

# Understand, Maintain & Service Your Torque Wrench

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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
23 - 35	30	28.5 - 31.5
5 - 15	10	9.5 - 10.5

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 survey of IMPO readers indicated that over 76 percent 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.

The following information 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

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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 following table shows the allowable tolerance for Full Scale vs. Indicated Value accuracy.

In the above table, 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 percent, whereas the Indicated Value Accuracy is 5 percent 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 measure that must be taken in order to achieve 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

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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 of cycles per day or total hours that 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 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. A torque wrench is a precision tool and should be treated and maintained like a measuring instrument.

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