



TECHWRENCH FREQUENTLY ASKED QUESTIONS

November 30, 2005

WHAT IS A TECHWRENCH?

The **TECHWRENCH®** is an electronic torque wrench. It was designed to provide basic electronic features, such as UNITS CONVERSION, (Nm, ft-lb and in-lb) TRACK, PEAK HOLD, PRESET, TOLERANCE and DATA STORAGE functions on a robust, yet ergonomically comfortable, wrench platform. It is priced to compete with mechanical bending beam, dial, preset and adjustable click-type torque wrenches

HOW DOES IT WORK?

Two versions of TECHWRENCH are presently on the market:

The "TECH" version (red handle) emulates a mechanical click wrench. The display shows the torque specification, (PRESET value) that can be changed immediately using the UP and DOWN pushbuttons. The torque units of measure are selected by using the UNITS conversion pushbutton. When load is applied the display automatically switches to TRACK mode, emulating a mechanical dial wrench, so the user can monitor torque in real time. At 2% below the preset value, the wrench beeps once and the handle vibrates, alerting the user to stop increasing torque. When load is released the display automatically shows the PEAK torque applied for 10 seconds, flashing on and off, thus emulating a dial wrench with a follow-up pointer. The wrench turns itself off after sitting idle for two minutes to conserve battery power. The wrench returns to the last PRESET and UNITS setting at power on.

The "D" version (gray handle) features both a torque PRESET function and a TOLERANCE function. Certain keystrokes are necessary to enter the PRESET or TOLERANCE adjustment modes, so they are effectively "locked-out" from immediate changes. This emulates the mechanical fixed preset wrench. TOLERANCE is adjustable from 1% to 16% of the PRESET value. When the wrench is turned on, or any time the ON/ZERO button is pushed, the display shows the PRESET value for 2 seconds and then reverts to ZERO. The torque units of measure can be selected by using the UNITS pushbutton. As load is applied the display shows torque in the TRACK mode, emulating a mechanical dial wrench. When the torque reaches the PRESET value minus the TOLERANCE percent, the wrench beeps once and the handle vibrates, emulating a mechanical click wrench. Should the torque exceed the PRESET value plus the TOLERANCE percent, the wrench beeps three times. By exhibiting different signals between lower and upper TOLERANCE readings, a window of acceptable torque is established. This promotes quicker, less concerted, use of the wrench, which is more suitable to manufacturing environments. When load is released the display shows the PEAK torque applied for 10 seconds, flashing on and off. The wrench turns itself off after sitting idle for two minutes to conserve battery power. The wrench returns to the last PRESET, TOLERANCE and UNITS settings at power on.

Both TECH and D versions (software functions) are also available in MEMORY models.

HOW DOES THE TECHMEMORY™ WRENCH WORK?

The MEMORY, "M" models of the TECHWRENCH can store up to 1,000 readings. These readings can be recalled for later review and downloaded to a computer for recording or statistical analysis. A reading is stored when the "M" pushbutton is pressed during the 10 seconds that its PEAK value is flashing. Each reading is sent out the RS232 serial port, as it is stored in the

wrench. This allows real-time recording of readings, if the wrench is tethered to a PC. Pushing the PRINT pushbutton will download the entire data list. A display flag “M” indicates that at least one reading is stored in memory. Data is retained until manually cleared, even if the wrench is turned off.

HOW DO I GET THE STORED READINGS INTO MY COMPUTER?

The **TECHMEMORY™** wrenches include a serial interface cable and a software CD. The CD will auto-load the free **TORQLOG™** program into the Programs folder on a PC running WINDOWS 2000 or later operating system. In use, TORQLOG resides on the PC desktop and will place the downloaded data into whatever utility program, (WORD, EXCEL, OUTLOOK, NOTEPAD, etc.) is running under it. Two Excel worksheets (Templates) are included on the CD for user convenience. The **DOWNLOAD template** is used to print the previously stored data list from the wrench. The PRINT function of the wrench sends out the number of the reading, the torque value and the units of measure. The **DATE-TIME template** automatically creates a DATE and TIME stamp for each reading, while the wrench is connected to the computer. *NOTE: Snap-on does not provide technical support for these templates.*

WHY DOES THE TECHWRENCH SIGNAL 2% EARLY?

A mechanical click wrench releases torque slightly when its PRESET value is reached. This helps the user to stop applying torque without over-loading the fastener. With the TECHWRENCH, the user must ergonomically respond to the beep and handle vibration. Empirical studies showed that the typical user overshoots the PRESET value by about 2%. So, the program purposely signals PRESET alert 2% early to compensate. Refer also to “HOW DOES IT WORK?” above.

WHAT IS THE ACCURACY OF THE TECHWRENCH?

It depends on the model. Flex-head models are within +/-2% in the CW direction and +/-3% in CCW direction from 20% to 100% of full scale. Similarly, memory models are within +/-1% CW and 1.5% CCW and interchangeable head models are within +/- 4% CW and +/- 6% CCW. Refer to the product specifications at the home page for more details.

WHAT AFFECTS TECHWRENCH ACCURACY?

Handhold position: To provide a robust, yet cost effective design, the TECHWRENCH uses strain-gaged, bending beam, sensing technology. To get the best accuracy, users must apply torque to the center of the handhold position. Moving off the center of the handle can induce errors as much as:

MODEL	RANGE	% DISPLAY ERROR FROM CENTER OF HANDLE		
		1" Short	1" Long	2" Long
TECH1FR240	240 in-lb	-2.75	2.78	4.40
TECH2FR100	100 ft-lb	-2.49	1.93	3.44
TECH3FR250	250 ft-lb	-0.90	1.25	1.79
TECH4R600	600 ft-lb	-0.32	0.56	0.87

Flex-head position: Because the flex-head can place the center of the socket drive some distance away from the center of the calibration length (non-flexed drive axis to handhold position), compensation for torque setting or display reading may be necessary. Using a deep-well socket, for example, can result in errors as much as:

MODEL	DRIVE	% DISPLAY ERROR +/- FLEX-HEAD ANGLE		
		5 deg	10 deg	15 deg
TECH1FR240	1/4"	0.74	0.98	3.57
TECH2FR100	3/8"	0.35	1.43	3.33
TECH3FR250	1/2"	0.39	1.64	1.80

Orientation: As with all bending beam, and most click style torque wrenches, the TECHWRENCH is sensitive to gravity induced error. Torque wrenches are calibrated in the vertical position (handle down) or horizontal position (drive facing down) orientations. When the wrench is used in a horizontal position, with the drive parallel to the surface of the earth, setting and display errors can be off as much as:

Model	Horizontal Orientation Error		
	CW	CCW	UNITS
TECH1FR240	-1.5	1.6	in-lb
TECH2FR100	-0.2	0.2	ft-lb
TECH3FR250	-1.0	1.0	ft-lb
TECH4R600	-3.0	4.0	ft-lb

Temperature: The TECHWRENCH utilizes full-bridge strain gage sensing to provide excellent temperature compensation. The wrench will maintain accuracy per ASME STANDARDS at room temperature (23 degrees C) +/-10 degrees C. Electronic display drift is +0.04% per degree C.

HOW CAN I CHECK THE ACCURACY OF THE TECHWRENCH?

Per ASME B107.28 and ISO 6789 Standards, checking the accuracy of a torque wrench requires the use of a torque tester/calibrator with accuracy at least four times better than that of the wrench. The TECHWRENCH is calibrated in the horizontal position, with the display facing up. Per the Standards, the wrench must be exercised three times to full scale in the direction of test and then both the wrench and tester/calibrator must be zeroed. A constant torque is applied, (TRACK mode on the tester) by loading at the mark on the handle, and with the flex-head straight (non-flexed). Never try to test the wrench in the PEAK or FIRST PEAK modes because the dynamic differences between the wrench and the tester will produce inconsistent results. The Standards suggest checking the wrench at 20%, 60% and 100% of full scale. Wrench readings should match the tester display within the sum of the uncertainly specifications for each. For example, a +/-2% wrench tested using a +/-0.5% tester is within specification if the readings agree within +/-2.5%. A number of torque testers/calibrators are available from Snap-on Tools.

CAN I CALIBRATE THE WRENCH MYSELF?

Yes, with the proper calibration equipment. Refer to Calibration Instructions, at the home page.

HOW OFTEN SHOULD THE WRENCH BE CALIBRATED?

This question relates to the policy of the particular user, which generally reflects the critical nature of specific fastener installations. Obviously, military, aerospace and nuclear power facilities will

test their wrenches more often than a backyard mechanic. All TECHWRENCH models have been tested against ASME and ISO standards for cycle life. The Standards require 5,000 CW and CCW cycles at full-scale without loss of accuracy. To establish your own policy, as an example, using a 100 ft-lb wrench to install lug nuts to 100 ft-lb, you can reliably do 250 automobiles before checking calibration, (5,000 lug nuts / 5 lugs / 4 wheels = 250 cars). If you use the wrench at mid-scale, you can expect to get at least 4 times the cycle life. At any extent, due to environmental affects, even if the wrench is only used occasionally, it is good practice to have it checked every six months. As with any measurement instrument, should you drop it, have it checked. Snap-on Repair Centers are outfitted with the latest in torque testing/calibration equipment.

IS THE TECHWRENCH CE APPROVED?

Yes, refer to the Declaration of Compliance at the home page. Both TECHWRENCH® and TECHMEMORY™ Instruction Manuals include English, Deutsch, Francais, Italiano, Espanol, Nederlands, Portugues and Japanese translations.

IS THE TECHWRENCH "INTRINSICALLY SAFE" (EXPLOSION PROOF)?

No. The TECHWRENCH is not sealed tight against volatile atmospheres that may ignite should a spark be generated in its electrical circuitry.

CAN THE TECHWRENCH BE AUTOCLAVED?

No. Sterilization temperatures and humidity of that level will destroy the wrench.

WHAT ARE THE OPERATING TEMPERATURE LIMITATIONS?

The TECHWRENCH was tested between zero and 50 degrees Celsius, (32 and 125 degrees Fahrenheit). Although the wrench does work at those extremes, the LCD (LIQUID Crystal Display) will get sluggish as the temperature drops and the circuitry will drift out of ASME Standard specifications, which is within 10 degrees C of room temperature (23 degrees C).

CAN THE TECHWRENCH BE USED IN THE RAIN?

The TECHWRENCH assembly uses "O" rings and close fit components to minimize dirt and grime getting inside. For that reason, it is also claimed to be "splash proof." However, because the rigid bezel (electronics and display) assembly must be able to float over the bending steel frame and handle, it is not sealed tight. Therefore, the TECHWRENCH must never be immersed in any liquid or be directly exposed to moisture that may seep into the electronics.

WHAT IS THE BATTERY LIFE FOR THE TECHWRENCH?

The TECHWRENCH was tested continuously with a one second handle vibration every 10 seconds. With fresh alkaline cells installed, the battery lasted over 130 hours. The memory version draws approximately 20% more current and will get proportionately less battery life. Even with the display off, the circuitry still draws a fraction of a milliamp. Therefore, the battery should be removed when the wrench is stored for an extended period of time.

DOES BATTERY VOLTAGE AFFECT ACCURACY?

No. The TECHWRENCH regulates the 4.5V battery voltage to 3V, thus insuring measurement precision. Its micro controller constantly monitors battery voltage as reported by the battery condition flags on the display. Should the battery fall below the regulator dropout voltage, the display will show "bAtt" and the wrench cannot be used until the battery cells are replaced.

WHAT DOES “Err0” MEAN ON THE DISPLAY?

Every time the wrench is turned on, and whenever the ON/ZERO key is pressed, the wrench reestablishes a ZERO/TARE. “Err0” (Error Zero) means that a signal, greater than 20% of full scale, is coming from the bending-beam sensor as the wrench is trying to ZERO itself. Such a signal is indicative of torque being applied during ZERO set, a bad gage, open gage wiring, or a permanent set taken by an over-loaded sensor. In any case, the wrench cannot be used and must be repaired.

WHAT DOES “ErrP” MEAN ON THE DISPLAY?

On “D” version wrenches, if torque is applied while in the PRESET or TOLERANCE adjust modes, the wrench will beep, the handle will vibrate and the display will show “ErrP,” (Error Program). Simply push the ON/ZERO pushbutton to exit the program mode and return to the measurement mode.

**IS THE TECHWRENCH SKYDROL PROOF?
(CHEMICAL RESISTANCE)**

No, practically nothing is Skydrol proof! However, the materials chosen for use in the TECHWRENCH have all been proven in existing Snap-on products, such as screwdriver handles, cordless power tools and diagnostic equipment housings. Casual contact, even with the most reactive solvents, has little affect on function or finish. Most chemicals evaporate before doing any damage. The nylon display window will not fog, except due to abrasion. Replacement of the plastic components, should the tool experience damage due to prolonged chemical exposure or physical abuse, is relatively inexpensive. The following plastics materials are used in the TECHWRENCH:

- Handle and electronics bezel – Nylon, 30% glass filled
- End cap, battery tray, trim ring – Polypropylene
- Soft grip handle – Santoprene
- Display window – Transparent Nylon (Grilamid TR90)
- Keypad – Silicone Rubber
- Sensor and endcap “O” rings - Buna-N (Nitrile)

Each of these materials was tested by applying chemicals, identified in Snap-on Standard ES60.12J, that are typical of the automotive repair environment, including:

- | | |
|--------------------|----------------------------------|
| Denatured Alcohol, | #2 Diesel Fuel |
| 30W Motor Oil, | Unleaded Gasoline |
| Transmission Fluid | Carburetor Cleaner |
| Naphtha | Brake Fluid (Similar to Skydrol) |
| Lacquer Thinner | Nitro Methane (Racing Fuel) |

SIGNIFICANT RESULTS:

The keypad expands in volume up to 100% when soaked for 24 hours in diesel fuel, naphtha, gasoline and lacquer thinner. However, it returns to normal when the solvents are removed and have evaporated.

According to published data, the soft grip, Santoprene, will expand 3% when immersed into brake fluid for one week and will shrink 15% when immersed into gasoline for one week.

WHAT HAPPENS IF I DROP THE TECHWRENCH?

All models of the TECHWRENCH were drop tested per Government Standard GGG-W-686E with the following results:

One sample wrench was dropped six times, [three times beyond the standard] from four positions horizontally, [three positions beyond the Standard] and once on each end from a height of three feet onto a concrete floor. When dropped on the drive head end, the innermost AA cell shifted forward resulting in a deformed positive cell contact.

One sample wrench was dropped six times, from four positions horizontally and once on each end from a height of four feet, (one foot beyond the Standard) onto a concrete floor. When dropped on either the drive head or handle ends, the innermost or outermost AA cell shifted forward or rearward respectively resulting in deformed positive contacts. The handle weld separated near the endcap – unit remained functional.

One sample wrench within its shipping/storage case was dropped once on all six sides from a height of six feet onto a concrete floor, (all beyond the Standard). Case slightly deformed when dropped on handle end. No damage to the wrench inside.

POST DROP TEST CALIBRATION CHECK:

All wrenches remained functional and within accuracy specifications.

NOTE: The TECH4 series (600 ft-lb) wrenches will not survive this test when dropped on the handle end.

CAN THE AUDIBLE BEEP AND HANDLE VIBRATION BE MADE ANY MORE INTENSE?

The beep alarm and handle vibration are already optimized given the available space for components and the battery capacity.