

# TorqueLab®

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## *Analyzer*



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## IMPORTANT PRECAUTIONS

The TorqueLab® is solely designed for measuring and testing of torque controlled equipment such as wrenches, power tools or hand- screwdrivers. Mountz, Inc. strongly recommends that this analyzer not be modified and/or used for any application other than for which it was designed. If the analyzer is not used as described in this manual, the safety features of the unit might be impaired.

Although the unit is safe during normal operation, remember to use common sense and exercise caution when using other equipment such as power tools, calibration equipment and custom accessories.

If you have questions relative to a particular application, contact Mountz, Inc. to determine if it can or should be performed on the product.

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- Do not use the analyzer if the housing or transducer look damaged, or if you suspect that the unit is not operating properly.
- Make sure to select the appropriate transformer when using external power supply.
- Secure the analyzer using the integrated clamping channel or using the threaded holes provided in the back of the unit by bolting it onto the work area.
- When using a power tool or an accessory item always follow safety precautions recommended by the manufacturer.

## WARRANTY

*Every Mountz tool is thoroughly checked and tested before shipment. Should defects due to faulty materials and/or workmanship develop within (1) year from the date of sale, the tool will be repaired free of charge if returned to Mountz, Inc. This warranty is not valid if the tool has been misused, tampered with or abuse. Any questions pertaining to Warranty Repair or Returns should be directed to Mountz Customer Service department.*

*All incoming freight charges are the responsibility of the customer. If the customer requests second day or overnight return, the customer will be responsible for the difference between ground and air shipment returns. Tools that are returned and found to require repair for any reason other than faulty material(s) and/or workmanship, including, but not limited to: normal or excessive wear, misuse, abuse, tampering, attempts to repair or repair work performed by individuals other than Mountz personnel, could be void of any and all warranty. In such cases, Mountz will estimate the cost of the repair and will proceed with the repairs when the authorization for such repairs is received.*

*Tools estimated for repair and/or calibration are subject to a minimum service charge of \$25.00 if repair and/or recalibration are not authorized.*

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## FEATURES OVERVIEW

Controlling torque is quintessential for companies to ensure their product's quality, safety and reliability isn't compromised. Insufficiently torqued fasteners can vibrate loose overtime and when excessively torqued the threaded fasteners can strip. Using a quality torque analyzer has become increasingly important for many companies to secure that proper torque is being applied.

The Torque Lab analyzer is built for accuracy and reliability. This analyzer accurately measures torque for most tools, meeting the demands to test multiple torque ranges for various tools used in production. The analyzer features a built-in transducer and supports most external size transducers. Utilizing a high-performance circuitry system, the analyzer can download torque readings to a computer at high speeds. This allows a powerful collection of analytical data to be stored for future reference and statistical analysis of tools. Offering three modes of operation (Track, Peak, and 1st Peak) this versatile analyzer provides the operator a variety of ways to smoothly verify torque applied with a selection of seven measuring units. Models ranging in torque up to 250 lbf.ft.

- Recommended for all hand screwdrivers, wrenches, or power tools.
- Accuracy +/- 1% of reading from 10% to 20%, +/- 0.5% of reading from 20% to 100% of full scale.
- Selection of three operation modes: (Track, Peak, 1st Peak).
- Seven units of torque measurements available: (lbf.ft, lbf.in, ozf.in, N.m, cN.m, Kgf.m, kgf.cm).
- Can accept up to 9 external transducers.
- Go / No Go signals (green / red LEDs) to indicate validity of torque readings.
- Buzzer for audible user feedback.
- RS-232 interface to download readings in "real time."
- Manual and auto reset functions to clear displayed values.
- Software selectable filters to eliminate unwanted "noise": (500Hz, 1000Hz, 1500Hz, 3000Hz).
- Calibration will allow for both a fast calibration (using mV/V transducers rated output) and a true (dead weight) calibration.
- Battery powered or AC adapter cord included. NiMh batteries provide 10 hours of operation per charge and a low battery indication turns on when battery is low. Automatic shut down occurs when battery becomes critically low.

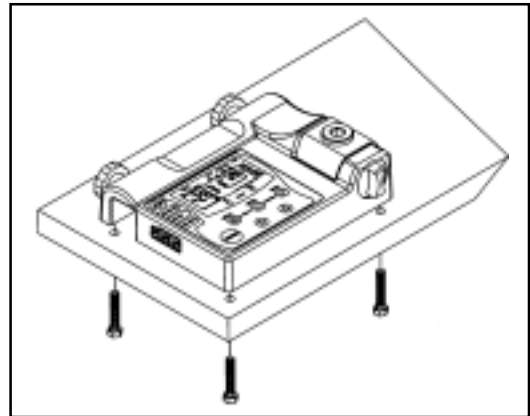
## MOUNTING

It is strongly recommend securing the analyzer to a workbench before operating. Immobilizing the analyzer is critical for the safety the operator as well as for the accuracy of torque measurements during operation.

The TorqueLab® features two mounting options.

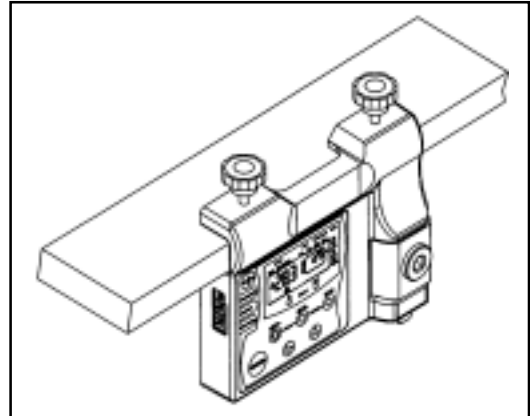
### SURFACE MOUNT

This mounting option offers the most secure way to immobilize the analyzer, and is recommended when used at a permanent location. In the back of the unit, you will find 4 threaded holes 3/8-16, spaced at 9.75 by 7.25 inches.



### RACK MOUNT

When the analyzer is used at various locations, this fast mounting option offers more flexibility. The mounting channel width is 1.5 inch wide. Always hand tighten the knobs, when clamping.



**Note:** Remember that a loose Analyzer during utilization can impact the validity of torque readings. Always make sure the unit is secure before operating, repeated usage may loosen the screws or knobs.

## EXTERNAL CONNECTIONS

### EXTERNAL POWER SUPPLY

Plug the provided transformer to recharge the internal battery supply when low.

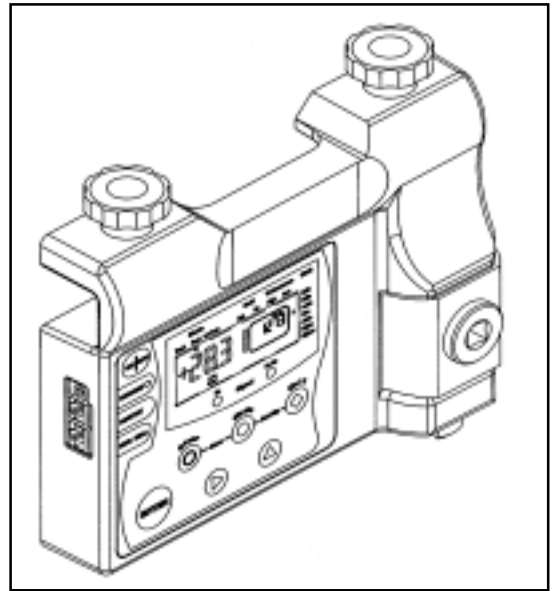
Note: The TorqueLab® can be used while being charged.

### RS 232 OUTPUT

The RS 232 can be used for printing or downloading torque values into a computer.  
Rate: 9600 BPS  
Format: 8 bits fixed, 1 stop bit, no parity.

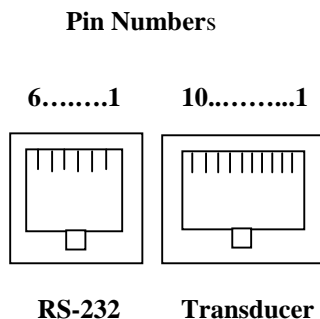
### EXTERNAL TRANSDUCER INPUT

The TorqueLab® can be used with external transducers up to 9 Cells (Cell 01 –09).  
The TorqueLab® is compatible with transducers with Rated Output between 1.7 to 2.3 mV/V and 5 V. See “CELL SET-UP”.



### TRANSDUCER and RS 232 CONNECTION PIN-OUT

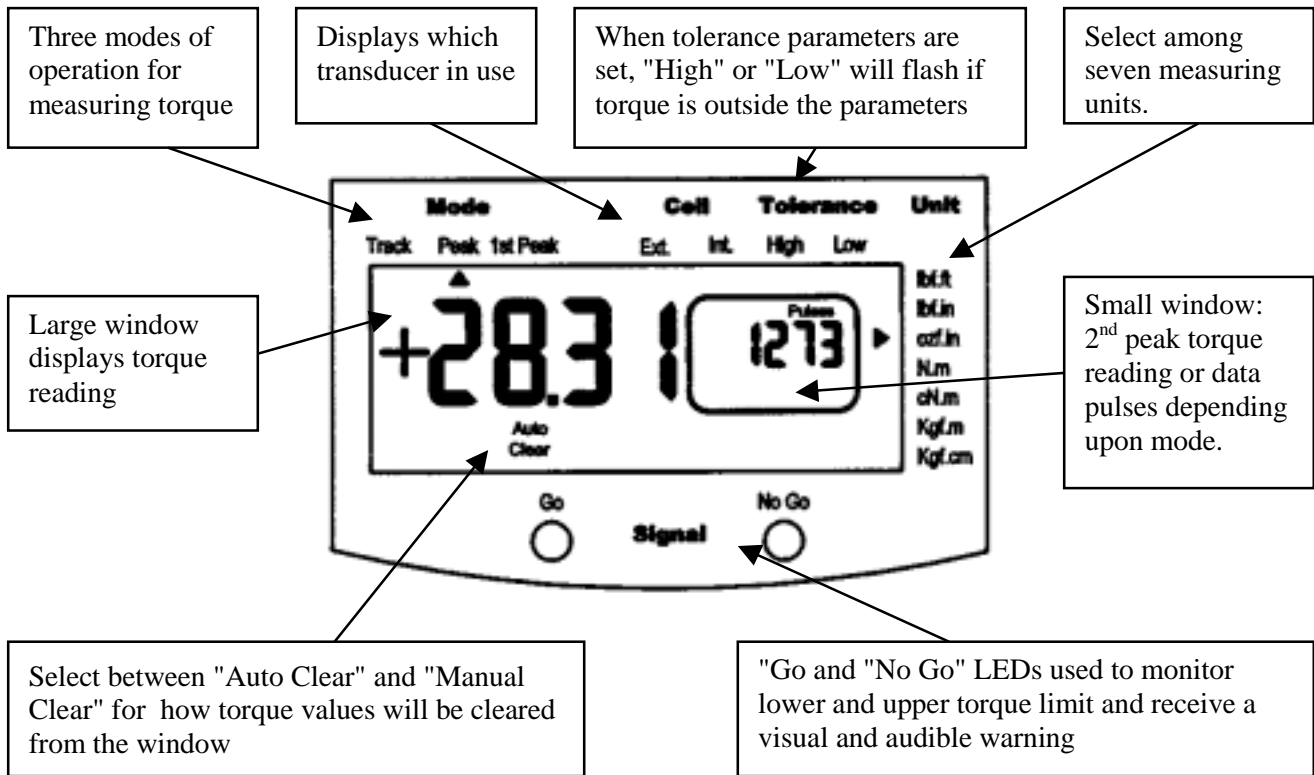
The following diagram and Table define the pins of the I/O connectors for the TorqueLab®.



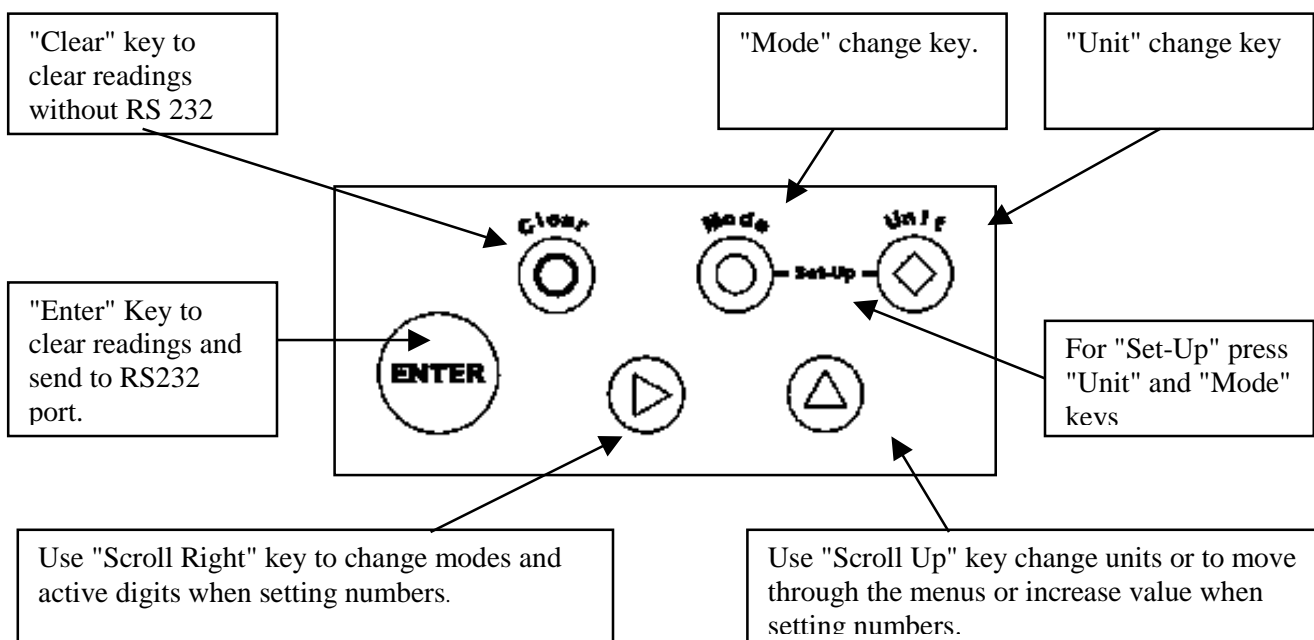
RS-232 Connector		Transducer Connector	
Pin	Signal	Pin	Signal
1	Not Used	1	+ Signal
2	Reserved	2	- Signal
3	TXD	3	Excitation -
4	Not Used	4	Excitation +
5	Ground	5	Reserved
6	Not Used	6	Signal from Brush-Less
		7	Reserved
		8	Reserved
		9	Analog Ground
		10	+ V for Brush-Less Transducer

# USER INTERFACE

## DISPLAY



## KEYPAD



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## CLEARING THE DISPLAY

### Hysteresis

All transducers can experience some drift in the “zero” or “zero offset” point when shifting torque from clockwise to counter clockwise or vice versa. This is a normal characteristic of transducers due to a hysteresis or lack of “retrace.” As a result, for the most accurate readings, you should preload the transducer in the direction of measurement. Proceed as follows:

- Apply torque to the transducer in the direction of usage, clockwise or counter clockwise.
- Unload the transducer and wait for 30 seconds.
- Proceed to taking torque measurements.

### CLEAR KEY

The *CLEAR* key function is to “Clear” readings from the display and reset all values to zero. Clearing the display should always be performed before taking new readings.

**Note:** If the CLEAR key does not clear the display to zero, it may be an indication of damaged or overtorqued transducer. In this case you should contact the manufacturer.

### ENTER KEY

The *ENTER* key function is used for the validation of user selection during set-ups. The other function is to send data to the RS 232 port for printing or downloading displayed readings. After sending the data, the readings will automatically be cleared from the display thus the *ENTER* key can also be used to clear the display (see *Printing / Downloading Data* section).

**Notes:** When in *AUTO CLEAR* mode this process occurs automatically.  
The CLEAR function will also prevent data from being printed or downloaded (see *Printing / Downloading Data* section).

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## SLEEP MODE

The TorqueLab® features a built-in sleep mode function to save power when not in use. If there is no activity for 5 minutes, such as key press or no torque input, the analyzer will display **SLP**. Any key press will restore the analyzer to operational mode and restore power to any components that were shut down.

## GO / NO GO SIGNAL

The TorqueLab® is equipped with visual (green and red LED) and audible (buzzer) signals to provide the user instant torque status during operation. These signals operate in conjunction with the transducer's capacity and tolerance settings.

Torque Range	Signal	Status
High Capacity	Buzzer	Long Beep
	No Go	On
	Go	Off
	High Tol. Icon	On
	Low Tol. Icon	Off
High Tolerance	Buzzer	Short Beep
	No Go	Flashing
	Go	Off
	High Tol. Icon	Flashing
	Low Tol. Icon	Off
Low Tolerance	Buzzer	Short Beep
	No Go	Off
	Go	On
	High Tol. Icon	Off
	Low Tol. Icon	Off
Low Capacity	Buzzer	Off
	No Go	Flashing
	Go	Off
	High Tol. Icon	Off
	Low Tol. Icon	Flashing
Zero	Buzzer	Off
	No Go	On
	Go	Off
	High Tol. Icon	Off
	Low Tol. Icon	On
Zero	N/A	N/A

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## PRINTING / DOWNLOADING DATA

Data output is available, from the TorqueLab®, via the RS232 port. The analyzer only outputs displayed torque values. These values can be directly printed by any serial printer or downloaded into a computer.

The data format is 9600 BPS, 8 data bits, No Parity, 1 Stop Bit and no flow control.

### How to send torque values to the RS 232

- **When in *Track* mode**, the analyzer will automatically and continuously output the values through its serial port. This provides a “real time” torque output desired for some applications, but remember that in track mode will output torque values every 128 msec.
- **When in *Peak* or *1<sup>st</sup> Peak* mode and *Auto Clear* is set**, the analyzer will automatically output the values through its serial port before the display is cleared. Only the captured torque value can be printed or downloaded.
- **When in *Peak* or *1<sup>st</sup> Peak* mode and *Manual Clear* is set**, the user needs to press the *Enter* key to send the data through the serial port. If you do not want to send a specific value, use the *Clear* key to prevent downloading or printing of that value.

If you desire to download and display data on a computer, you can do so by using any serial communications software. One such program is Hyperterminal accessory, standard to Windows 95, NT or Windows 98. A description of operation with Windows 95, NT, or Windows 98 is given below. This procedure may vary slightly depending on the Windows software version being used. This is just an example, if you have problems consult Windows Help files.

- Select “Start”, “Programs”, “Accessories”, and then “Hyperterminal”. Then select HyperTerminal.exe.
- When the program starts you will be asked to choose an icon and assign a name. Choose any icon you prefer and choose a name such as “Data\_Aq”, for example. Click OK.
- The “Connect To” screen will appear. Just click OK, or if you want to change the COM port, select the appropriate COM port and click OK.
- The “COM2 Properties” screen will appear. Choose 9600 Bits per second. Leave the default values for character format (8 Data Bits, Parity – None, and Stop Bits 1). Change the Flow Control to “None”. Click OK.
- Click “File” on the Menu Bar and select “Properties”. When the “Data\_Aq Properties” screen appears choose the “Settings” tab and then choose “ASCII setup”. In “ASCII receiving” check the box “Append line feeds to incoming line ends”. Click OK then OK again.

Hyperterminal is now configured to allow torque values to be displayed on your computer screen. If you want to capture data to a file as it is downloaded, you must enable the file capture option. To capture to a file, select "Transfer" from the Menu Bar and select "Capture Text". Then select the folder and file you wish to save it as.

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## MODE SELECTION

The TorqueLab® Analyzer offers three different modes for displaying torque information during operation. The user will determine which mode is best suited for the application.

Key sequence to change mode:

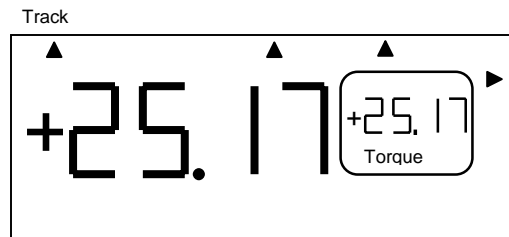
- **Mode**
- **Scroll Right**
- **Enter**

### TRACK

This mode constantly tracks increasing or decreasing torque variations. The small window displays the same torque values as the large characters, but at a slower rate to better assimilate these variations.

Use this mode to monitor varying torque on motors and machinery. Also for calibrating and testing Dial type wrenches on a loading bench.

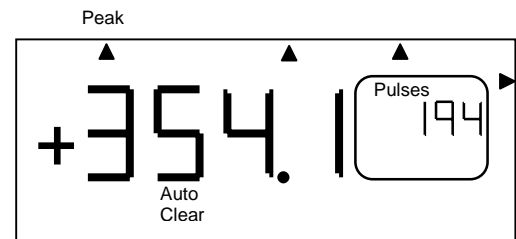
**Notes:** The *Auto/Manual Clear* function will be disabled during this mode.



### PEAK

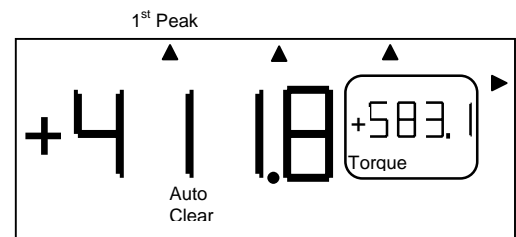
The display retains the highest torque applied. The small window displays the number of pulses (peaks) generated during operation.

Use this mode during calibration or testing of any hand type torque wrench (dial, beam, and screwdriver), as well as power tools.



### 1<sup>ST</sup> PEAK

The display holds the first detected torque peak applied. The small window displays further increasing torque inputs.



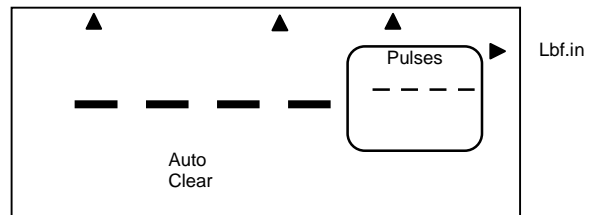
This function is primarily used for testing and calibrating click type mechanical torque wrenches. The TorqueLab® captures the point where the wrench clicks. This peak may be used for operator training on correct use of the wrench. Always apply torque smoothly to avoid false first peak readings.

## UNIT SELECTION

The TorqueLab® analyzer supports seven units of torque measurement, lbf.ft, lbf.in, ozf.in, N.m, cN.m, Kgf.m, and kgf.cm. However certain torque values cannot be converted into other units due to display resolution, in these cases the TorqueLab® will warn you by displaying “Err”.

Key sequence to change units:

- **Units**
- **Scroll Up**
- **Enter**



## Torque Conversion Chart

Units to Convert	American			S.I.			Metric		
	ozf.in	lbf.in	lbf.ft	mN.m	cN.m	N.m	gf.cm	kgf.cm	kgf.m
mN.m	0.142	0.009	0.0007	1	0.1	0.001	10.2	0.01	0.0001
cN.m	1.416	0.088	0.007	10	1	0.01	102	0.102	0.001
N.m	141.6	8.851	0.738	1000	100	1	10,197	10.2	0.102
ozf.in	1	0.0625	0.005	7.062	0.706	0.007	72	0.072	0.0007
lbf.in	16	1	0.083	113	11.3	0.113	1152.1	1.152	0.0115
lbf.ft	192	12	1	1356	135.6	1.356	13,826	13.83	0.138
gf.cm	0.014	0.0009	0.00007	0.098	0.01	0.0001	1	0.001	0.00001
kgf.cm	13.89	0.868	0.072	98.07	9.807	0.098	1000	1	0.01
kgf.m	1389	86.8	7.233	9807	980.7	9.807	100,000	100	1

# SET-UP MENU

The following is a quick reference for the *Set-Up* menu structure. If lost within the menu, you can turn the analyzer *OFF* and *ON* at any time.

Key Function:

**Set-Up (Mode + Unit)** to access the menu  
**Scroll Up** to navigate through the menu options or to select values  
**Scroll Right** to locate values  
**Enter** to validate selections

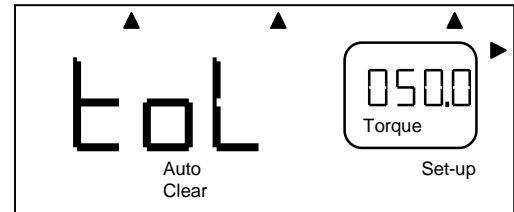
Tolerance	<b>toL</b>	(Low Torque Threshold) (High Torque Threshold)
Clear	<b>CLr</b>	<b>Manual Clear</b> <b>Auto Clear</b> (Time Threshold)
Filter	<b>FIL.1</b> <b>FIL.2</b> <b>FIL.3</b> <b>FIL.4</b>	( 500 Hz) (1000 Hz) (1500 Hz) (3000 Hz)
Cell	<b>C.00</b> <b>C.01</b> <i>Through</i> <b>C.09</b>	(Internal) (External) (External)
Calibration	<b>CAL</b>	<b>Code</b> (2003) <b>CAP</b> (Unit) <b>H.CAP</b> (Maximum torque) <b>L.CAP</b> (Minimum torque) <b>r.o.</b> (mV.V) <b>ACCU</b> (Fast) (True)
Access Code		
Capacity unit		
High Capacity		
Low Capacity		
Rated Output		
Calibration Method		
True Calibration Points		---- (-P0) ---- (-P1) ---- (-P2) ---- (-P3) ---- (+P0) ---- (+P1) ---- (+P2) ---- (+P3)
Exit Calibration Menu		---- (Out)
Software Revision	<b>SOft</b>	(r #)
Exit Set-Up Menu	<b>Out</b>	

## TOLERANCE SET-UP

The Tolerance parameters control the Go and No-Go signal response (see Go / No Go Signal section). The user sets a lower and upper torque thresholds to get a visual and audible warning signals when these limits are reached or breached during operation. This function is primarily used for safety and quality control.

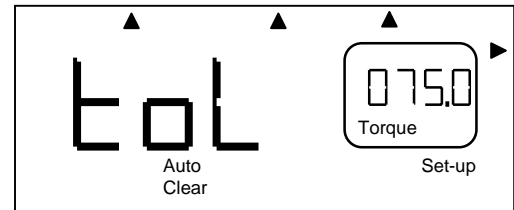
### Low Tolerance

The display will prompt to the low tolerance setting. Use the *Scroll Up* and *Scroll Right* keys to select a torque value, then press *Enter* to validate the selection.



### High Tolerance

The user is then prompted to enter the upper tolerance. Use the same key process as described above.



**Note:** The Tolerance values decimal point will be at a fixed position. The decimal location is predetermined by the transducer's capacity during the calibration process. If the Go / No Go Signals are unwanted, the user can disable the function by setting the Tolerance values to zero.

**Note:** The Tolerance values must be set using the calibrated set of units. If you wish to use another set of units, use the conversion chart on page 12 to convert torque values.

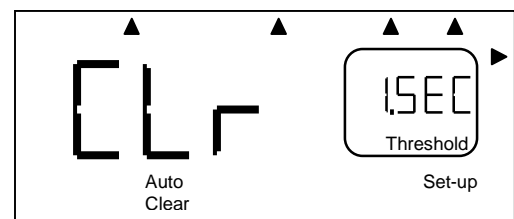
## CLEAR SET-UP

This function controls the method of clearing the display of torque readings.

### Auto Clear

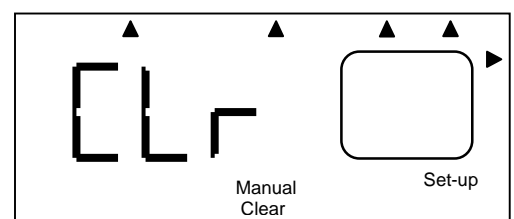
When *Auto Clear* is selected, the torque values, during operation, will automatically be cleared from the display.

The user can set the time threshold to control how long the values should be displayed before clearing.



### Manual Clear

When *Manual Clear* is selected, the torque values during operation will indefinitely be display until the user presses the *Clear* key.



**Note:** When in *Auto Clear* is selected, the analyzer will automatically send the torque value to the RS 232 port before clearing (see *Printing / Downloading Data* section).

## FILTER SET-UP

The TorqueLab® offers a selection of four different *Low Pass Filters*. These filters are used to eliminate unwanted noise, most often occurring during operation of power tools.

The process of converting dynamic torque into an electronic signal using a transducer may result in a distorted torque value due to undesirable frequencies. Different tools or applications will generate different unwanted signals, for that reason no single filter can be specified. Our experience has shown that a 1500 Hz filter should work with most applications, however we recommend you, testing with different filters before validating torque values.

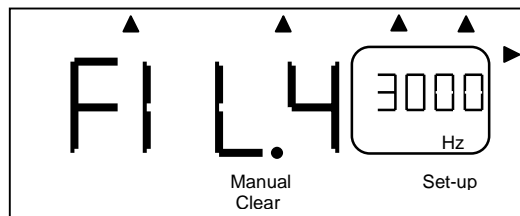
The filter selection is accessed through the *Set-Up* menu.

**FIL 1 = 500 Hz**

**FIL 2 = 1000 Hz**

**FIL 3 = 1500 Hz**

**FIL 4 = 3000 Hz**

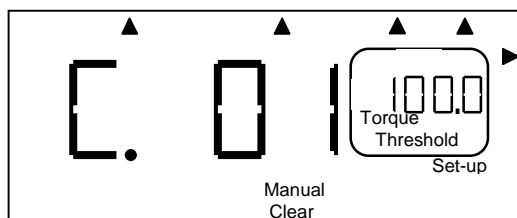


## CELL SET-UP

This option allows the user to select the cell (transducer) to be used during operation. Although the TorqueLab® features one internal cell, this analyzer can memorize and recall up to 9 external cells. The internal cell is always labeled *C.00*. Calibration data are saved under the corresponding *Cell #*.

The *Cell* selection is accessed through the *Set-Up* menu.

You can also access this option to review current settings for individual cells. The low capacity, high capacity, mV/V and calibration method will be displayed alternately in the small window.



**Note:** A value of "3333" in the small window, indicates that the cell has never been programmed and can be available for calibration.

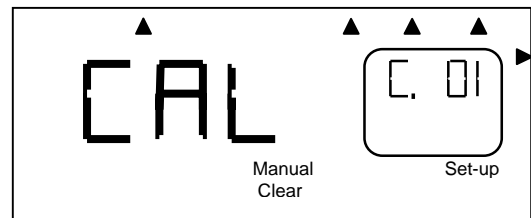
## CALIBRATION SET-UP

Equipment and methods used during the calibration process of any transducers or analyzers are critical and can dramatically affect the quality, accuracy and performance of your analyzer. Maintain all your calibration equipment in top condition, and always perform the calibration process in a controlled environment.

### Key sequence to access the Calibration Set-Up:

**Set-Up** (Mode + Unit)  
**Scroll Up** until you display CAL  
**Enter** to access the program

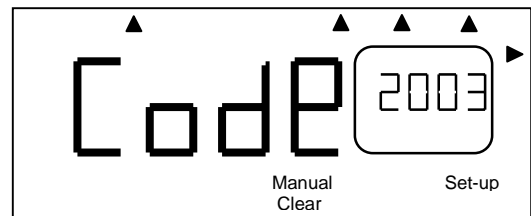
**Note:** Make sure the Cell number corresponds to the transducer you are intending to calibrate. See Cell Set-Up section if you need to change number.



### ACCESS CODE

The Access Code is "2003", this can not be changed. In order to prevent tempering or deletion of calibration data, we recommend releasing the code number to limited personnel.

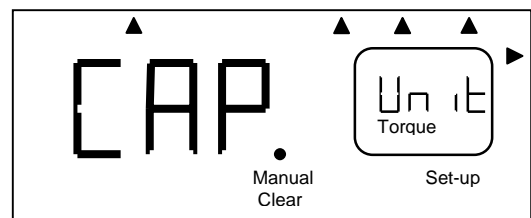
**Scroll Up** to change the number  
**Enter** to validate



### CAPACITY UNIT

This unit of measurement corresponds to the transducer to be calibrated.

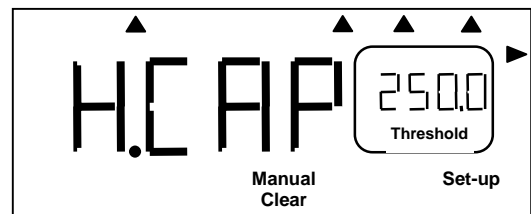
**Scroll Up** to change units  
**Enter** to validate



### HIGH CAPACITY

This value is the transducer's maximum capacity provided by the manufacturer. Always start with the left most digit.

**Scroll Up** to update digit value  
**Scroll Right** to select digit to be updated  
**Enter** to validate



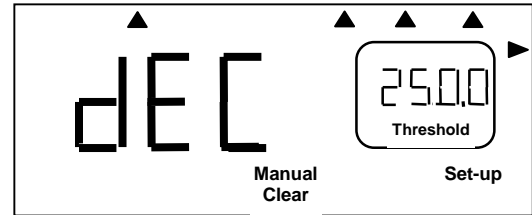
## CALIBRATION SET-UP

*Continues...*

### DECIMAL POINT

*Prompts to decimal point selection*

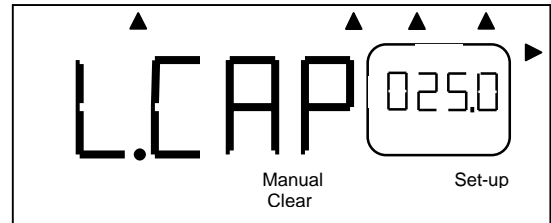
**Scroll Right** to change decimal point location  
**Enter** to validate



### LOW CAPACITY

This value is the transducer's minimum capacity provided by the manufacturer.

**Scroll Up** to change the number  
**Scroll Right** to change digit  
**Enter** to validate

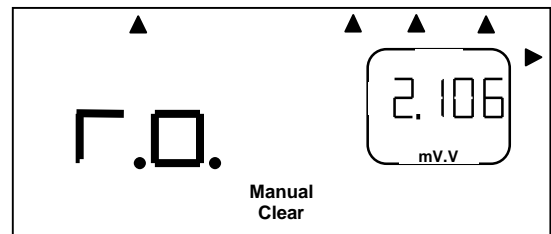


**Note:** The decimal point is now at a fixed location, previously determined during the HIGH CAPACITY set-up.

### RATED OUTPUT

The TorqueLab® can accept a rated output ranging from 1.700 to 2.300 mV/V and 5 V (Brushless transducers). This value is provided by the manufacturer and needs to be known if performing a Fast Calibration. If you intend to do a True Calibration you can enter 2.000 mV/V

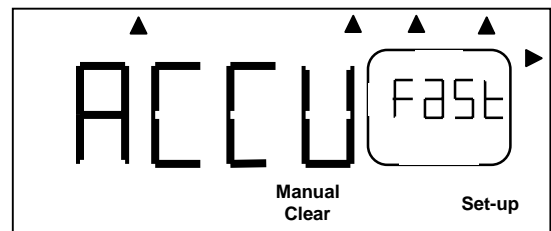
**Scroll Up** to change the number  
**Scroll Right** to change digit  
**Enter** to validate



### FAST CALIBRATION

This method of calibration is based on a two-point (zero and full scale) calibration system, which doesn't compensate for transducers nonlinearly. It's a lesser accurate method than the True calibration.

**Scroll Up** to change the method  
**Enter** to validate



**Note:** When choosing this method, the calibration program will be completed and the display will return to the operating mode.

## CALIBRATION SET-UP

*Continues...*

### TRUE CALIBRATION

This method is based on an eight-point calibration system to compensate for a transducers nonlinearity.

**Scroll Up** to change the method  
**Enter** to validate

*Prompts to the dead weight calibration program*

#### -P0 Counter Clockwise offset point.

1. Load the transducer to maximum capacity.
2. Unload the transducer and wait for 30 sec.
3. Repeat steps 1 and 2 three times to exercise the transducer.
4. Press **Enter** to accept the offset, if any.

**Note:** Do not zero the display if a value is present. The analyzer needs this offset, if any, for programming purpose.

#### -P1 Counter Clockwise point (10% FS)

5. Load the transducer to 10 % of maximum capacity.
6. Use the **Scroll Up** and **Scroll Right** keys to adjust the displayed value to match the actual torque applied.
7. Press **Enter** to accept  $-P1$ .

#### -P2 Counter Clockwise point (50% FS)

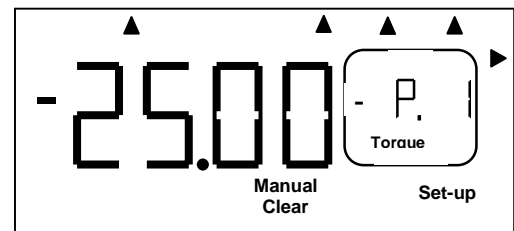
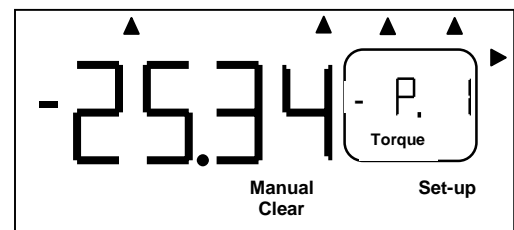
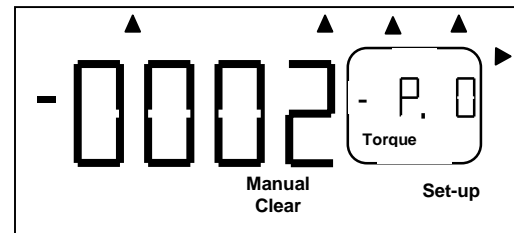
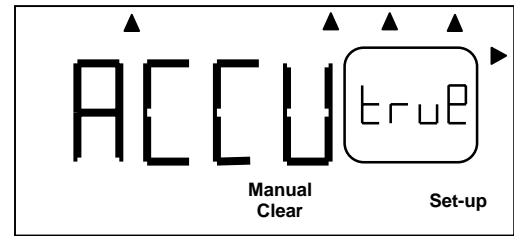
8. Load the transducer to 50 % of maximum capacity.
9. Use the **Scroll Up** and **Scroll Right** keys to adjust the displayed value to match the actual torque applied.
10. Press **Enter** to accept  $-P2$ .

#### -P3 Counter Clockwise point (100% FS)

11. Load the transducer to maximum capacity.
12. Use the **Scroll Up** and **Scroll Right** keys to adjust the displayed value to match the actual torque applied.
13. Press **Enter** to accept  $-P3$ .

The program will then prompt for the Clockwise Calibration Points, this will require the same process as described above.

Once the process is completed, exit the Calibration Set-Up by pressing **Enter** when *Out* is displayed inside the large window.



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## APPLICATIONS

### Impulse and Power Tool Testing

*Always use a quality joint rate simulator (run down adapter) when testing power tools in a simulated application. Use the peak mode. The Peak mode is designed to meet the demanding frequency requirements for testing dynamic torque applications.*

Impulse tools have become prevalent throughout the industry. The advantages of ergonomics and functionality of impulse tools are well known. It is also well known that, due to the lack of standards in the industry, all impulse tools are not created equal.

The frequency at which a pulse tool pulses has not been standardized. Some are fast and some are relatively slow. Some tools create sharp torque vs. time peaks and some create flat peaks. In addition to this, the characteristics of the joint (soft, medium or hard) changes the output of the tool, so a tool that pulses one way on one type of joint may pulse differently on the next. To further complicate things, each brand of tool will act different given the same joint characteristics. And to make things worse, variations in air pressure to the tool will also make the tool behave differently. The good news is that individual impulse tools repeat under the same conditions (within reasonable limits). So creating the same conditions as the application under test is important.

Due to these non-tester related variations, it is difficult, if not impossible, to create a torque tester that will be out-of-the-box accurate for all impulse tools and all joint conditions. This is not to say that the tester is not accurate, only that the conditions during test may not simulate the conditions during the application, and due to the variance in pulse tools, the tester may show a different torque value than what is actually happening at the application.

In order to minimize the effects of these variances, the application must be analyzed so it can be simulated properly on the torque tester with a joint simulator.

**The TorqueLab®, and the Mountz family of transducers have been designed to minimize these variations and are well suited for both the analysis of the application joint and the testing of the impulse tool.**

**You can test pulse and power tools in different ways:**

1. Preferred Method (and quickest): Use the TorqueLab® in Peak Mode with a rotary transducer between the pulse tool and the actual application. This is a widely accepted way to test since you are using the actual joint as the test station. What the TorqueLab® reads is what the fastener “sees”. Caution: Variances in tool performance may occur do to the addition of the rotary transducer.
2. Simulated Method: Always use a quality joint rate simulator (run down adapter) when testing power tools in a simulated application. Use Joint rate and Breakaway methods to obtain most accurate torque readings in a simulated rundown.

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## APPLICATIONS

### **Calibrating Torque Wrenches & Hand Screwdrivers**

To calibrate torque wrenches that are outside the range of the TorqueLab®, use a bench-mounted transducer (BMX) or mount a TWX or SMX transducer in a fixture. Mount the transducer directly to a bench and apply the torque directly to the wrench by hand, or attach the transducer to a Mountz mechanical loader and isolate the wrench from the operator, reducing the possibility of operator errors (highly recommended).

For manual calibration of click type wrenches use the First Peak mode on the TorqueLab® so the tester will display the point at which the wrench “clicked” (First Peak) and the point when the operator stopped pulling (Second Peak shown in the torque window). In First Peak Mode the Torque Lab® will disregard any further input once the wrench has clicked. Make sure you apply the torque slowly and smoothly (try not to shake or you may induce a false first peak). To avoid this problem, calibrate click wrenches in Peak mode on a mechanical loader.

For dial type, screwdrivers and cam- over torque wrenches put the Torque Lab® in Peak mode.

You can also enter the wrench accuracy tolerance in the Torque Lab®'s Tolerance settings making it easier to determine a Go or No/Go condition.