

TNP Digitorq Software

Instruction Manual

Digitordq_TNP Main Menu

Memory | Continuous | Print Setting

Continuous

START STOP

Setting Zero

Zero

Setting

Trigger 0 Inout Absolute ON

Number of Data 0 Inout Graph ON

Sampling Rate 50 times/sec

Status

Import

Select Cell

Model TNP-10

Memory Data

Open Memory Close Memory

Clear All Memories

Comparator

Change

Upper Limit 1

Lower Limit 0

Result

Select Cell

Model TNP-10

Communicating

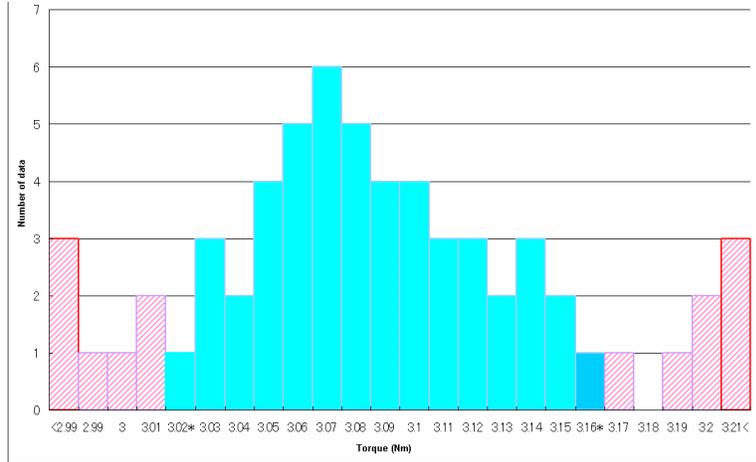
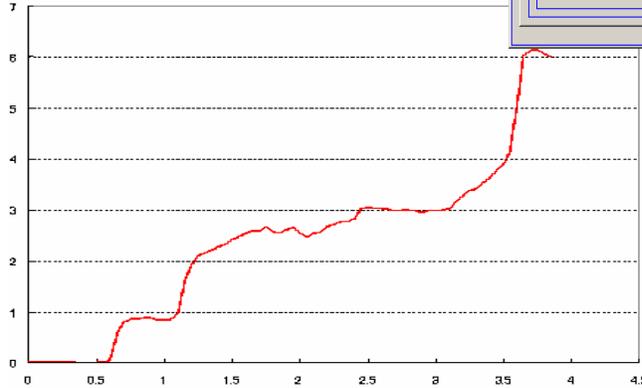
Setting

Torque Class 0.5 Inout Denominator for SD N-1 N

Start Torque 0 Inout

End Torque 10 Inout

Frequency Distribution Graph ON



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I. Software Overview

Thank you for choosing the TNP digital torque meter; as an added feature the TNP can be operated with the free software called Digitorq.

What is Digitorq?

Digitorq is an Add-in tool for Microsoft Excel, allowing easy download and analysis of the data gathered during testing.

Read this instruction manual carefully prior to use. It holds important information on how to properly install and use the Digitorq Software.

II. Software Requirements and Initial Information

The TNP Digitorq is an add-in tool for Microsoft Excel 2000 or higher. This tool allows data to be collected and downloaded via USB cable, which in turn tabulates these data to useful information.

Software requirements

- Windows 2000 or XP
- Microsoft Excel 2000 or higher

Minimum System Requirements

- 256 MB of RAM
- Minimum of 1GHZ of Processing Speed
- USB Port 1.1 or higher

Important: Close all programs prior to installation. It is recommended to close other program before using the Digitorq Software at higher data transfer.

Software features:

- Download data stored in OPEN and CLOSE memory Modes
- Download data in Continuous mode (real time).
- Compare test results based on preset comparator limits.
- Quick summary and information for tests made in different memories
 - Frequency Distribution Chart
 - Max/Min/Average Values
 - Separate OPEN and CLOSE values (Continuous Mode).

III. Reminders



Caution warning holds important safety information



Reminder: holds important key information for the product.

IV Set Up Procedure

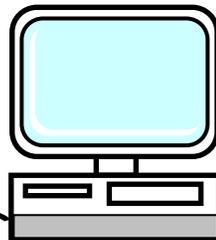
What will you need to get started?

- A copy of the Digitorq software, this software can be downloaded from <http://www.shimpoint.com/software.php>
- Visit this website for future and additional updates.
- USB A to USB B cable plugged in to an open port from the Host PC.
- USB port 1.1 or higher
- Microsoft Excel 2000 or higher (this versions includes the necessary libraries needed to make the software works).
- Host PC running in Windows 2000 Service Pack 4 or Windows XP Service Pack 2.



TNP Digital Torque Meter

USB cable



Host PC



Digitorq Software

Operating environment

- Windows XP/2000
- Excel 2000 or more

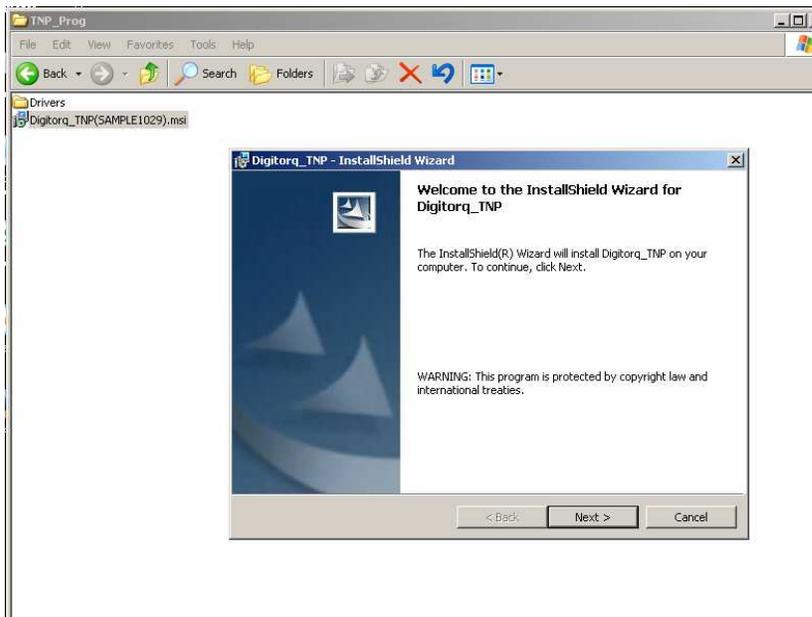
The zip program for Digitorq includes the following:

- Digitorq Windows application software (Digitorq_TNP(SAMPLE).msi)
- Driver folder (contains the two drivers)



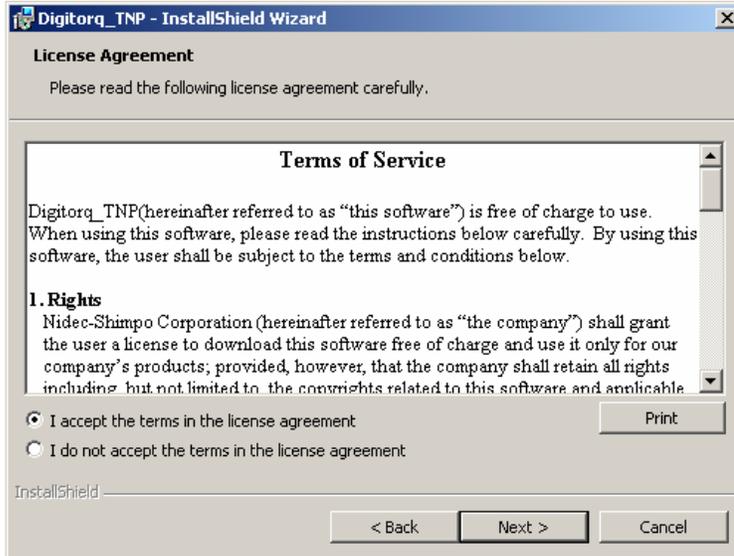
How to install the software?

1. Open and unzip the files for the Digitorq Software
2. You can install the Digitorq_TNP(SAMPLE1029).msi separately. The TNP connection is not needed to complete installation. However to open the program to browse to its features the TNP has to be ON and connected.



Run the Windows installation process. A welcome window will appear, select “Next” to move to the next screen.

3. Review the License agreement and select accept from the options. Hit Next to move to the next Window.



4. Enter username and company name then select “Next” or choose who can utilize this application.



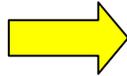
5. The next window summarizes the location and information related to the installation of the Digitorq software. Selecting install from the bottom of the window starts the install wizard.



6. After the installation is completed. This final window appears. Selecting finish exits out of the installation process.



7. Next step is to install the USB drivers. To prevent problems with the installation process, assign the USB port that will use the program prior to performing this procedure. To use multiple USB port, separate driver installation is required.
8. Attach the USB cable to the TNP Digital torque meter. USB B (larger connector) is attached to the Digital torque meter. USB A to the USB port chosen from the Host PC.



TNP USB B

Host PC USB A



It is important that you do this step; this allows Windows to recognize a new device, which opens a driver installation wizard that guides you through the whole procedure

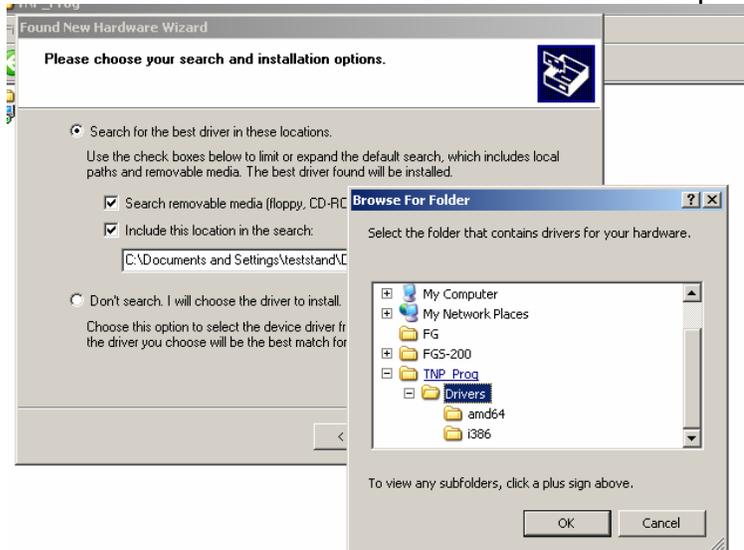
Depending on the operating system you may have a pop up window appear automatically or you will need to select the unrecognized device dialog box on the lower corner of the window.



FT232 USB UART found new hardware wizard.

Select Install from a specific location (Advanced) then select "Next" to move to location dialog window.

9. Select Browse from the window and locate the folder where you have the drivers for the Digitorq software. (In this example the location is on the desktop under a folder called TNP_Prog.) After the driver location is selected. Hit OK to move to the installation process.



10. The process will take a couple of minutes and opens another window confirming the installation is completed. Hit finish to exit out of the installation.



At this point DO NOT unplug the USB cable another driver will need to be installed to complete the communication requirements.

The Windows found new hardware wizard will prompt for the next driver.



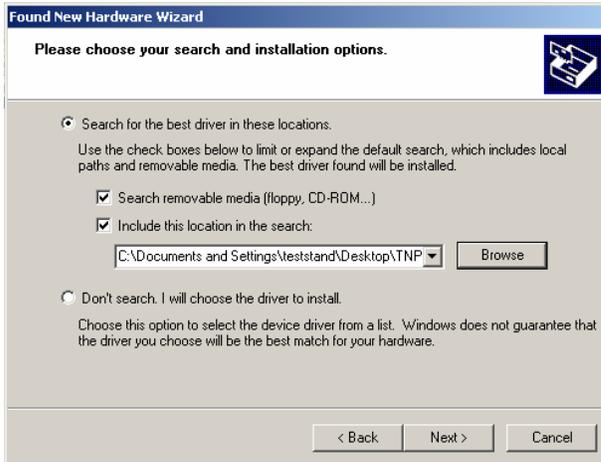
Why do we need these drivers?

The TNP has a built in USB to Serial Converter that requires the data to be processed and transmitted correctly via USB communication.

10. Second Driver installation USB to Serial Port. A second installation wizard will open.



From the selection change to “Install from a list or specific location (Advance)”, then click next to continue.



Same as the previous installation select browse to locate the driver folder for the Digitorq software.

11. Click Next to start the installation process.



12. After confirming the installation process is completed. Click “Finish” to exit out of the installation process.



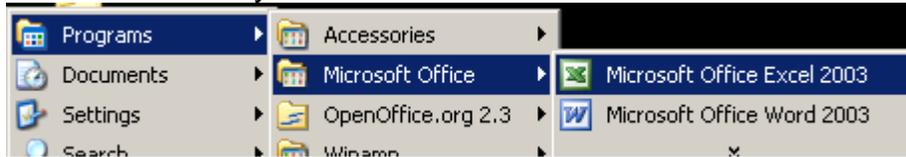
Windows will confirm the presence of a new hardware (dialog box will appear on the lower part of the screen).



Drivers installation are completed proceed to the next section on how to add the TNP Digitorq software to Microsoft Excel.

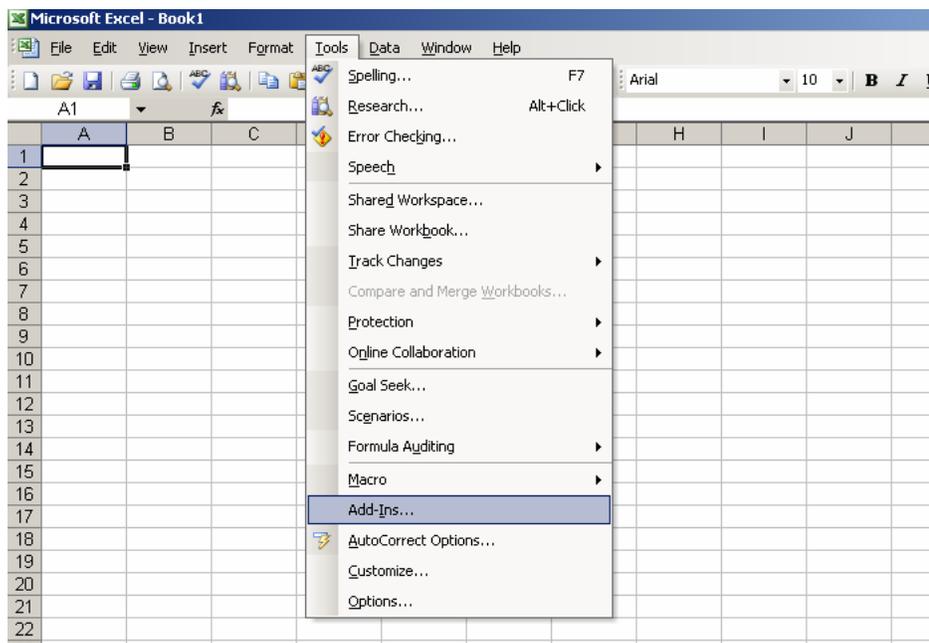
V. Adding the Digitorq Software

1. Open Microsoft Excel from your PC

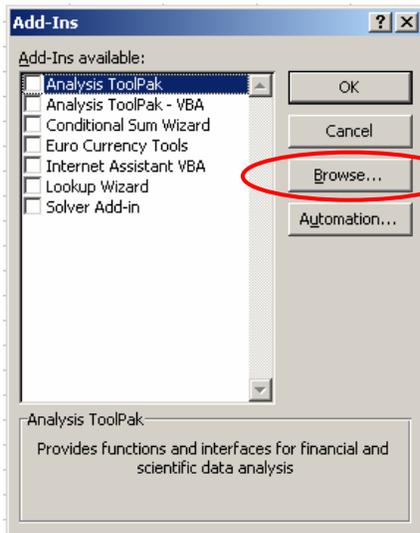


In order to take advantage of the Digitorq software the host PC should have Microsoft Excel 2000 or higher. Confirm that the right version is installed before proceeding.

2. From your Menu (upper part of the screen) select “Tools” then Add-ins



A dialog box will appear providing a list of Add-Ins available.

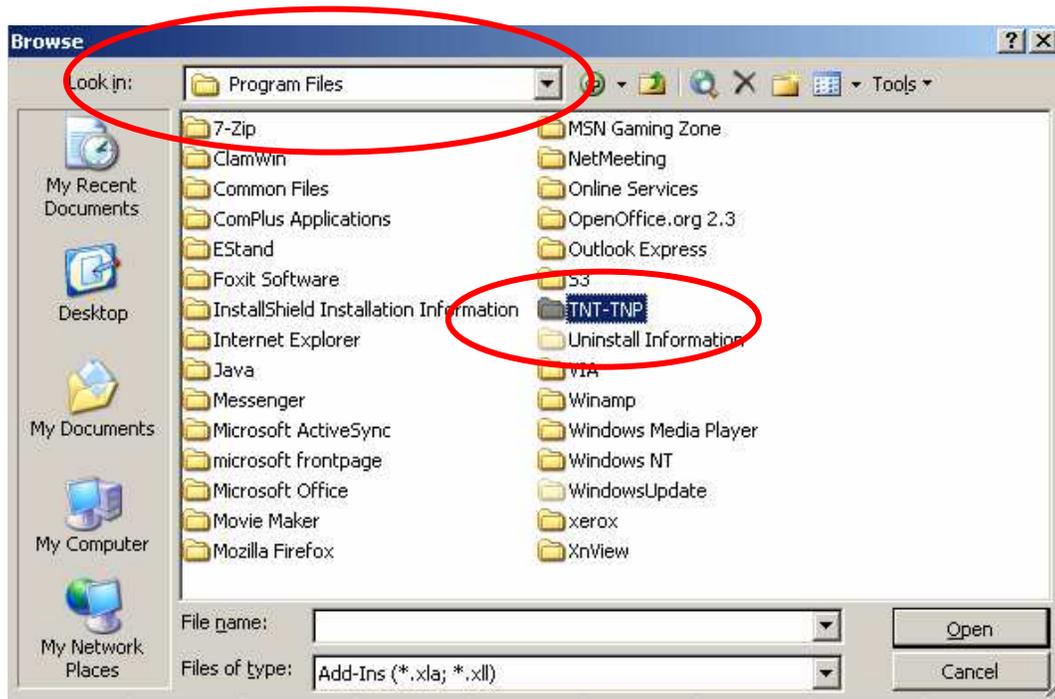


If the Digitorq software is not part of this list, manually add the Digitorq software to the Add-ins available.



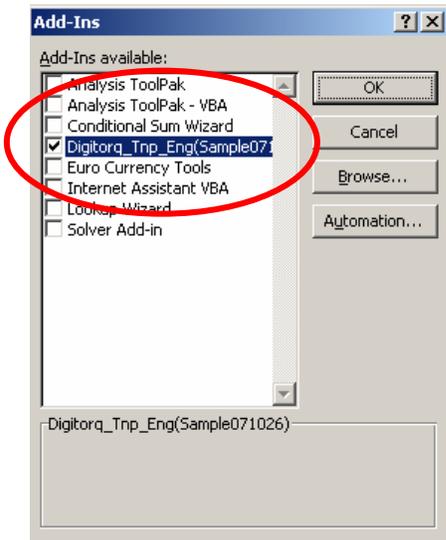
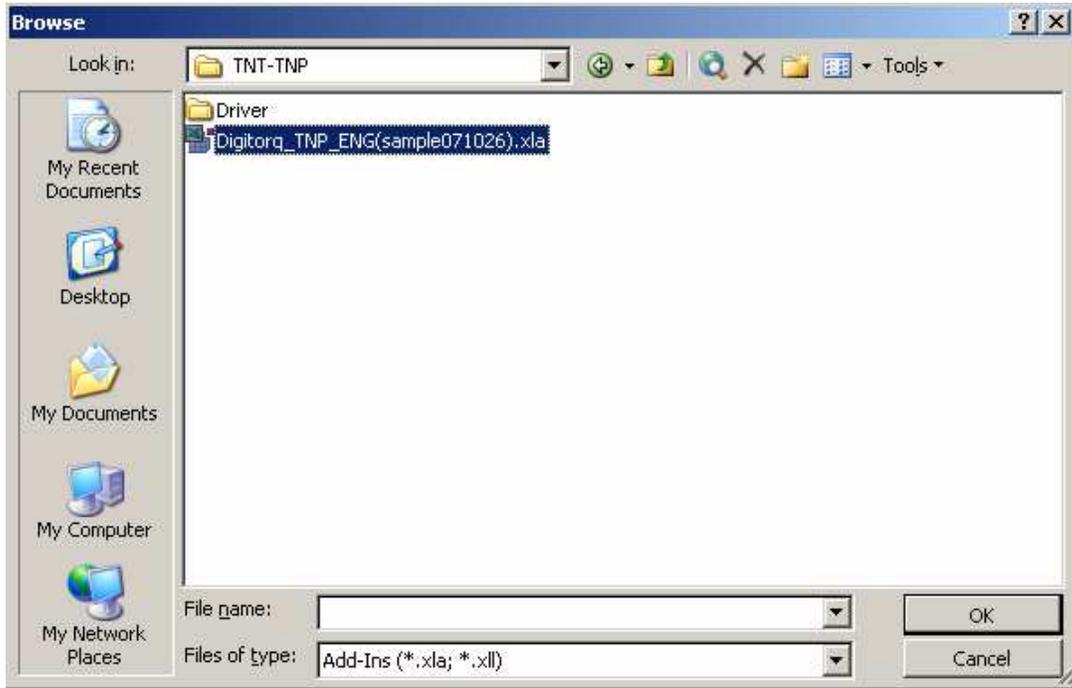
List of Add-ins vary from different PC, the one shown is just an example to emphasize the Add-Ins feature.

3. Manually add the Digitorq software. Select “Browse” from the right side of the Add-Ins window.



Look for the TNT-TNP folder located under your program files.

4. Open this folder and select “Digitorq_TNP_Eng(sample071026).xla” from the items found inside this folder. Click OK to accept selection.

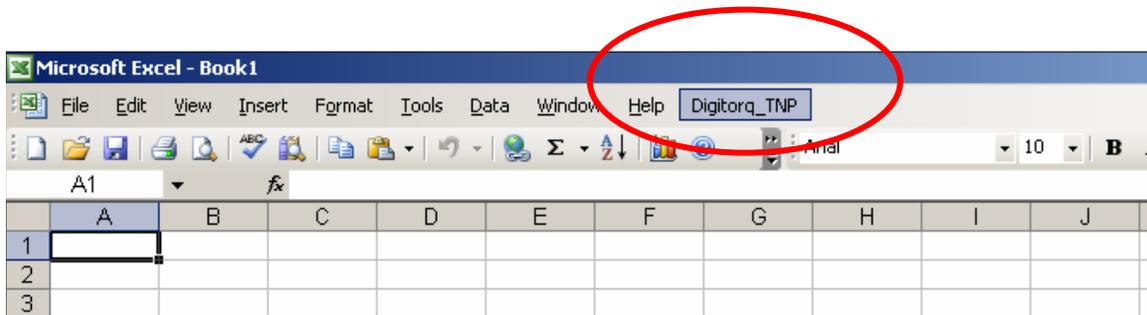


The Digitorq software is added to the list of Add-Ins available in Microsoft Excel.

Confirm that the Digitorq software is checked then Click OK to accept.

What does this do?

The selection allows the Digitorq software to be part of the Microsoft Excel Menu.



The Digitorq_TNP menu provides the access for the software. The host PC is now ready to communicate with the TNP Torque Meter.

VI. Digitorq Software Application

With the Digitorq software installed the TNP torque meter extends its capabilities by providing quick visual information results for testing and further analysis.

The Software provides a means to easily download data without manually typing and gathering the information for QC reports.

It provides a quick summary similar to a survey of number of failures and its percent rate.

Allows flexibility by providing adjustable parameters for display, it can check the highest torque recorded regardless of direction. The software also has the capability to automatically separate Open from Close torques.

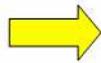
The following sections will provide an in depth discussion of the Digitorq software.

How to Start?

Attached the USB communication cable from the TNP to the Host PC if the cable is not yet connected (Remember to use the USB port where the drivers are installed. Otherwise the host PC will prompt you to install the drivers prior to use.)

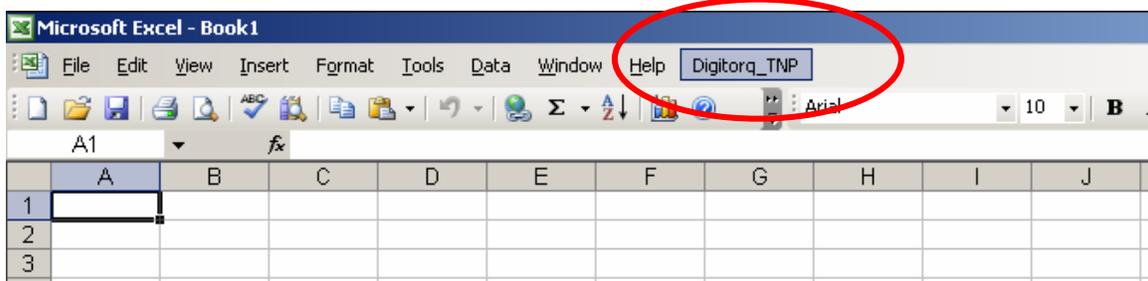


TNP USB B

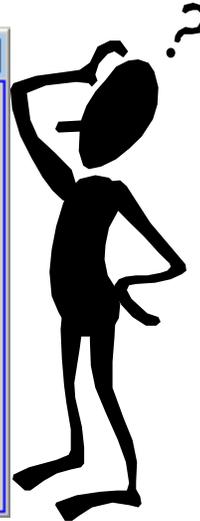
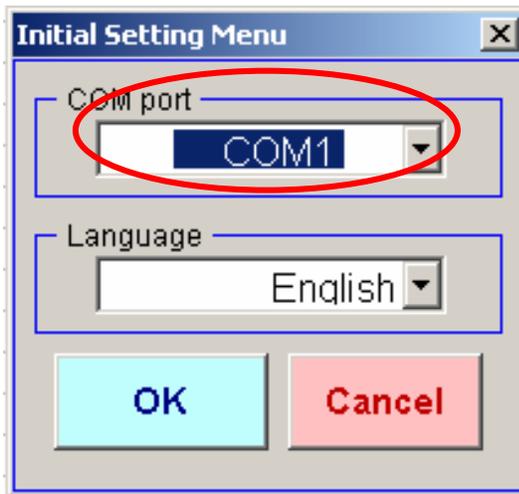


Host PC USB A

Open Microsoft Excel then select the Digitorq_TNP from the Menu bar.



The initial window will ask the COM port information for communication.



If known select the COM Port for communication. The initial screen provides a drop down selection up to COM 15.

How do I know which COM port I have?

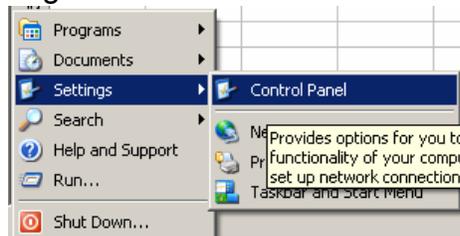
Because of the built in RS232 to USB converter of the TNP, the assignment of the COM port number is dependent on the HOST PC. The HOST PC automatically assigns a communication port number for the TNP

To find out the communication port assigned to the TNP there are two ways to do this. One to manually look thru the list up to COM 15 and check which one is the assigned Com port number (no communication error) or two you can go to your Device Manager and check the Com port Number from there.

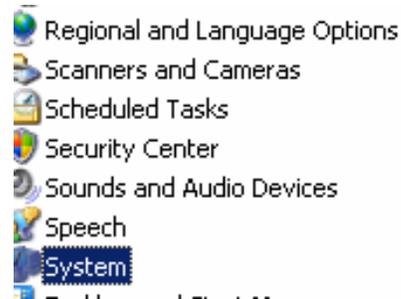
How to go to the Device Manager?

Depending on your operating system the windows in the next pages maybe different, the operating system on this example was made from Windows 2000.

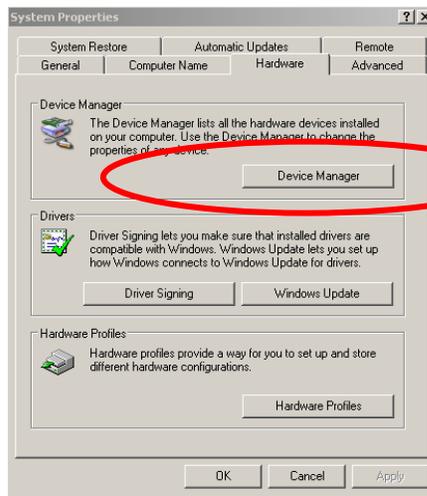
1. From your Start menu located on the lower part of your screen select "Settings" then "Control Panel"



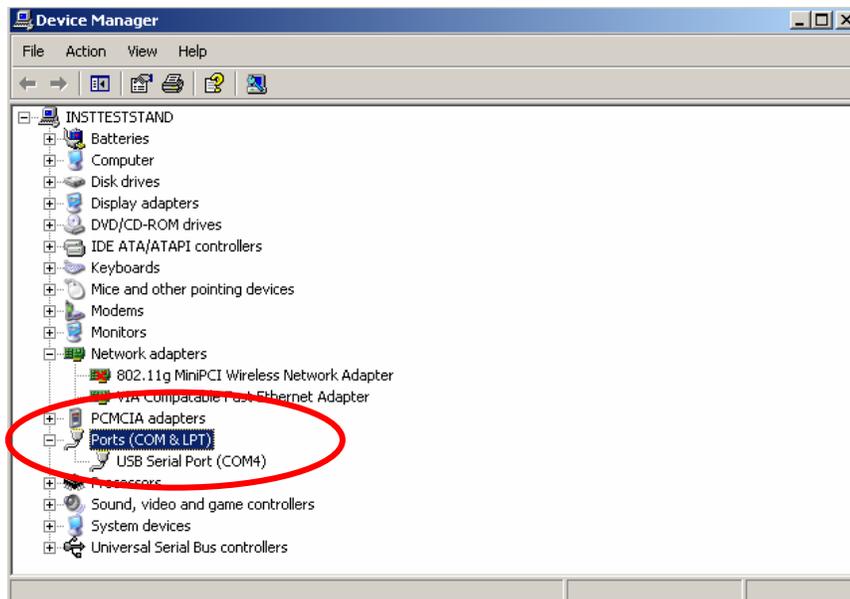
2. After selecting “Control Panel” a window will appear with a list of items similar to the one shown next to this item. Look for “Systems” from the list of items.



3. Under Systems select Hardware and Device Manager

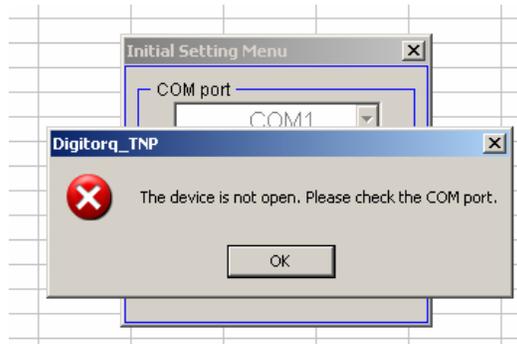


4. From the next Window look for Ports (COM & LPT). If the item is not expanded, click on Ports. The COM port number for the devices attached to the host PC is shown in this window.



From the example it shows COM 4 as the assigned COM port number.

Selecting the right COM port opens the Main Window for the Digitorq Software.

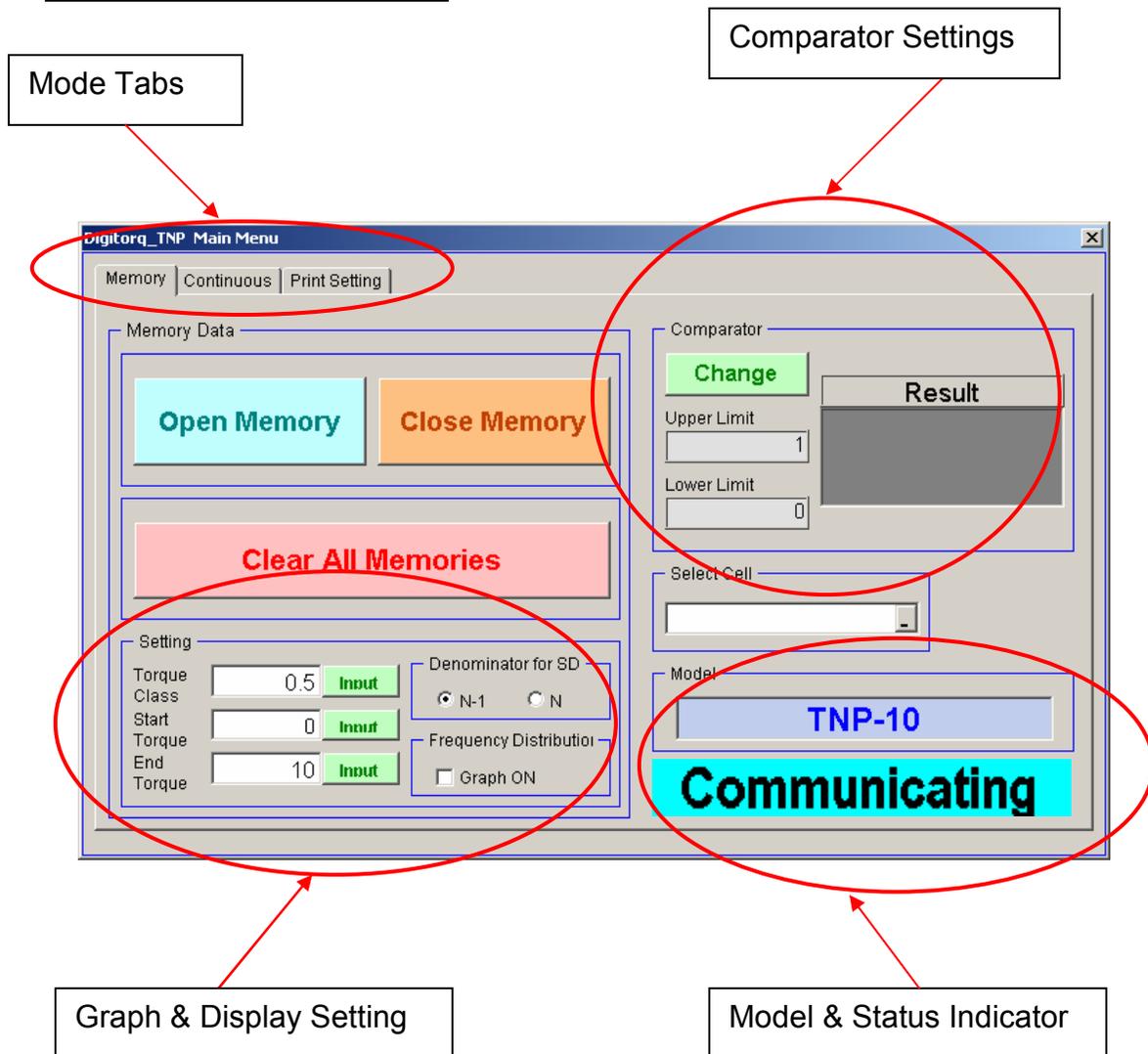


The above error will appear if the TNP Digital Torque meter is OFF or the COM port selected from the list is not correct.



While using the Digitorq software use the AC adapter as the power source. Using the internal battery may result in lost of communications once the auto shut-off feature is activated.

VII. Main Software Window

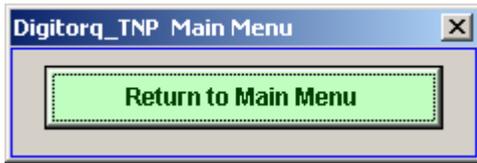


There are three mode tabs located on the main screen. Depending on the application, data can be downloaded from the TNP digital torque meter or in real time using the Digitorg software.

Shown above is the Memory tab, which is the initial screen when the Digitorg software is first opened.



Microsoft Excel functions are not available while Digitorg is running. Use the return to main menu to toggle back and forth on the spreadsheet results and the Digitorg control panel. To edit or arrange the downloaded data in Microsoft Excel, you will need to exit out of the Digitorg Software.



VIII. Major Sections of the Memory Tab

- Mode Tab
- Graph & Display Settings
- Model & Status Indicator
- Comparator Settings

Memory Tab

This allows the operator to choose between two methods of data collection.

- Download from stored memory (Memory Tab)
- Download in real Time (Continuous Tab)

Under the Memory Tab we can download data stored in the digital torque meter. There two types of memory OPEN and CLOSE Memory each of this data is separated based from which key is selected.

A quick summary of the data is provided in the Excel Sheet similar to the example below.

	A	B	C
1	Open Torque		
2			
3	Date	12/13/2007	3:00:28 PM
4	Prepared by		
5	Remarks		
6			
7	Temperature		
8	Humidity(%)		
9			
10	Model	TNP-5	
11	Unit	Nm	
12			
13	Number of data	6	
14	Maximum	0.822	
15	Minimum	0	
16	Average	0.528	
17	Standard Deviation	0.2926	
18	Denominator for SD	N-1	
19			
20	Upper Limit	1	
21	Lower Limit	0	
22			
23	Number of High NG	0	
24	Number of Low NG	0	
25	Defective rate(%)	0	

	A	B	C
1	Close Torque		
2			
3	Date	12/13/2007	3:04:04 PM
4	Prepared by	Arthur C. Morales	
5	Remarks	QC Cap Testing	
6			
7	Temperature(deg C)	70	
8	Humidity(%)	40	
9			
10	Model	TNP-5	
11	Unit	Nm	
12			
13	Number of data	8	
14	Maximum	1.171	
15	Minimum	0.03	
16	Average	0.268	
17	Standard Deviation	0.405	
18	Denominator for SD	N-1	

Shown on the left is a summary with Upper and Lower Limits. On the right without the Upper and Lower Limits. (Upper and Lower Limits are discussed in the next section).

Clear All Memories button is provided for easy deletion of the data stored in the TNP Digital Torque Meter. Once data is deleted no other means to retrieve data.

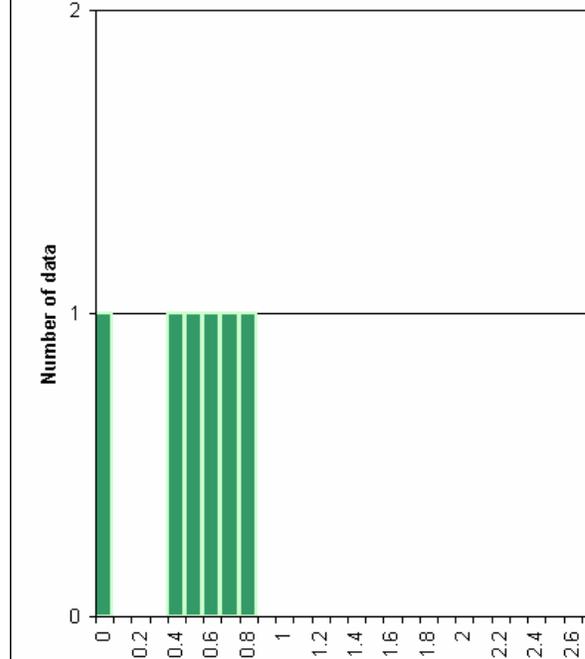
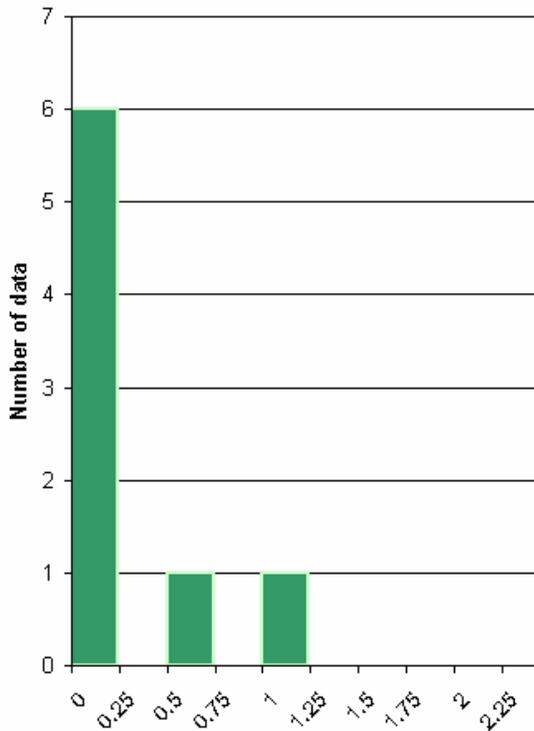
IX. Graph and Display Settings

These are settings that are provided to change the way the results are displayed on screen. There are a couple of options available for adjustment.

Torque Class

Torque class is the width of how the distribution graph is divided. The lower the value the thinner the result bars appear. It is similar to the range divisibility of the results. Shown below is an example of how the Torque Class works, notice the number on the X-axis.

Input range: 0.01 – Max Capacity of the TNP (Models available up to 10 Nm).



Shown on the left picture, torque class = 0.25; on the right torque class = 0.1.

Start Torque

What is Start Torque? Start torque allows you to limit the display to a certain starting point. This feature is useful to narrow down the information to the most important results. It starts the display to the set value.



Conditions for Start Torque:
Start Torque <= End Torque; Start Torque should not be greater than the TNP capacity.

End Torque

End Torque sets the max value or range of the display. The value entered dictates the extent of the graph display.

Denominator for SD

Denominators for SD or Standard Deviation, there are two choices provided:

- N
- N-1

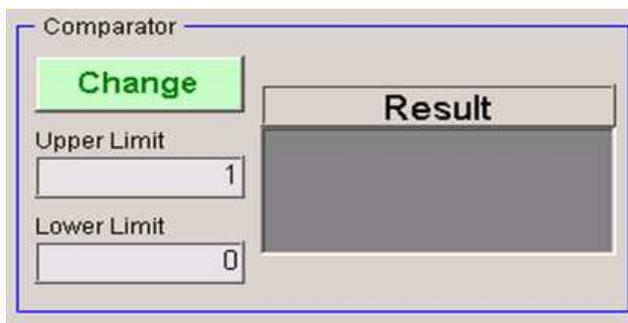
“N stands for the total number of items”

$$s = \sqrt{\frac{1}{N-1} \sum_{i=1}^N (x_i - \bar{x})^2}, \quad \text{OR} \quad s = \sqrt{\frac{1}{N} \sum_{i=1}^N (x_i - \bar{x})^2},$$

\bar{x} Average or Mean Value of all data

x_i Value on the set

X. Comparator Settings

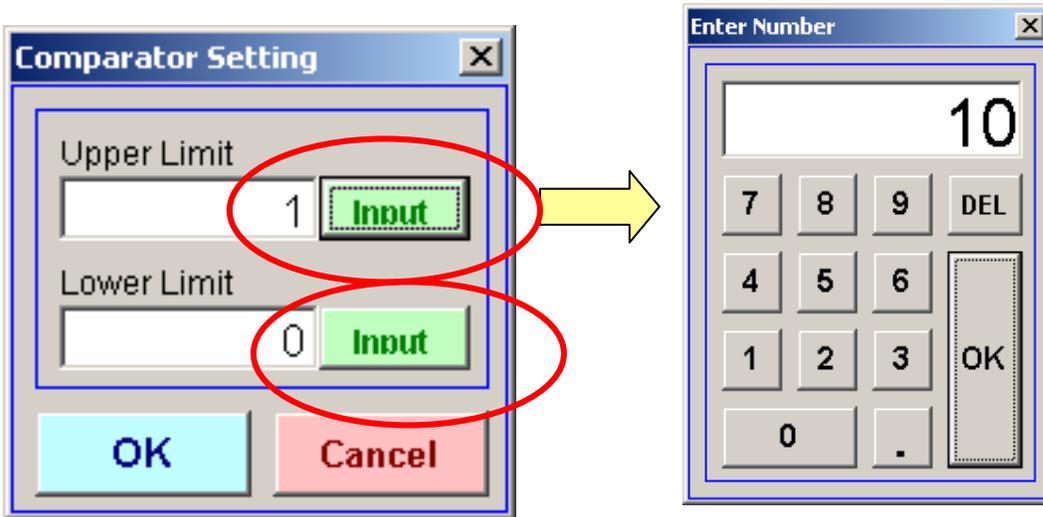


Comparator feature is only available in the Memory Tab - OPEN and CLOSE Modes.

There are two ways to enter the values:

The values can be entered by clicking on the UPPER and LOWER limit box or by selecting the Change button.

Selecting the Change button opens a small window. In this window there is an corresponding input button for Upper and Lower Limit. Selecting this button opens a keypad, which can be used to enter the data.

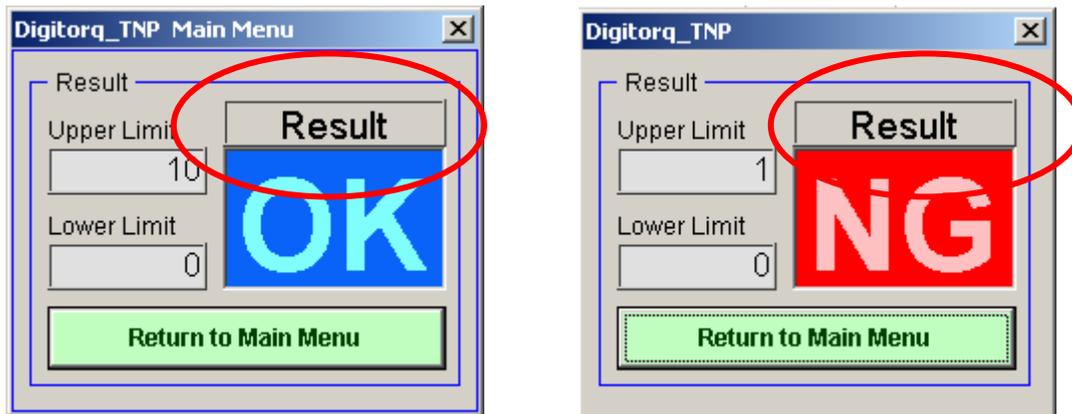


What is the importance of this feature?

In QC testing the comparator feature provides a visual and quick summary if the torque values are acceptable based from the entered Upper and Lower Limits.

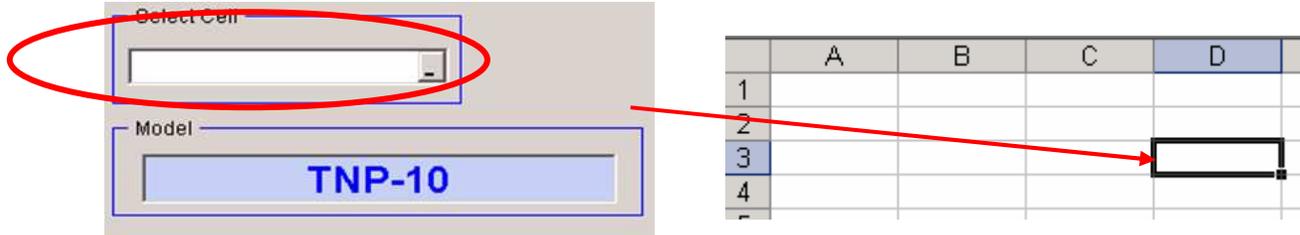
What happens when the test results are not acceptable?

Under Results OK or NG will appear depending on the set comparator limits.





Setting the Upper and Lower Limits to zero “0” is the same as disabling or turning off this feature.



Start Cell

Starting cell location for download (From the example above the start cell selected is D3).

Format sample: Sheet1!\$D\$3

Model

TNP model type and capacity, the torque tester are identified by capacities in Newton-meter (TNP-2, TNP-5, TNP-10). The capacities are automatically recognized by the DigiTorq software).

XI. Memory Data Format

	A	B	C
1	Open Torque		
2			
3	Date	12/13/2007	3:00:28 PM
4	Prepared by		
5	Remarks		
6			
7	Temperature		
8	Humidity(%)		
9			
10	Model	TNP-5	
11	Unit	Nm	
12			
13	Number of data	6	
14	Maximum	0.822	
15	Minimum	0	
16	Average	0.528	
17	Standard Deviation	0.2926	
18	Denominator for SD	N-1	
19			
20	Upper Limit	1	
21	Lower Limit	0	
22			
23	Number of High NG	0	
24	Number of Low NG	0	
25	Defective rate(%)	0	

	A	B	C
1	Close Torque		
2			
3	Date	12/13/2007	3:04:04 PM
4	Prepared by	Arthur C. Morales	
5	Remarks	QC Cap Testing	
6			
7	Temperature(deg C)	70	
8	Humidity(%)	40	
9			
10	Model	TNP-5	
11	Unit	Nm	
12			
13	Number of data	8	
14	Maximum	1.171	
15	Minimum	0.03	
16	Average	0.268	
17	Standard Deviation	0.405	
18	Denominator for SD	N-1	

The TNP Digitorq software provides a complete summary located on the header for each test results

The following information are automatically downloaded in Microsoft Excel

- Memory Type: Open or Close
- Date
- Prepared by: Optional entered by user– see Print Setting Tab
- Remarks : Optional entered by user
- Temperature: Optional entered by user
- Humidity: Optional entered by user
- Model
- Number of Data
- Maximum
- Minimum
- Average (real time measured torque values)
- Standard Deviation: with information on the denominator used
- Upper Limit: Available when comparator feature are used
- Lower Limit: Available when comparator features are used.
- Total number of High NG: failed values based on the entered HI limit, when enabled.
- Total number of Low NG: failed values based on the entered LO limit, when enabled.
- Defective rate (%): percent defect rate: see next section for definition of formula.

The header is followed by downloaded data arranged according to the order of how it was saved.

If comparator feature is not used there are only two columns “Memory Number” and “Torque”.

If comparator feature is used a third column is inserted identified as “Result”

Result Messages:

- UL – Upper Limit
- LL – Lower Limit
- OK – passed or approved values

Result is a quick summary of where the failure occurs based from the defined Upper and Lower limits.

XII. Defective Rate(%)

Defective Rate (%) is only available in Memory tab. The formula used for calculating defective rate is

$$DefectiveFraction(\%) = \frac{UpperNGnumber + LowerNGnumber}{TotalMemoryNumber} \times 100$$

UpperNGnumber = UL (torque > Upper Limit)
LowerNGnumber = LL (torque < Lower Limit)

XIII. Frequency Distribution Graph

Frequency distribution graph is available in the Memory Tab. In order to avail of the graph information check the box that corresponds to graph under the Frequency distribution options.

The screenshot shows a 'Setting' dialog box with the following fields and options:

- Torque Class: 0.25 (Input)
- Start Torque: 0 (Input)
- End Torque: 5 (Input)
- Denominator for SD: N-1, N
- Frequency Distribution: Graph ON



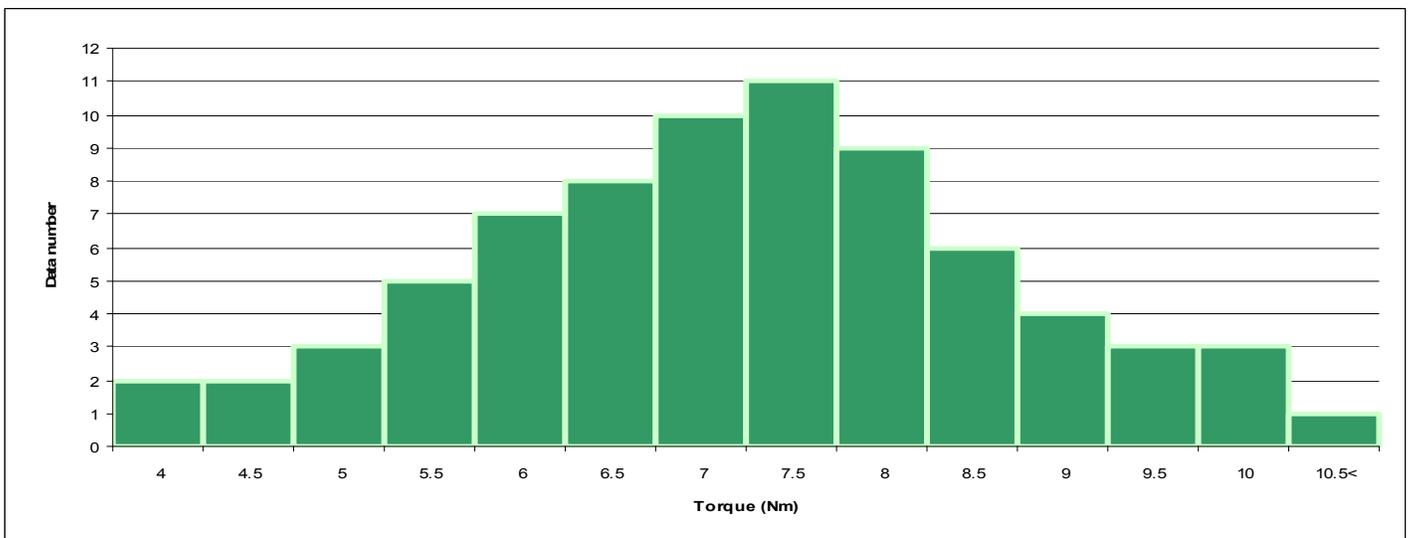
If the Frequency Distribution option is enabled (checked), another sheet is created in Microsoft Excel whenever the Open or Close Memory are downloaded.



How to read the Frequency Distribution Chart?

The Frequency distribution chart provides a quick summary of the data results. It gives quick visual information on where most of the results are grouped.

The X-axis from the DigiTorq frequency distribution chart corresponds to the data results grouped based on the Torque class entered. The Y-axis on the other hand is based from the number data that falls under that torque class.



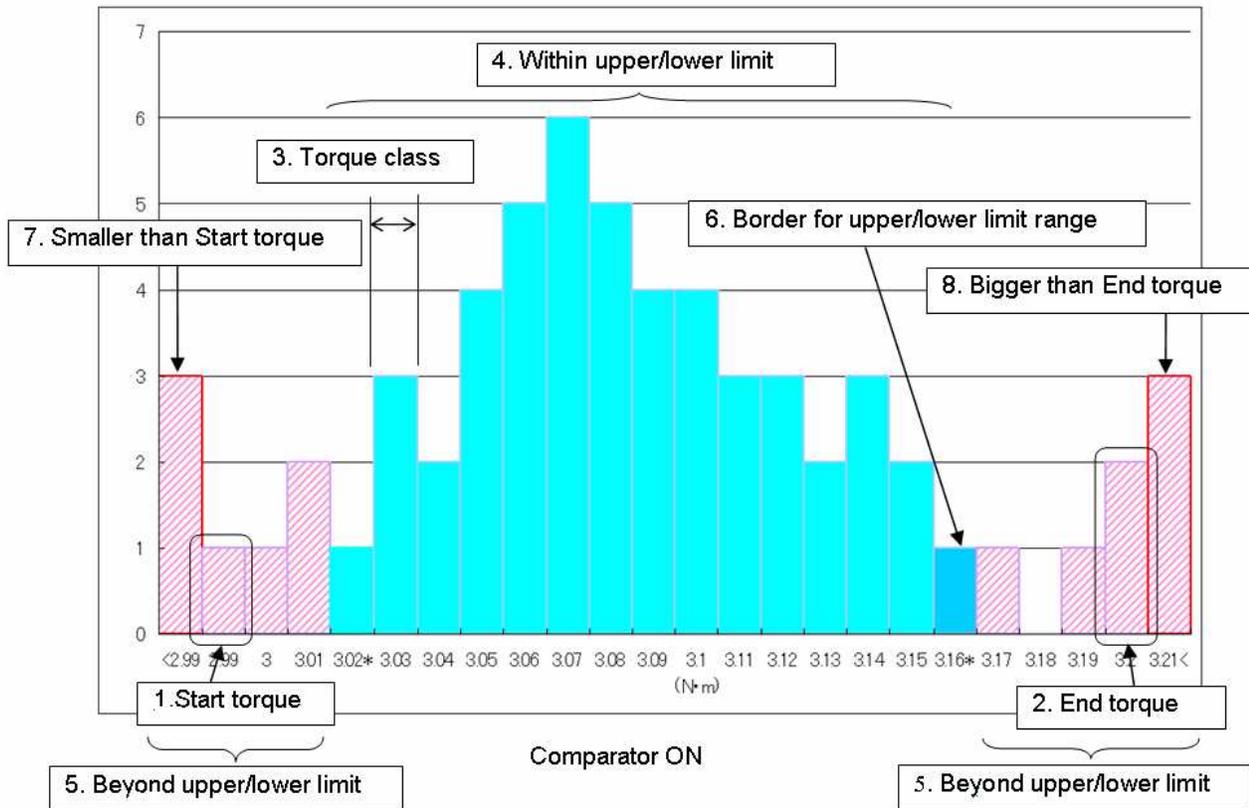
From the previous example the following information can be derived.

Start torque = 4
 End torque = 10.5
 Torque Class = 0.5
 Comparator feature disabled.

Looking at the results it indicates that 11 samples or data falls under the 7.5 Nm range and 1 sample under the 10.5 Nm range.

Frequency Distribution Graph – Comparator Feature enabled

If the comparator feature is enabled the graph displays different colors based of the results as it compared to the comparator values.

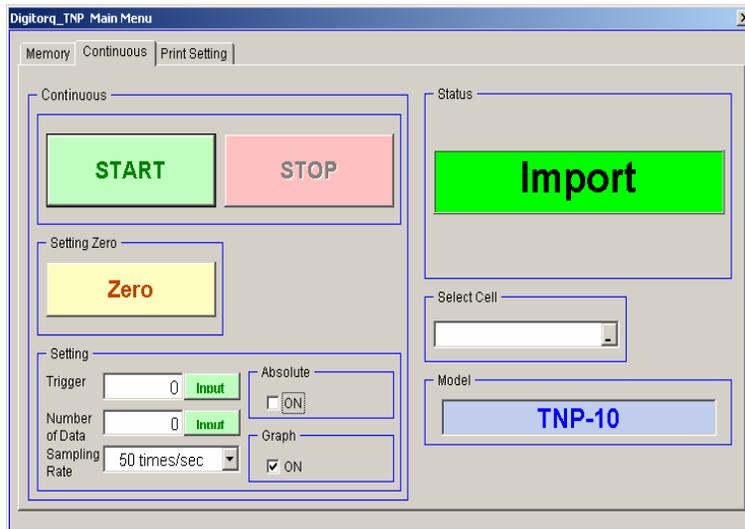


From the above example the following setting are set from the Digitorg software

Start Torque: 2.99
 End Torque: 3.20
 Torque Class: 0.01

-  Values with this color passed the HI and LO limits.
-  Values failed the HI and LO limits.
-  Failed values highlighted in red indicates values lower than start torque
-  Different shade of blue, this indicates values included in the HI/LO Limits
-  Failed values highlighted in red > than start torque indicates values greater than end torque.

XIV. Continuous Tab (Real Time Data transfer)



Continuous Tab provides the basic functions

- Start
- Stop
- Zero/Tare

Additional settings available includes

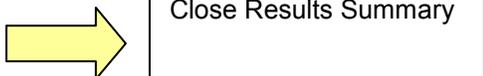
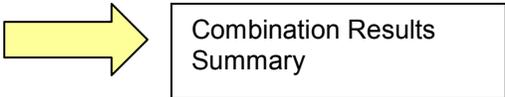
- Trigger – sets a threshold value before data collection starts
- Number of data – sets the number of data downloaded in the spread sheet
- Sampling rate – speed of transfer, available options are: 20 times/second, 50 times/second, 100 times/second
- Select Cell – allows data transfer to start on the selected cell.

- Absolute (check box) – applies absolute value to all data results, this allows data to be graphed regardless of direction. Useful in determining which direction is applied torque greater.
- Graph (check box) – enables the Digitorq software to graph the downloaded result.

Data format – Continuous

Header summary includes the following information:

	A	B
1	Continuous data	
2		
3	Date	12/18/2007 4:21:30 PM
4	Prepared by	
5	Remarks	
6		
7	Temperature	
8	Humidity(%)	
9		
10	Model	TNP-5
11	Unit	Nm
12		
13	Total	
14	Number of data	67
15	Maximum	0.781
16	Minimum	0.001
17	Average	0.4443
18		
19	Open	
20	Number of data	30
21	Maximum	0.698
22	Minimum	0.018
23	Average	0.4239
24		
25	Close	
26	Number of data	37
27	Maximum	0.781
28	Minimum	0.001
29	Average	0.4609

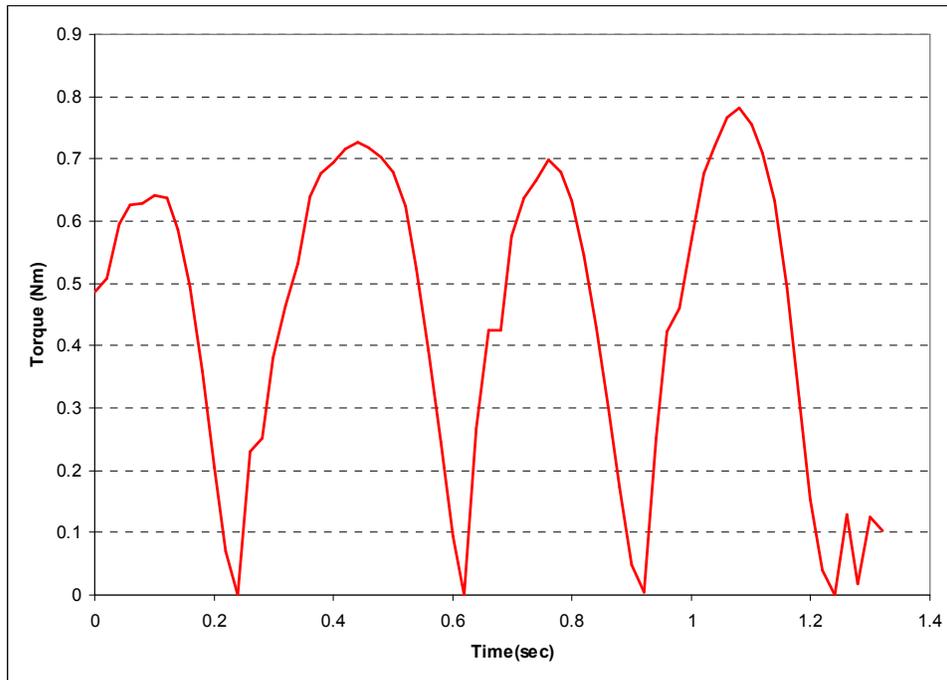


Provides three summaries, which includes the **Combination results summary, Open result summary and the Close result summary.**

Data results are separated based on these 4 headers: OPEN, CLOSE, TORQUE (Combined data) and Time

41	Time(sec)	Torque (Nm)	Open	Close
42	0	0.486	0.486	
43	0.02	0.508	0.508	
44	0.04	0.596	0.596	
45	0.06	0.627	0.627	
46	0.08	0.628	0.628	
47	0.1	0.642	0.642	
48	0.12	0.637	0.637	
49	0.14	0.587	0.587	
50	0.16	0.495	0.495	
51	0.18	0.359	0.359	
52	0.2	0.203	0.203	
53	0.22	0.071	0.071	
54	0.24	0.001		0.001
55	0.26	0.229		0.229
56	0.28	0.252		0.252
57	0.3	0.38		0.38
58	0.32	0.465		0.465
59	0.34	0.532		0.532

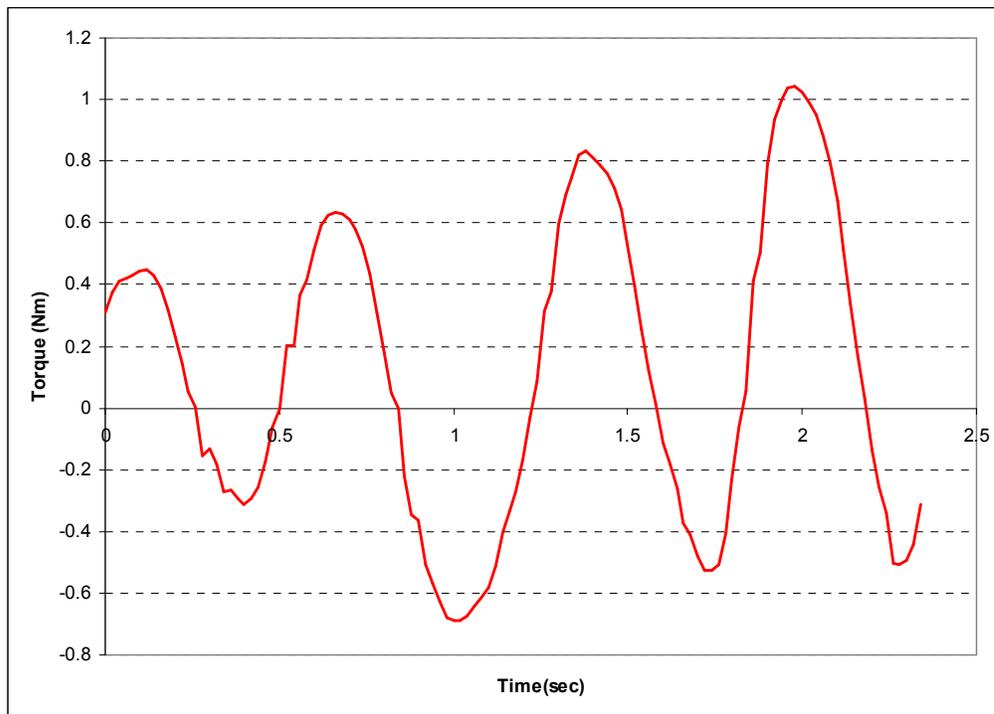
Notice that when the **Absolute check box is enabled** no signed data is recorded. All data are graph above zero.



The corresponding graph is plotted with positive numbers (Absolute check box enabled).

41	Time(sec)	Torque (Nm)	Open	Close
42	0	0.311		0.311
43	0.02	0.375		0.375
44	0.04	0.412		0.412
45	0.06	0.42		0.42
46	0.08	0.431		0.431
47	0.1	0.445		0.445
48	0.12	0.448		0.448
49	0.14	0.43		0.43
50	0.16	0.39		0.39
51	0.18	0.319		0.319
52	0.2	0.231		0.231
53	0.22	0.141		0.141
54	0.24	0.054		0.054
55	0.26	0.002		0.002
56	0.28	-0.157	0.157	
57	0.3	-0.134	0.134	
58	0.32	-0.183	0.183	
59	0.34	-0.27	0.27	
60	0.36	-0.266	0.266	
61	0.38	-0.296	0.296	
62	0.4	-0.311	0.311	

Data when Absolute check box is disabled. (From this example OPEN is considered negative, CLOSE data are all positive).



XV. Print Settings Tab (Optional)

Print settings tab allows users to enter the following information as part of the generated report.

The screenshot shows the 'Print Setting' tab in the 'Digitorg_TNP Main Menu' application. The 'Memo' section contains the following data: Title: 'Cap Test', Prepared by: 'Arthur C. Morales', Remarks: 'QC Report Selarom'. The Temperature is set to 70 with the Fahrenheit radio button selected, and Humidity is set to 30. A yellow 'Preview' button is located at the bottom of the form.

- Title –Report Header
 - Input up to 20 characters
- Prepared by – User Name
 - Input up to 20 characters
- Remarks
 - Input up to 20 characters
- Temperature (Degrees Fahrenheit, Degrees Celsius)
 - Input range 5 digits; 0 – 99999 including the decimal point
- % Humidity
 - Input range 5 digits; 0 – 99999 including the decimal point

Using the tab button or mouse, the data can be entered in the boxes provided. For temperature and humidity, clicking the “Input” button opens a keypad where you can enter the values.

This screenshot shows the same 'Print Setting' tab as above, but with an 'Enter Number' keypad overlay. The keypad is a standard numeric keypad with a display showing '70'. The 'Input' button next to the temperature field is highlighted, indicating it was clicked to open the keypad.



Print Preview is not available prior to download. It only works after the data is downloaded using the Digitorq software.

Microsoft Excel - Book1

Next Previous Zoom Print... Setup... Margins Page Break Preview Close Help

Soft Cap 1

Open Torque

Date 12/19/2007 12:27:07 PM
Prepared by A. Morales
Remarks Open Torque QC Check

Temperature(deg F) 70
Humidity(%) 40

Model TNP-5
Unit Nm

Number of data 6
Maximum 0.822
Minimum 0
Average 0.528
Standard Deviation 0.2926
Denominator for SD N-1

Upper Limit 1
Lower Limit 0

Number of High NG 0
Number of Low NG 0
Defective rate(%) 0

Memory Number	Result	Torque (Nm)
1	OK	0
2	OK	0.456
3	OK	0.52
4	OK	0.522
5	OK	0.75
6	OK	0.619

Open Torque	
Date	12/10/ 2007
Prepared by	A. Morales
Remarks	Open Torque QC Check
Temperature (deg F)	70
Humidity (%)	40

XVI. Common Errors

This section describes the common errors in the DigiTorq Software and their description.

Error Display Message	Description/Explanation	Solution
	<p>This error appears when the COM port is not detected or the wrong COM port number is selected</p>	<p>Select the right COM port number, check the section for "How to start."</p>
	<p>Comparator entry values not valid, Upper limit > lower limit</p>	<p>Enter a valid limit to the DigiTorq software.</p>
	<p>No power to the TNP, the TNP turned off.</p>	<p>Use AC adapter to power the TNP to prevent auto power off feature to turn on. Check the AC adapter for damage.</p>
	<p>Setting value for End torque and Start torque not valid.</p>	<p>Start Torque should always be less than end torque.</p>
	<p>Range for entry beyond allowed values.</p>	<p>Reenter the values, see next section for maximum allowed values.</p>
	<p>Invalid entry, decimal places not allowed</p>	<p>Reenter the values, see next section for maximum allowed values.</p>
	<p>Download of data cannot continue, the allowed rows in Microsoft Excel is reached 65,536 rows.</p>	<p>Stop the TNP meter, start a new worksheet.</p>
	<p>Selected Start Cell not in the same work sheet.</p>	<p>Use current sheet for downloading data.</p>

	No data in OPEN and CLOSE memory	Reenter data for OPEN and CLOSE modes.
	Wrong Mode selected.	Select correct mode to avail of requested feature.

XVII. Limitations/Allowed Values

Model	Item	Upper limit value		Lower limit value		Class range	
		Nm	Ncm	Nm	Ncm	Nm	Ncm
TNP-2	Input range	0-2.000	0-200.0	0-2.000	0-200.0	0.001-2.000	0.1-200.0
	Initial value	0 ¹	0 ¹	0 ²	0 ²	0.1	10
	Number of digits after decimal point	3	1	3	1	3	1
TNP-5	Input range	0-5.000	0-500.0	0-5.000	0-500.0	0.001-5.000	0.1-500.0
	Initial value	0 ¹	0 ¹	0 ²	0 ²	0.25	25
	Number of digits after decimal point	3	1	3	1	3	1
TNP-10	Input range	0-10.00	0-1000	0-10.00	0-1000	0.01-10.00	1-1000
	Initial value	0 ¹	0 ¹	0 ²	0 ²	0.5	50
	Number of digits after decimal point	2	0	2	0	2	0
Model	Item	Start position		Finish position		Trigger	
		Nm	Ncm	Nm	Ncm	Nm	Ncm
TNP-2	Input range	0-2.000	0-200.0	0-2.000	0-200.0	0-2.000	0-200.0
	Initial value	0	0	2	200	0	0
	Number of digits after decimal point	3	1	3	1	3	1
TNP-5	Input range	0-5.000	0-500.0	0-5.000	0-500.0	0-5.000	0-500.0
	Initial value	0	0	5	500	0	0
	Number of digits after decimal point	3	1	3	1	3	1
TNP-10	Input range	0-10.00	0-1000	0-10.00	0-1000	0-10.00	0-1000
	Initial value	0	0	10	1000	0	0
	Number of digits after decimal point	2	0	2	0	2	0

0¹ Initial value of upper limit value □ upper comparator value of the TNP

0² Initial value of lower limit value □ lower comparator value of the TNP

