



Getting the Best Out of Your Torque Tester – Part Two

Matching the Calibration Device Capacity to Your Torque Wrenches

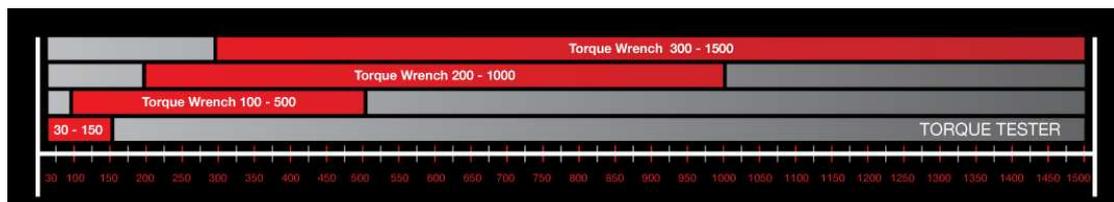
In an ideal world every torque device would have a range from zero to infinity. In the real world there are many reasons why torque wrenches and screwdrivers have a limited capacity. The ability of the spring to work in a linear way is one limit. The weight of the wrench at low torques is another. The resolution of dial or digital displays is another.

Most torque wrenches and screwdrivers have a range of 20% to 100%. This is recommended by the international standard ISO 6789. Some manufacturers may have a scale below 20% but this may not be a calibrated area. Sometimes the total scale range is called the operating range.

Torque testers also have a range. This is determined by resolution and accuracy considerations and by the standards for such equipment. The 20% to 100% range is common because it gives the best performance. However if the tester can only work from 20 to 100 N.m and the wrench has a range from 20 to 100 N.m then each size of torque wrench needs its own tester. To get round this problem modern testers often have extended ranges down to 2%. The standards do not allow calibration below 2% and you should check that the resolution and accuracy are good enough to test your wrench if you are working in the 2% to 10% scale area.

It is not good practice to use more than one tester to test one torque wrench. Always use a tester with a capacity equal or greater than the torque wrench.

The good news is that if you use a good quality tester, such as the Norbar Pro-Test 1500, you can use it from 2% to 100% and the calibration certificate tells you exactly what accuracy and uncertainty you will achieve. The 30-1500 N.m range allows 20-100% calibrations of wrenches with maximum capacities between 150 and 1500 N.m.



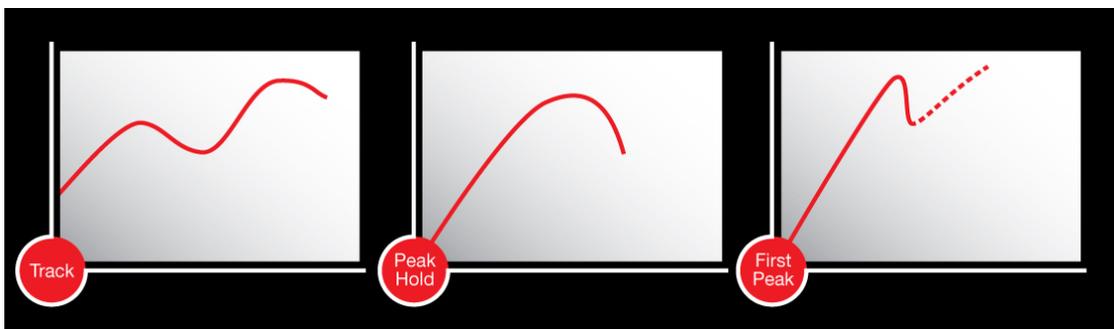
A good quality torque tester, such as the Norbar Pro-Test 1500 in this example, can calibrate wrenches with maximum capacities between 150 and 1500 N.m.

Different modes and settings

Most torque testers have a “Track” mode. This means that the display changes as you vary the torque applied. It is used mainly for calibration and to set the zero before use.

Testers for cam operated screwdrivers and dial or electronic wrenches use “Peak Hold” mode. This holds the highest torque achieved to allow comparison with the wrench display.

Use of the “Peak Hold” mode with “click” torque wrenches will give incorrect readings. For these wrenches you should use “First Peak” mode. This captures the point at which the torque peaks and decreases by an amount as the mechanism operates. This mode is used in calibration of “click” wrenches around the world and is accepted as the consistent way to calibrate the wrench.



The three modes common to most electronic torque testers.

Warm Up and Zeroing

Most torque testers have strain gauges to measure the applied torque. These testers should be allowed to warm up for at least 15 minutes before use. This allows the current passing through the strain gauges to expand the metal and for this expansion to be “zeroed out” before use. Before applying torque you should zero the tester and then operate the wrench five times at its maximum capacity. You should then observe the change in zero. A change of more than 1% may suggest a problem and you should seek advice. Re-zero the tester and you are ready to start the calibration.

Adjustment of the Wrench

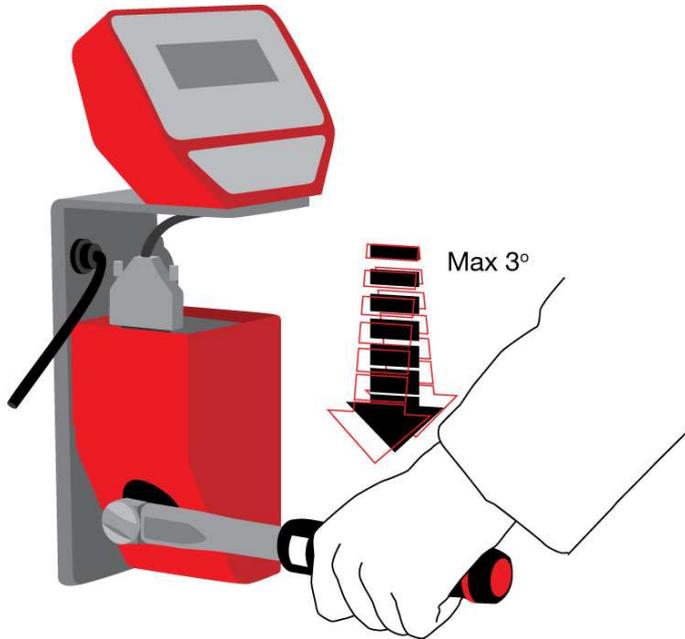
The golden rule is always approach the target torque setting from below. If you overshoot then wind the adjustment back and approach from below again. This is to minimise variation caused by play in the adjusting mechanism.

The sequence is to calibrate at 20% or the lowest scale value marked if below 20%. Five successive readings are taken and recorded. The wrench is then adjusted to 60% of maximum value and then to 100%, taking five readings at each point.

Some wrenches are not adjustable, or may not have a scale. These wrenches are used in situations where the operator does not need to adjust the torque value. Such wrenches are operated 10 times at the set value and the readings recorded.

Load Point and Angle of the Wrench

Most torque wrenches are affected by “side loads”. This is when the wrench is pushed or pulled at an angle to the normal direction of load. The standards require that the angle of load is within $\pm 5^\circ$ but even this will have an influence on the reading. Practice pushing in a straight line, ideally within $\pm 3^\circ$, to get the most consistent readings.



Although not allowed by the standard it is very common and convenient to test wrenches by pushing down as in the diagram. In this case the wrench should be horizontal and the load applied vertically to prevent end loading of the mechanism.

Finally ensure that the load is applied at the centre of the handle, (not the centre of the overall length). Many wrenches have a load point to assist you. The reading can vary significantly by moving even 10 mm either side of the load point. Try it and see!

