

**CALIBRATION INSTRUCTIONS
PTW-SERIES PNEUMATIC TORQUE WRENCHES**



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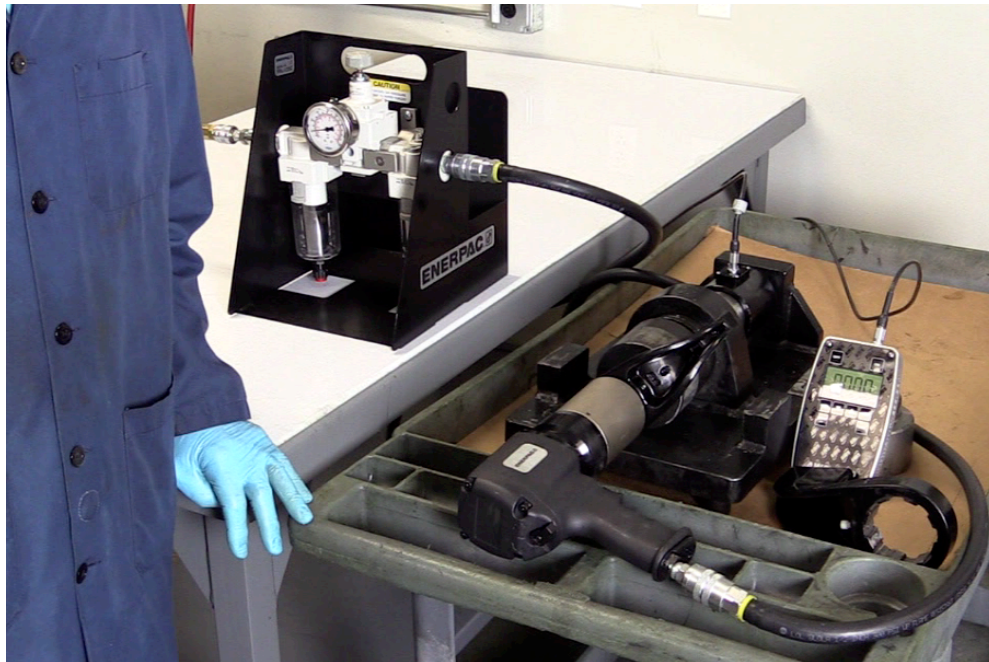
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Introduction

The following document contains instructions on how to calibrate an Enerpac PTW-Series Pneumatic Torque Wrench. Prior to operating this tool, please read all operating instructions carefully. A copy of these operating instructions may be found in the tool box, or on the Enerpac website.

Follow all appropriate safety precautions to avoid personal injury as well as damage to the wrench and/or damage to other property. Enerpac cannot be held responsible for any damage or injury from unsafe use, lack of maintenance or incorrect operation.

Required Equipment



The equipment required for performing calibration includes the following:

- The PTW system to be calibrated, including wrench, filter-regulator-lubricator (FRL) and tool hose with fittings
- A dynamic calibration stand with a range of at least 200 to 6,000 Ft.Lbs (270 – 8135 Nm)
- The a digital readout for the calibration stand
- An air supply that is capable of at least 50 CFM (85 CMH) at 100 psi (6.9 bar)
 - o The air supply must be regulated or limited to 120 psi (8.3 bar)
- A ½" (13 mm) air hose

Calibration Procedure

Securely attach the air compressor hose to the FRL and the tool hose from the FRL to the torque wrench. Set the air pressure at the minimum setting for the torque wrench to be calibrated with the tool free running (keep the trigger pulled while setting the air pressure):

Model	Initial Pressure Setting
PTW1000	20 psi (1.38 bar)
PTW2000	30 psi (2.07 bar)
PTW3000	20 psi (1.38 bar)
PTW6000	30 psi (2.07 bar)



Make sure the reaction arm is secured to the tool and then mount the tool to the calibration stand using the appropriate socket to interface between the wrench square drive and the stand.



Pull the trigger and record the torque from the readout when the tool stalls.



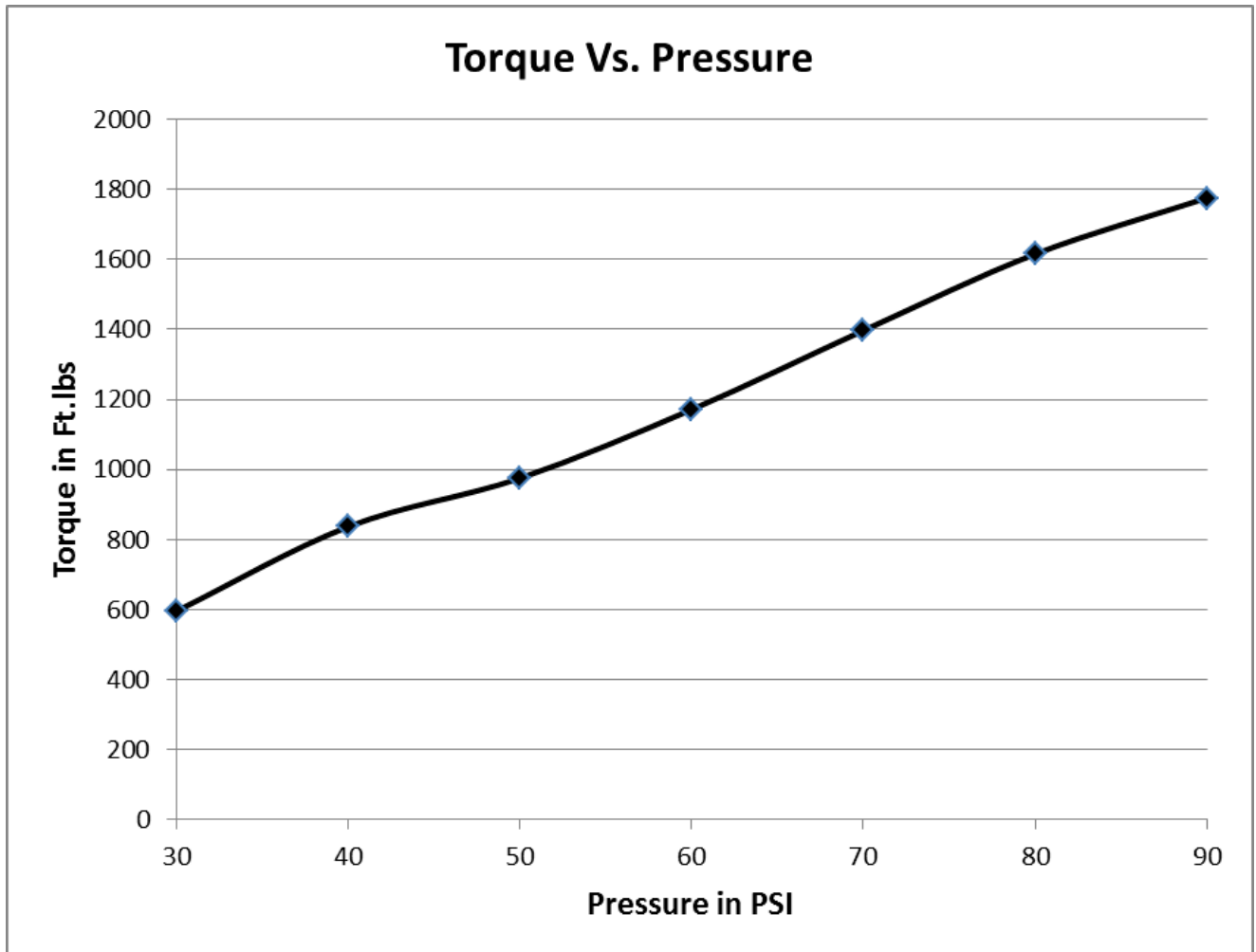
Repeat this process to obtain 3 to 5 data points. The average of these values provides a calibration point. Repeat this process at 10 psi (0.69 bar) increments until the full rated torque of the respective tool is achieved.

⚠ CAUTION: Never exceed the full rated torque of the wrench.

Example of data points taken in increments of 10 psi

Air pressure (psi)	30	40	50	60	70	80	90
1 (output in Ft.Lbs)	597	845	981	1166	1411	1589	1794
2 (output in Ft.Lbs)	602	845	979	1184	1362	1616	1749
3 (output in Ft.Lbs)	589	821	966	1164	1418	1641	1783
Average torque (output in Ft.Lbs)	596	837	975	1171	1397	1615	1775
Torque std. deviation	6.6	13.9	8.1	11.0	30.5	26.0	23.5
2 sigma repeatability.	2.2%	3.3%	1.7%	1.9%	4.4%	3.2%	2.6%

Use the averages of the data points at each pressure as the data point for that pressure. Results can be plotted and/or charted. For torque settings in between data points, interpolation can be used. Additionally, an equation can be developed for the best fit line for the data, and the equation can be used to determine the set pressure for any desired torque.



Simulating dynamic torque on a static stand

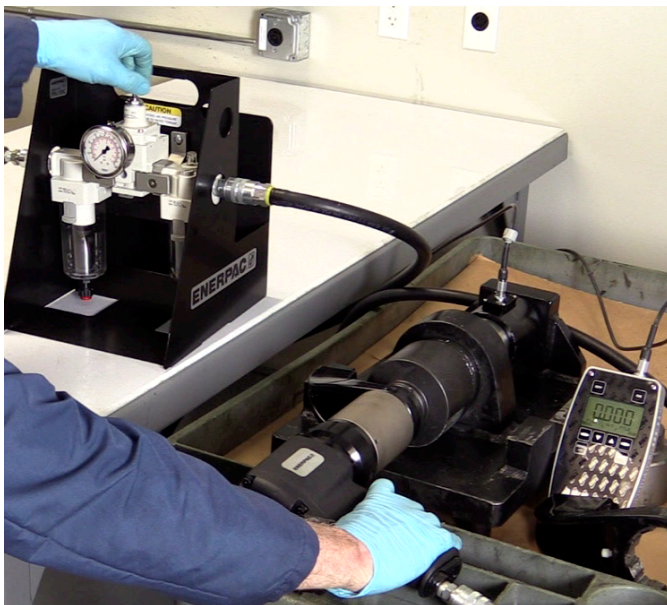
Actuating a torque wrench when the reaction arm has been pre-positioned against a fixed point (in effect, a static calibration) will yield higher torque values at a given pressure, than will be encountered when conducting a calibration procedure with a dynamic test stand. Given that it is common practice to calibrate pneumatic torque wrenches on dynamic test stands, it may be desirable to simulate a dynamic joint tightening on a static stand. To do so, follow the steps indicated below:

- 1: Position the reaction arm against the reaction point.

Note that the test stand depicted below is actually a dynamic test stand; however the process described is valid for use with a static test stand.



- 2: Adjust the air pressure to about 10 psi (0.69 bar) below the target pressure with tool free running.



3: Continue to pull the trigger on the tool and slowly turn the air pressure adjustment knob to ramp the pressure up to the target pressure at a rate of about 0.5 psi/sec (0.034 bar/sec) Note that turning the knob slower than this will not adversely affect results, but turning it faster could. Once the target air pressure is achieved and tool rotation stops, release the trigger, and record the value shown on the digital display. This is the first data point for this air pressure setting.

4: Next, release the air pressure, and repeat this process multiple times until the desired number of data points have been taken at this pressure setting.

Repeatable results are an indication of good technique. The same process may then be used to obtain data points at additional pressure settings throughout the full range of the tool.