*\*



20.96 N-m  
(250 In.-Lbs. Wrench)



78.7 N-m  
(250 Ft.-Lbs. Wrench)

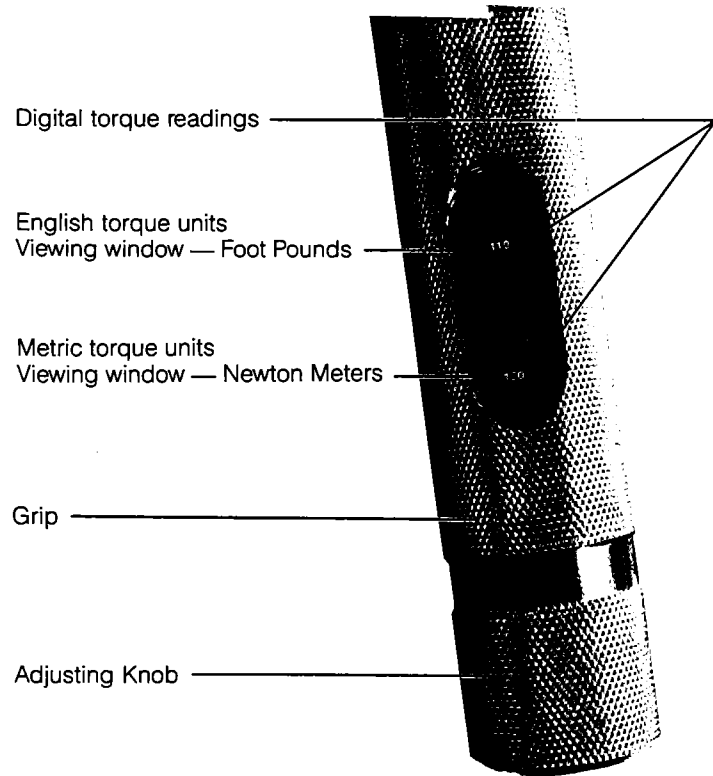
\*Various models and capacities of wrenches are illustrated. Though they might be different from your particular wrench, the principle of obtaining scale reading is the same.

\*\*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.

- WARNING:**
1. Do not attempt to turn the grip while it is locked.
  2. Do not turn the grip more than one revolution either below the lowest scale reading or above the highest scale reading.

## TO SET TORQUE — 3/4" DRIVE

1. Pull the adjusting knob out to unlock the mechanism.
2. While holding the adjusting knob unlocked, turn it clockwise to increase the torque, and counterclockwise to decrease the torque. Keep turning until the desired torque reading shows in the readout window. Although the wrench is calibrated to torque correctly with the reading in any position within the window, best accuracy is obtained by centering the number.
3. Lock the setting by releasing and, if necessary, pushing the adjusting knob in. The knob might be turned slightly back and forth without changing the torque setting to assure a proper engagement of teeth in the locking mechanism.



### WARNING:

1. Be sure that you are using the correct torque units. Your 3/4" Drive Torque Wrench is calibrated in Foot Pounds (upper window) and Newton Meters (lower window).
2. DO NOT turn the adjusting knob more than one revolution either below the lowest scale reading or above the highest scale reading.

## TO APPLY TORQUE

1. Attach the proper socket or other attachment to the drive. Set the reversing lever for the proper direction of operation.

**NOTE:** When accessories are used, torque setting must be corrected in accordance with the directions given on the next page.

2. Insert the socket or attachment onto the fastener to be torqued.
3. Utilizing the ratcheting head, you may "spindown" the fastener until resistance is felt (ratchet head models only).
4. Holding the wrench **BY THE GRIP ONLY,\*** apply **SLOW AND STEADY** pull until a momentary release impulse is felt. Release tightening pressure right at this moment.

**WARNING:** At low torque settings the release is gentle and there usually is no audible 'click' signal. Learn how the release feels **BEFORE** you torque to avoid accidental overtightening or damage.

\*When using long sockets or concentric extensions, the wrench may be supported at the head (only at the head!) with only negligible effects on accuracy.

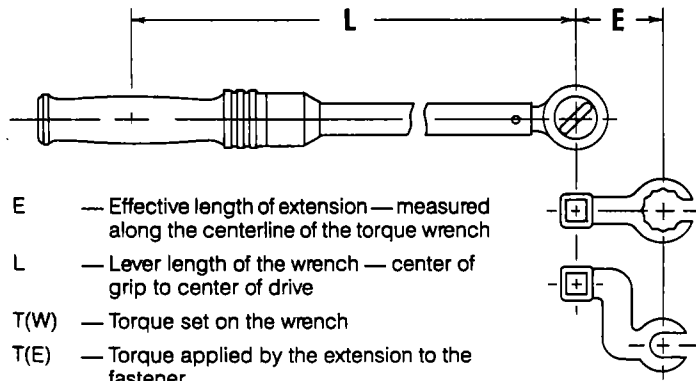
5. The wrench resets automatically and is ready for the next operation.

## IMPORTANT SUGGESTIONS

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 were accidentally 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 to 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!!

## ATTACHMENTS

At times, it is impossible or impractical to use regular sockets, (a good example being the tightening of threaded tubing connectors), and a special attachment must be utilized. Such attachments change the calibration of the torque wrench, and it is necessary to calculate the correct torque settings using the following formulas.



$$T(W) = T(E) \frac{L}{L + E} \quad T(E) = T(W) \frac{L + E}{L}$$

### 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. Handle extensions (a piece of pipe put onto the wrench in order to make torquing easier) **SHOULD NOT BE USED** under any circumstances. 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 (on 3/4" drive models there is enough grip area to accommodate both hands).

## 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 certain industrial solvents. It may be cleaned with a clean cloth wetted in mineral spirits or denatured alcohol. **NEVER IMMERSER THE WRENCH OR ANY PORTION OF IT IN ANY LIQUID!**
4. All torque wrenches should be periodically checked for accuracy. This should always be done after the wrench is subjected to abnormal handling or storage.

### TORQUE UNITS CONVERSIONS

TO OBTAIN	MULTIPLY NUMBER OF				
	Inch Ounces	Inch Pounds	Foot Pounds	Meter Kilograms	Newton Meters
Inch Ounces	1	16	192	1389	141.6
Inch Pounds	.0625 <sup>1</sup>	1	12	86.80	8.851
Foot Pounds	.00521	.0833 <sup>2</sup>	1	7.233	.7376
Meter Kilogram <sup>3</sup>	.000720	.01152	.1382	1	.1020
Newton-Meters	.00706	.1130	1.356	9.807	1

<sup>1</sup>or divide by 16

<sup>2</sup>or divide by 12

<sup>3</sup>A meter kilogram (m kg) is also known as meter kilopond (m kp)

**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
1/4-28	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 DIAM								
MM	INCH							
5	.197	3	4	5	7	8	11	12
6	.236	5	6	8	12.5	14	17	20
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	560
20	.787	200	—	330	520	—	740	860

These values are not to be used for fasteners which are not of the standard type. For fasteners of other types or for fasteners which should be torqued to a value other than that specified in this chart, the manufacturer's torque specifications should be used. For joints of soft materials, the torque values should be reduced to 75% of the values given in this chart. For values greater than the maximum torque specified in this chart, the fastener should be replaced with a higher strength fastener.