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Operating and Service Manual 3000-Series **Exacta**® 2 Digital Torque Wrenches (All Models)



The 3000-Series **Exacta**® 2 Digital Torque Wrenches are designed for use in applications where accuracy, control and recording of the torque data are of high importance. They are the electromechanical tool portion of an integrated system that includes Exacta Plus software from Sturtevant Richmond.

Safety

- Always wear appropriate safety equipment when using this or any other hand tool.
- Never use the tool for other than its designed purpose.
- Never use the tool outside of its rated capacity.

Batteries and Battery Chargers

These tools were designed to use only and solely NiMH batteries having specific dimensions and operating characteristics. Within NAFTA countries, the only batteries that are to be used with 3000-Series **Exacta**® 2 digital torque wrenches are those immediately below.

<u>P/N</u>	<u>Model</u>	<u>Description</u>
21259	Charger & 4 AA	NiMH 4 AA NiMH 2200 mAh batteries & charger, NAFTA only
21258	4 AA NiMH	Batteries 2500 mAh NiMH batteries, spare

Battery Caution!

- Use of any other NiMH batteries may cause inaccurate torque readings.
- Use of any other NiMH batteries may damage the tool and may void the warranty.
- Use of any Alkaline battery **will** damage the tool and **will** void the warranty.

In countries outside of NAFTA, go to the S/R website page given below to select the correct batteries for use with the 3000-Series **Exacta**® 2 digital torque wrenches. The same cautions listed above apply to all of the 3000-Series **Exacta**® 2 digital torque wrenches, regardless of the country in which the tool is purchased and used. The URL for the needed information is:

<http://www.srtorque.com/batteries.html>

Battery Installation

At the end of the grip is a battery cap that covers the battery compartment inside the grip. To install the batteries:

1. Insure that the correct batteries are those to be used, and that they are completely charged. Follow the instructions that come with the charger to charge the batteries before installing them.
2. The battery cap is screwed into an internal thread inside the grip. Remove the battery cap by unscrewing it from the grip (CCW).
3. The battery compartment will be exposed. There are two labels inside the compartment. Install the batteries in the locations given by the labels and maintaining the battery orientation shown by the labels and in the photo here.
4. Reinstall the battery cap. Tighten the cap only to snug; do not overtighten the cap.



The 3000-Series Exacta® 2 has a Low Battery Indicator on the display. If the battery voltage falls below 4.1 volts, a battery icon will appear in the upper right-hand section of the display, the “BAD” icon will illuminate and “bAtt” will be displayed in the main display. When this occurs it is time to replace the batteries. Wrench will continue to operate until the battery voltage drops below 4.0 volts. At that time the display will show the message “bAtt” and the ability to operate the wrench will be lost. Readings stored prior to that point will remain in memory. The tool will remain inoperable until the batteries have been replaced with charged batteries.

Interchangeable Heads

The 3000-Series **Exacta® 2** digital torque wrenches of 150 foot-pound capacity and below use the S/R dovetail system. The tools are calibrated for use with S/R Interchangeable Heads having a $1 \frac{7}{16}$ ” Common Centerline. Any S/R heads with this centerline length may be used without affecting torque accuracy. If an interchangeable head of a different centerline length is to be used, the tool must be recalibrated with that head (or one of the same centerline length) before the tool is used.

The 400 foot-pound capacity tool is calibrated for interchangeable heads having a Common Centerline length of $3 \frac{7}{8}$ ”. When used with heads having the same Common Centerline length, no recalibration is needed. If a head with a different Common Centerline length is to be used, the tool must be recalibrated before use with an interchangeable head of the same Common Centerline length as the one to be used.

3000-Series **Exacta® 2** digital torque wrenches of 250 foot-pound capacity and above (except 400 ft. lb.) use S/R slide pin ratchets. The ratchets should be disassembled and cleaned periodically. Ratchet renewal kits having the appropriate parts for each ratchet are available.

Power Switch, Serial Port and Cover

On the top of the electronics housing are the power switch and serial port for the tool. These are protected by a rubber that can be lifted to expose them for use. The cover should be closed at all times when access to the serial port and/or power switch is not immediately needed.

The tool power is enabled (power On) by sliding the switch away from the grip as shown here. Power to the tool is disabled (power Off) by sliding the power switch towards the grip.



The serial cable for the wrench connects to the round serial port that is also used to hold the cover in place. The cable should first be connected to the computer (9-pin connector) then to the tool (single-pin connector) when the tool is to communicate with the computer and software.

Display Elements

Text Indicators and Triangular Icons

There are four words of text above the LCD. Each of the words: Target, Residual, Peak, and Stored has a triangular icon underneath it along the top of the LCD. The icons are used in conjunction with the values in other areas of the display. Note: The display will vary slightly from the depiction here due to differences in the fonts used.

Target

When the triangular icon beneath this is illuminated, it means that the target value for the torque specification is displayed in the main section of the display. The target value is the midpoint between the minimum and maximum torque specification values.

Residual

When the triangular icon beneath this is illuminated, it means that the Residual mode is the current torque measurement mode.

Peak

When the triangular icon beneath this is illuminated, it means that the Peak mode is the current torque measurement mode.

Record

When the triangular icon beneath this is illuminated, it means that the specific record in the lower right-hand corner of the display is being reviewed and the torque for that record is the torque value currently displayed.



Unit of Measure Indicator

Available units of measure include inch-pounds, foot-pounds and Newton metres. The current unit of measure is displayed to the right of the main section of the display.

Main Section

The main section of the display is used to display a variety of information important to the current functioning of the tool. During normal use, the target torque or the current torque will be displayed, depending upon whether the tool is awaiting use or actually tightening a fastener. The triangular icons and text along the top indicate which value is being displayed.

Other Icons

There is a battery icon in the upper right-hand quadrant of the screen above the units of measure. This icon and other indications are used to warn the user when the battery voltage drops to a level where the batteries should be replaced.

There are two icons used in normal operating mode (during performance of a task) to provide a quality attribute indication for a just-completed fastener. The "OK" and "BAD" icons are located along the bottom of the display on the left side. When a torque application is completed and the final torque result is compared to the torque specification values for the task, an attribute evaluation is made and the appropriate icon is illuminated briefly.

Definitions

<i>Target</i>	A specific torque value: the midpoint between the minimum and maximum torque specification values for the task.
<i>Peak</i>	Mode of operation capturing the highest torque value in a single loading of the wrench.
<i>Residual</i>	Mode of operation for capturing the torque remaining on a previously-installed fastener. In this mode the tool captures the lowest point between two peaks; the peak torque to begin fastener motion (includes inertia) and the peak torque where force application stopped.
<i>Stored</i>	Mode of operation used to review torque values currently stored on the tool.
<i>Task</i>	A set of from 1 - 50 torque applications grouped together and sharing common unit of measure and torque value specification. Tasks are numbered from "00" to "50".
<i>Record</i>	A single torque application within a specific Task. Numbered from "00" to 50. Record 00 is designed to give the user the ability to use the specifications for the active task on a fastener without recording the result.
<i>UOM</i>	Currently active Unit of Measure for torque. IN.LB, FT.LB, Nm
<i>Clear Button</i>	Clear the current reading from the display and, if in a task or record other than "00", begin storing information at the current point.
<i>Select Button</i>	Used to enter, select, and exit various options on the tool itself.
<i>Up Button</i>	Used to move (increment) upwards among options and increment levels within a selected option.
<i>Down Button</i>	Used to move (decrement) downwards among options and increment levels within a selected option.
<i>Task 00</i>	A special task always available, even when specific tasks have been downloaded to the tool. When Task 00 is displayed, the tool functions as a torque wrench with no memory of the torques applied, similar to a beam or dial wrench. When there is no job on the tool, the default settings for the tool will be applied.
<i>Yellow Light</i>	Color (orange- yellow) projected onto display to indicate that the warning torque level has been reached during use and that the speed of force application should be slowed. Use of the LED color scheme is selectable in the software (active or inactive). Warns user that the torque specification is being approached. Used in all Tasks numbered 01 and above when record 01 and above are active. Not available in "Task 00" or "Record 00".
<i>Green Light</i>	Color projected onto display to indicate that the current torque is within the limits of the minimum and maximum torque specified for that Task. Use of the LED color scheme is selectable in the software (active or inactive). Active in all Tasks numbered greater than "00". Not available in "Task 00" or "Record 00".

Red Light Color projected onto display to indicate that the current torque exceeds the maximum torque specified for that Task. Use of the LED color scheme is selectable in the software (active or inactive). Active in all Tasks numbered greater than "00". Not available in "Task 00" or Record "00".

Keypad

The keypad to the right of the display has four buttons: Clear, Select, Up and Down.

Clear The Clear button is used to clear a reading from the tool and make that Task/Record combination the active combination for the next torque application. Example: The operator makes an error in tightening the fastener. The operator returns to the correct record within the task for that record, then presses the Clear button. This clears the display of the reading and displays the target torque, as though the operator were facing that fastener for the first time. The operator may then properly tighten the fastener and store the torque value for the retorque where the original value was stored.

Select The Select button is used to navigate among tasks. During normal (job loaded) operation, press the select button once to permit navigation among the tasks currently on the tool. Use the Up and Down buttons to navigate to the task to be performed. Press the Select button again to make that task the active task. Note that when so doing it is necessary to use the Up and Down buttons to navigate to the record of interest after the task has been selected.

Up Navigate among tasks and records. Increments count of displayed task or record by one.

Down Navigate among tasks and records. Decrements count of displayed task or record by one.

Display During Operation

Exacta® Plus uses a liquid crystal display and a buzzer to communicate. The display content is grouped into four categories: items displayed during startup when the power is turned on, items displayed during PC communications, items displayed during normal operation, and items displayed when results are being reviewed.

Items Displayed During Startup

1. The tool series number "3000" will be displayed in the center, and "r00N" in the Task and Record markings will be displayed for 1 - 2 seconds. "N" is the firmware revision number.
2. The tool capacity will be displayed in the center for 1 - 2 seconds.
3. Upon completion of the startup routine, what is displayed is dependent upon whether or not there are tasks in the memory of the tool

If no Tasks are in memory, the following will appear on the display:

Indicator for the Peak mode will be lit.

Indicator for Target will be lit.

IN.LB Unit Of Measure will be lit.

-000.0 will be displayed as the current torque value.

00 will be displayed for the Task number.

00 will be displayed for the Record number.

If one or more Tasks are in tool memory, the following will appear on the display:

Indicator for the active mode will be lit.

The indicator for the active Unit Of Measure will be lit.

The Target torque will be the displayed torque value.

The number of tasks in memory will be displayed in the Task section.

After startup the last task and record number worked on will be displayed. If the tool memory has been cleared, the task and record will each be "00".

Tool Use Without Job Download

The 3000-Series tools can be used to a limited extent without downloading a job. The tools have default factory settings of inch-pounds as the unit of measure, Peak as the mode of operation, and no data capture in memory. When no job has been downloaded, these default instructions are active.

The tool can be used to measure torque in inch-pounds, to observe the torque during the application, and to briefly (2-3 seconds) display the peak torque once it has been achieved. The data for the use will not be stored in memory and available for later use.

Connecting the Tool to a Computer and Using Exacta Plus Software

Use the supplied serial cable to connect the tool to the computer that has the Exacta Plus software installed.

1. Ensure that the computer has the power enabled and is operating.
2. Connect the 9-pin end of the supplied serial cable to the serial port of the computer.*
3. Ensure that power to the tool is disabled (Power Switch in Off position).
4. Connect the single-pin end of the cable to the serial port on the tool.
5. Enable power on the tool.
6. Start the Exacta Plus software.**

* If the computer has a USB port but does not have a 9-pin serial port then a powered USB to RS-232 converter will be needed. S/R offers one as P/N 10456.

** The Exacta Plus software may be started before this step if desired. There is no need to close the software before connecting the tool if the software is running on the computer.

When the tool is connected to the computer and the Exacta Plus software is being used to communicate with it, avoid touching the buttons on the tool and do not disable the power. Allow the software to perform the communications and complete them before taking further action with the tool.

The software will perform all of the functions required to assure communication with the tool as long as the tool is properly connected, the power is enabled, and the correct communication settings for the computer and software have been selected and are used. If there is a communication problem check the communication setting first; instructions for this are provided with the software. If there are still problems, it is likely that the connectors on the cable are not properly seated at one end or the other. Check the cable connections to determine which is incorrect or incomplete and correct the problem with the connection.

During the download the display will update as each task is downloaded. The displayed values will include the mode of operation, unit of measure and target (midpoint between minimum and maximum specifications) as the task is received and stored. When the download is complete, the information pertinent to the last task downloaded will be on the display.

Once a job has been downloaded from the software to the tool and the download has been confirmed as successful by the software, close the active communication window(s) on the computer. The tool can now be disconnected from the cable. The same applies when uploading data on a job to the computer.

Normal Operation

When the download was completed, the information on the last task received in the download is on the display. If there is more than one task in the job it is necessary to make the first task to be performed the active task.

- To navigate to the desired task, press the Select button one time. The word “SEt” will appear in the main section of the display. The task number of the last task downloaded will be in the Task section display.
- Use the down arrow to scroll through the task numbers until the desired task number appears.
- Press the SEt button a second time to make that the active task. The display will show the unit of measure, mode and target value for this task.
- The record number will be “00”. To change the record, press the Up button one time to go to the “01” record. Once this is displayed, the tool can be used and recording will start at the first record.

As you start applying torque to the first fastener, the main section of the display will change from the target torque to the current torque value. When you reach the Warning Torque for the task, an LED will backlight the screen and light the lens with a yellow-orange light to alert you that you are approaching the specified torque. When the minimum torque specification is achieved, the illumination will change from yellow-orange to bright green, and the beeper will emit five rapid pulses.

Stop the force application and remove the tool from the fastener. The torque for that fastener and the task and record number for it will remain on the screen for three seconds. The tool will then turn off the LED and index to the next fastener in the task (if more than one). This inform/warn/record/inform/index cycle will repeat until all of the fastening records for that task have been obtained.

Once the last fastener in a task has been completed, the information will be displayed normally, then the screen will display “SEt” in the main section.

Use the Up arrow key to go to the next task in the sequence. When the desired task is displayed, press the Select button again to make this the active task. The tool will be in the “00” record; press the Up button to go to the first fastener in the task.

At any time when the tool is not applying torque you can leave the current task and move to a different task by using the Select button. At the new task you can use the tool in the “00” mode or you can select the fastener(s) in the task to be tightened and use the tool normally.

Correcting an Error

If you make an error in a torque application and wish to correct it and the record for that fastener, this can be achieved easily. There is a slightly different method to be used if the torque was too low than if it was too high.

If the torque was too low:

1. Use the Select, Up and Down buttons to navigate to the applicable task and record.
2. When the correct record is displayed, press the Clear button.
3. Use the tool to apply the correct torque. This will store the new data where the old data was. You can then navigate to the next task and record to be worked on.

If the torque was too high:

1. Use the Select, Up and Down buttons to navigate to the “00” record for that task.
2. Loosen the overtorqued item.
3. Use the Select, Up and Down buttons to navigate to the applicable task and record.
4. When the correct record is displayed, press the Clear button.
5. Use the tool to apply the correct torque. This will store the new data where the old data was. You can then navigate to the next task and record to be worked on.

Uploading Data

To upload data, connect the serial cable from the computer to the tool and use the software to perform the upload function. If communication errors are encountered, check the security of the cable connections and the computer communication settings.

Communication Default Settings

The default settings for serial communications are: 9600 Baud, 1 Start Bit, 8 Data Bits, 1 Stop Bit.

Calibration

The calibration process for the 3000-Series **Exacta**[®] **2** tools has three sub-processes. The first is testing the tool to find the “as found” condition. If the tool is out of calibration, then two subsequent processes are performed; calibration adjustment to bring the tool into calibration, and subsequent repetition of tool testing to assure that the adjustments were effective and the results are valid. This process addresses only the adjustment, not pre- and post-adjustment testing.

We strongly recommend that when performing the calibration process a torque tester of not less than 0.25% Indicated Value Accuracy be used, and that it be used in conjunction with a mechanical loader to obtain proper loading of the tool. We have designed these tools to be as hand-position insensitive as we can within other constraints, but the use of a mechanical loader is still recommended. The load applied during testing must be at the loading point on the grip indicated by the plain ring at the middle of the grip.

It is imperative that when calibrating and testing one of the tools having the S/R dovetail that the calibration be performed with an interchangeable head having the same Common Centerline Length as the head the tool will be used with. Changing the Common Centerline Length does change the readings and using the incorrect head will result in torque inaccuracy.

We strongly recommend that the tool be temperature stabilized before testing, and that fresh batteries be used during the procedure to assure that the tool does not suffer a loss of battery power during the process.

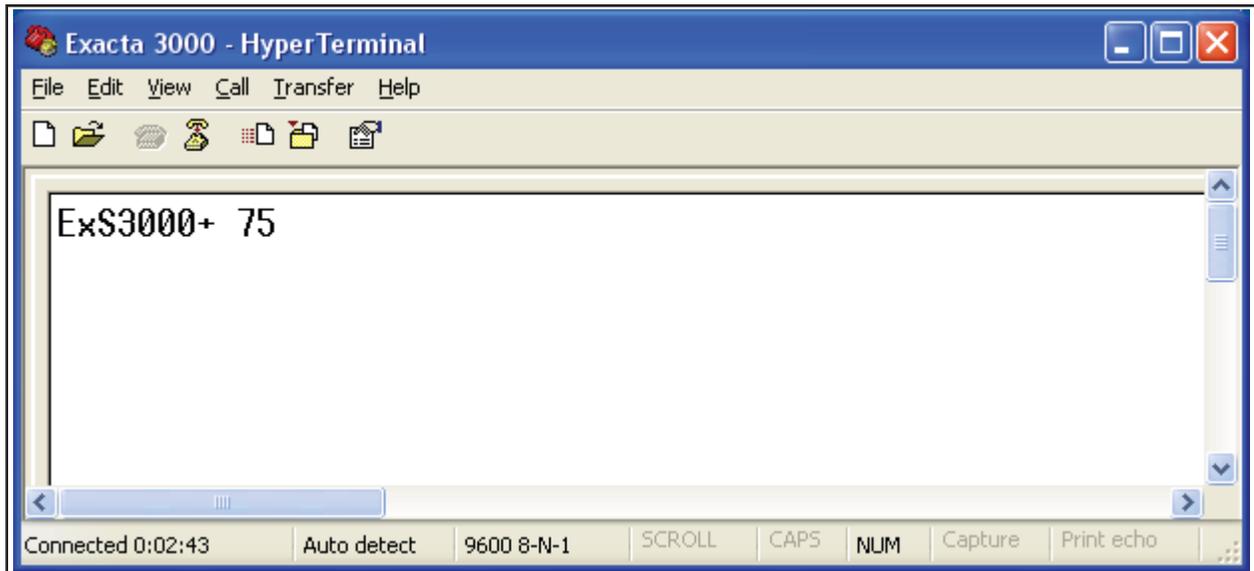
This section of this document presents the information required to make adjustments when the tool is found to be out of tolerance.

Needed items (in addition to tester and loader):

- A computer with a serial port and Hyperterminal software
- The serial cable supplied with the torque wrench

Setup for Adjustment

1. Ensure the computer is operating and that tool power is disabled (off).
2. Connect the serial cable to the serial port on the computer.
3. Connect the single-pin connector on the cable to the serial port on the tool.
4. Start the Hyperterminal software on the computer. Note: Most versions of Microsoft Windows include Hyperterminal software. Other terminal emulation software programs will also work for this procedure.



5. Set the communication protocols within Hyperterminal to the following settings:
 - Baud Rate = 9600 baud (tool default baud rate at startup)
 - Data bits = 8
 - Stop bit = 1
 - Parity = None
 - Flow Control = none
6. Ensure that there is no torque load on the tool. Enable power to the tool and allow it to complete the starting processes. Communication with the computer will be established and the tool will send the firmware version and model information to the computer. In Hyperterminal, the information will appear approximately as it does in the next image.
7. Type the diagnostic “D” Command into the terminal and press <enter>. The Terminal display will display “DiaOn”. You are now in diagnostic mode.
8. Type the M <enter>. The capacity of the tool should be seen on the display.
9. To enter the Calibration process, press the ‘Select’ button on the tool keypad.

Calibration Procedure Keypad Functions

- Clear button – Restarts calibration process at Cal point CW 0.
- Up Arrow – Selects calibration point to calibrate. Note: If pressed and held, the percent cal point will be displayed. Upon release the tool will display:
 - If under 1% of tool capacity the target torque value the cal point will be displayed.
 - If over 1% of the tool capacity, the current torque value will be displayed.
- Down arrow – Saves the new cal point and recalculates the current torque value.
- Select button – Not used during this process

Tool Display Note

- At this point the tool LCD should be displaying “0” in the lower right corner of the LCD display.
- The tool display will use both the main display and the lower right-hand segment to show key information needed during these processes.

Procedure - Calibration Adjustment

1. Install drive square on torque tester. Place wrench onto torque tester. Apply three 100% CW FS loads to ExS 3xxx wrench. See Pages 14 - 16 of this document for correct loads.
2. Remove the torque load from wrench. Remove wrench from tester, and hold in vertical position. Press DOWN arrow key to save the zero setting. Replace wrench on tester.
3. Press the Up arrow key until 100 appears in the lower right corner of the LCD display. Apply 100% CW FS load to the unit. When exactly 100% CW FS torque is applied, press the DOWN arrow key. Unload the tool.
4. Press the Up arrow key until 90 appears in the lower right corner of the LCD display. Apply 90% CW FS load to the unit. When exactly 90% CW FS torque is applied, press the DOWN arrow key. Unload the tool.
5. Press the Up arrow key until 80 appears in the lower right corner of the LCD display. Apply 80% CW FS load to the unit. When exactly 80% CW FS torque is applied, press the DOWN arrow key. Unload the tool.
6. Press the Up arrow key until 70 appears in the lower right corner of the LCD display. Apply 70% CW FS load to the unit. When exactly 70% CW FS torque is applied, press the DOWN arrow key. Unload the tool.
7. Press the Up arrow key until 60 appears in the lower right corner of the LCD display. Apply 60% CW FS load to the unit. When exactly 60% CW FS torque is applied, press the DOWN arrow key. Unload the tool.
8. Press the Up arrow key until 50 appears in the lower right corner of the LCD display. Apply 50% CW FS load to the unit. When exactly 50% CW FS torque is applied, press the DOWN arrow key. Unload the tool.
9. Press the Up arrow key until 40 appears in the lower right corner of the LCD display. Apply 40% CW FS load to the unit. When exactly 40% CW FS torque is applied, press the DOWN arrow key. Unload the tool.
10. Press the Up arrow key until 30 appears in the lower right corner of the LCD display. Apply 30% CW FS load to the unit. When exactly 30% CW FS torque is applied, press the DOWN arrow key. Unload the tool.
11. Press the Up arrow key until 20 appears in the lower right corner of the LCD display. Apply 20% CW FS load to the unit. When exactly 20% CW FS torque is applied, press the DOWN arrow key. Unload the tool.
12. Press the Up arrow key until 10 appears in the lower right corner of the LCD display. Apply 10% CW FS load to the unit. When exactly 10% CW FS torque is applied, press the DOWN arrow key. Unload the tool.

13. Apply 3 full-scale loads to the wrench in the CCW direction.
14. Remove the torque load from wrench. Remove wrench from tester, and hold in vertical position. Press the Up arrow key until - 0 appears in the lower right corner of the LCD display. With no torque applied, press the DOWN arrow key. Replace wrench on tester.
15. Press the Up arrow key until -100 appears in the lower right corner of the LCD display. Apply 100% CCW FS load to the unit. When exactly 100% CCW FS torque is applied, press the DOWN arrow key. Unload the tool.
16. Press the Up arrow key until - 90 appears in the lower right corner of the LCD display. Apply 90% CCW FS load to the unit. When exactly 90% CCW FS torque is applied, press the DOWN arrow key. Unload the tool.
17. Press the Up arrow key until - 80 appears in the lower right corner of the LCD display. Apply 80% CCW FS load to the unit. When exactly 80% CCW FS torque is applied, press the DOWN arrow key. Unload the tool.
18. Press the Up arrow key until - 70 appears in the lower right corner of the LCD display. Apply 70% CCW FS load to the unit. When exactly 70% CCW FS torque is applied, press the DOWN arrow key. Unload the tool.
19. Press the Up arrow key until - 60 appears in the lower right corner of the LCD display. Apply 60% CCW FS load to the unit. When exactly 60% CCW FS torque is applied, press the DOWN arrow key. Unload the tool.
20. Press the Up arrow key until - 50 appears in the lower right corner of the LCD display. Apply 50% CCW FS load to the unit. When exactly 50% CCW FS torque is applied, press the DOWN arrow key. Unload the tool.
21. Press the Up arrow key until - 40 appears in the lower right corner of the LCD display. Apply 40% CCW FS load to the unit. When exactly 40% CCW FS torque is applied, press the DOWN arrow key. Unload the tool.
22. Press the Up arrow key until - 30 appears in the lower right corner of the LCD display. Apply 30% CCW FS load to the unit. When exactly 30% CCW FS torque is applied, press the DOWN arrow key. Unload the tool.
23. Press the Up arrow key until - 20 appears in the lower right corner of the LCD display. Apply 20% CCW FS load to the unit. When exactly 20% CCW FS torque is applied, press the DOWN arrow key. Unload the tool.
24. Press the Up arrow key until - 10 appears in the lower right corner of the LCD display. Apply 10% CCW FS load to the unit. When exactly 10% CCW FS torque is applied, press the DOWN arrow key. Unload the tool. Remove the torque from the wrench.
25. Press the Up arrow key until a DATE appears on the LCD. Press the DOWN arrow key to save the calibration date.
26. Turn tool 'Off', disconnect from computer, wait ten seconds then turn the tool 'On'. This takes the tool out of calibration mode and places it in operating mode. It also provides a check to assure that the information was saved on the tool.

Accuracy Tolerance Tables By Capacity

25 foot-pounds

Capacity in Ft.Lb	% FS	Torque Value in In.Lb	+ Tol.	-Tol.
25	10	30	30.3	29.7
	20	60	60.6	59.4
	30	90	90.9	89.1
	40	120	121.2	118.8
	50	150	151.5	148.5
	60	180	181.8	178.2
	70	210	212.1	207.9
	80	240	242.4	237.6
	90	270	272.7	267.3
	100	300	303	297

75 foot-pounds

Capacity in Ft.Lb	% FS	Torque Value in In.Lb	+ Tol.	-Tol.
75	10	90	90.9	89.1
	20	180	181.8	178.2
	30	270	272.7	267.3
	40	360	363.6	356.4
	50	450	454.5	445.5
	60	540	545.4	534.6
	70	630	636.3	623.7
	80	720	727.2	712.8
	90	810	818.1	801.9
	100	900	909	891

150 foot-pounds

Capacity in Ft.Lb	% FS	Torque Value in In.Lb	+ Tol.	-Tol.
150	10	180	181.8	178.2
	20	360	363.6	356.4
	30	540	545.4	534.6
	40	720	727.2	712.8
	50	900	909	891
	60	1080	1090.8	1069.2
	70	1260	1272.6	1247.4
	80	1440	1454.4	1425.6
	90	1620	1636.2	1603.8
	100	1800	1818	1782

250 foot-pounds

Capacity in Ft.Lb	% FS	Torque Value in In.Lb	+ Tol.	-Tol.
250	10	300	303	297
	20	600	606	594
	30	900	909	891
	40	1200	1212	1188
	50	1500	1515	1485
	60	1800	1818	1782
	70	2100	2121	2079
	80	2400	2424	2376
	90	2700	2727	2673
	100	3000	3030	2970

400 foot-pounds

Capacity in Ft.Lb	% FS	Torque Value in In.Lb	+ Tol.	-Tol.
400	10	480	484.8	475.2
	20	960	969.6	950.4
	30	1440	1454.4	1425.6
	40	1920	1939.2	1900.8
	50	2400	2424	2376
	60	2880	2908.8	2851.2
	70	3360	3393.6	3326.4
	80	3840	3878.4	3801.6
	90	4320	4363.2	4276.8
	100	4800	4848	4752

600 foot-pounds

Capacity in Ft.Lb	% FS	Torque Value in In.Lb	+ Tol.	-Tol.
600	10	720	727.2	712.8
	20	1440	1454.4	1425.6
	30	2160	2181.6	2138.4
	40	2880	2908.8	2851.2
	50	3600	3636	3564
	60	4320	4363.2	4276.8
	70	5040	5090.4	4989.6
	80	5760	5817.6	5702.4
	90	6480	6544.8	6415.2
	100	7200	7272	7128

Parts and Repair

Original parts and factory repair services are available when needed. Simply contact us using the information on the first page of this document.

Frequently Asked Questions

The display turned red and showed "OL". What happened?

The tool is designed to be used within its rated capacity, and one of the calibration points for the tool is the 100% of capacity point. The tool is not designed to be used above this point.

At approximately 106% of capacity we use the LED and show "OL" on the display to tell the user that the rated capacity has been exceeded and that the tool is in danger of being damaged. Even a single use above this level can cause the tool to become less accurate, and repeated use at this level increases the probability of accuracy degradation and expensive damage to the tool.

At approximately 120% of rated tool capacity there is a very high probability of damage to the sensor, including damage of a level that necessitates replacement.

We strongly recommend that the tool never be used beyond its rated capacity, and that if the tool is inadvertently overloaded it be immediately removed from service and the calibration checked.

During the starting routine I saw "CAL" and 0 (or -0) appear on the display. What does this mean?

During the starting routine the tool checks the calibration table against the output from the sensor. This message appears if the two are not in agreement. Most frequently this is a response to an overload of the sensor (and tool) to the point where the sensor has suffered a deformation.

If this occurs the tool should not be used. Have the tool calibrated, and repaired if necessary, before use.

Additional Information

You can find additional information (parts prints and other materials) on our website. You can also contact your S/R distributor or S/R Representative, or you can contact us using the information on the front of this document.