



Understand, Maintain and Service Your Torque Wrench

White Paper



A torque wrench is a precision tool and should be treated and maintained like a measuring instrument. A torque wrench must be properly calibrated and maintained on a preventative maintenance and calibration schedule. Learn valuable information regarding setting verification and calibration intervals, as well as preventive maintenance for torque wrenches. Also gain a better understanding of different torque accuracies listed by suppliers as well as understanding the scale used on different torque wrenches.

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In the maintenance and manufacturing world, tightening, controlling, or measuring torque of fasteners is imperative for production efficiency and quality control. With inadequate torque a fastener can vibrate or work loose. Conversely, if the torque is too high, the fastener can break, strip or adjoining parts may fail causing premature malfunction, warranty or other liability. Faced with these problems, manufacturers are realizing that precise torque control can mean the difference between a safe, reliable, and economical product and complete disaster. Anybody who must tighten a threaded fastener needs to control, monitor, or measure torque with proper quality torque tools. If manufacturers and maintenance personnel wish to save money, make their workplace safer, enhance product quality, or reduce their exposure to liability; only quality torque tools will get the job done properly.

“Click” type wrenches are the most widely used torque product in the world. A recent IMPO survey indicated that over 76% of respondents use traditional, click type torque wrenches. When the set torque is reached, a click torque tool typically emits a loud audible “click” and a slight moment of release of up to 3 degrees, before going positive. At this point of “click” a user should stop pulling as torque has been reached.

Because a torque wrench is considered a measuring tool it must be properly calibrated and maintained on a preventative maintenance and calibration schedule.

This document is intended to provide general basic advice for effective or optimum use.

Before Using a Torque Wrench

Not all torque wrenches are alike. Take time to read all instructions provided to fully understand the working features and manufacturer recommendations. Before use, test the tool to make sure it functions properly and has a current calibration sticker or calibration certificate indicating its validity. Ensure that the socket or bit fits correctly on the drive and the adjustment mechanism functions properly.

Understanding the Scale and Tool Type

Most torque wrenches have a scale that can be adjusted. Externally adjustable scales typically have a master scale and sometimes a micrometer scale. Increments or graduations indicate how fine a tool can be set. Wrenches with a micrometer scale can be set to finer graduations and are more complex as two scales adjust simultaneously. Internally adjustable (preset) tools do not have an external scale and are typically used in a production environment or for one torque setting.

Understanding Accuracy

Accuracy can be stated in terms of Full Scale (FS) or Indicated Value (IV). There is a big difference in result as FS accuracy indicates the allowable error over the full-scale range of the tool. IV accuracy indicates allowable error at the set point on the wrench.

IV stated wrenches are more accurate, especially on the lower end of the range. It is important to determine if the accuracy needed for an application can be obtained with the torque wrench selected. The table shows the

Full Scale (5% throughout range)	% OF Scale (Torque)	Indicated Value (5% at each value)
95 - 105	100	95 - 105
45 - 55	50	47.5 - 52.5
25 - 35	30	28.5 - 31.5
5 - 15	10	9.5 - 10.5

allowable tolerance for
Full Scale vs. Indicated Value accuracy.

In the table on page 2, it can be determined that Full Scale accuracy is less accurate than Indicated Value as the tolerance against the scale varies from 5% to 50%, whereas the Indicated Value Accuracy is 5% at each value.

Establish a Verification and Calibration Interval

Torque wrenches go out of calibration with use. Verifying the accuracy of a torque wrench is a key quality measurement that must be taken for a successful outcome. Two accepted methods may be used. Verification is a process step to validate if the wrench is in or out of calibration. This test can be conducted with a suitable torque tester/checker. Any operator or inspector may verify a wrench by connecting it to a suitable torque tester and pulling the wrench. The torque tester will display a result that must be compared to the allowable tolerance of the wrench. Some torque testers offer a tolerance-setting feature that provides a GO/NG result (RED or GREEN) when the wrench is pulled. If the verification result is OK then the wrench is deemed in tolerance. If it is NG then calibration or adjustment of the wrench is required.

Unless broken, calibrating a torque wrench is a fine-tuning of the wrench to bring it back within tolerance. A competently trained technician with equipment that is certified to the National Institute of Standards and Technology (NIST) must perform the work if a calibration certificate is required. The international standard for torque wrench calibration (ISO6789) mandates all conforming wrenches meet or exceed 5000 cycles before requiring calibration. It also defines the methodology for calibration. Most competent wrench manufacturers use ISO 6789 as the basis for establishing performance criteria or standards for their tools.

A regular scheduled verification and calibration program helps to eliminate error based on a wrench being out of tolerance. Competent calibration labs in conformance with ISO17025 or best practices will issue “as found” readings for a calibration, allowing

examination of the wrench condition at time of calibration. It is an industry practice to reduce the calibration interval by one half if a wrench is found to be out of tolerance at time of calibration. Failure to calibrate a torque wrench may lead to failure of a joined connection.

Preventive Maintenance

To maintain consistent accuracy, torque tools must be checked periodically for wear or defective parts. A properly structured preventive maintenance program optimizes tool performance and reduces unexpected downtime, thereby saving time and money.

The more often a wrench is used the faster it will wear or go out of calibration. Monitoring the number a tool is used is the most accurate way to establish proper maintenance intervals. It is accepted that torque wrenches should be serviced in line with manufacturers recommendations or no longer than 100,000 cycles, or when a visual inspection reveals old or dry grease, parts that show signs of excessive wear, loose or unstable components.



The ratchet of a wrench should be inspected for wear, cleaned and lubricated. Periodically verify that ratchet screws are tight and that the ratchet spins freely when turned. The wrench handle should not be loose and it should be free of corrosion or lubricants when used. Failure to inspect, lubricate, adjust, and replace worn parts on wrenches can lead to premature failure.

Protect your wrench from dust, grime, chemicals and other hazards by storing the wrench properly in a case or other storage device and keep it in dry and clean place. Clean your wrench on the outside with a dry cloth. External cleaning fluid or other chemical solvents can corrode the internal lubrication of the tool, causing premature failure. If it is

necessary to disassemble the wrench follow properly documented instructions provided by the manufacturer or send to a competent technician.

Most click wrenches are built with an internal spring mechanism that is compressed to against a lever. Adjustable wrenches use springs that must meet a linear capability test. After use, externally adjustable click wrenches should be turned back to minimum scale value. This helps to preserve the linearity of the spring and calibration of the wrench. All calibrated wrenches should be backed off to the minimum setting when stored. Calibrated wrenches use a spring with a known linear range. It is thought (and has been proven) that leaving a calibrated wrench at one setting impacts spring linearity, disallowing accurate use at other settings. It does not happen every time, but over time linearity can be impacted causing error. This is the reason for the recommendation to turn a wrench back to its minimum setting when not in use. If you use the wrench at only one setting, you might consider a "preset" version that is set at one setting. This has no scale and is set by a torque analyzer. It requires no adjustment to minimum and can stay set at one torque setting without issue to linearity.

A torque wrench is a precision tool and should be treated and maintained like a measuring instrument.

About Mountz, Inc.

San Jose, California based Mountz Inc. produces a wide variety of torque tools, including torque analyzers, torque testers, torque sensors, torque wrenches, electric screwdrivers, torque screwdrivers, torque multipliers, assembly tools, screw counters, tool balancers and special torque applications.

Over the last 40 years, Mountz Inc. has proven its in-depth knowledge of torque solutions by consistently developing and producing as well as marketing and servicing highly sophisticated, cutting-edge tools. Mountz Inc., known among members of the industry as the nation's premier torque tool supplier, is an ISO 9001 registered and ISO 17025 accredited company. Mountz Inc. offers tools that comply with ISO6789:2003 and are

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constructed from high quality materials, engineered for superior reliability and safety and backed by a standard warranty.

For more information about Mountz visit our website at www.mountztorque.com