

# TORQUE 10

## TORQUE TRANSDUCER SOFTWARE

### USER MANUAL

[www.magtrol.com](http://www.magtrol.com)



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## **PURCHASE RECORD**

Please record all model numbers and serial numbers of your Magtrol equipment, along with the general purchase information. The model number and serial number can be found on either a silver identification plate or white label affixed to each unit. Refer to these numbers whenever you communicate with a Magtrol representative about this equipment.

Model Number: \_\_\_\_\_

Serial Number: \_\_\_\_\_

Purchase Date: \_\_\_\_\_

Purchased From: \_\_\_\_\_

2<sup>nd</sup> English Edition | July 2023

## SAFETY PRECAUTIONS

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**WARNING**

WARNING! IN ORDER TO MINIMIZE RISKS, IT IS OF UTMOST IMPORTANCE TO RESPECT THE CURRENT SAFETY STANDARDS WHEN PLANNING, CONFIGURING AND OPERATING THE MAGTROL SPECIFIC HARDWARE AND SOFTWARE

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**CAUTION**

CAUTION! OPERATE THE SPECIFIC DEVICES WITH GREAT CAUTION! THE HARDWARE MAY BE IRREVERSIBLY DAMAGED IF IMPACTED MECHANICALLY (FALL), CHEMICALLY (ACIDS) OR THERMALLY (HOT AIR, VAPOR).

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1. Make sure that all Magtrol electronic products are earth-grounded, to guarantee personal safety and proper operation.
2. Check line voltage before operating electronic equipment.  
Make sure that all rotating parts are equipped with appropriate safety guards.
3. Periodically check all connections and attachments.
4. Always wear protective glasses when working close to rotating elements.
5. Never wear necktie or baggy clothes when standing close to rotating elements.
6. Never stand too close or bend over the rotating drive chain.

### QUALIFIED PERSONNEL

Persons in charge of installing and operating the MAGTROL Hardware and Software must have read and understood this user manual, paying extra close attention to all safety-related information.

The Software TORQUE 10 is designed to control the TS 100 Series, Model 3411 Torque Display Unit and Model 3410 Torque Display Unit, which are a high-precision products integrating the most recent measurement techniques. The Hardware in rotation can give rise to residual dangers if used and manipulated in a non-compliant way by unqualified personnel.



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# PREFACE

## PURPOSE OF THIS MANUAL

This manual contains information required for installation and general use of Magtrol's TORQUE 10 Software. To achieve maximum capability and ensure proper use, please read this manual in its entirety before operating. Keep the manual in a safe place for quick reference whenever a question should arise.

## WHO SHOULD USE THIS MANUAL

This manual is intended for those operators in need of a software program to complement their Magtrol test equipment setup. The setup may include any of the following Magtrol products:

- TS 100 series IN-LINE Torque Sensors
- Model 3411 Torque Display
- Model 3410 Torque Display

## MANUAL ORGANIZATION

This section gives an overview of the structure of the manual and the information contained within it. Some information has been deliberately repeated in different sections of the document to minimize cross referencing and to facilitate understanding through reiteration.

The structure of the manual is as follows:

- Chapter 1: INTRODUCTION -Contains the general information.
- Chapter 2: SOFTWARE INSTALLATION - Provides information needed for the installation of the TORQUE 10 software.
- Chapter 3: DRIVER INSTALLATION – Provides the method to install the driver needs for the communication with the TS 100 Series or 3410/3411 Torque Display Model.
- Chapter 4: TORQUE 10 EXECUTION - User interface for selecting language and menu access of TORQUE 10.
- Chapter 5: SETUP CONFIGURATION - User interface to select and set up parameters for testing instruments and analog hardware being utilized in the test configuration.
- Chapter 6: DISPLAY CONFIGURATION - User interface to select and set up parameters for testing instruments and analog/ input hardware being utilized in the test configuration.
- Chapter 7: TEST FUNCTION - User interface while the test is in progress.
- Chapter 8: DATA DISPLAY - Displays data in a tabular format and allows data saving and printing.
- Chapter 9: GRAPH DISPLAY - Displays a multi-plot graph and allows user selection of axis parameters and printing options
- Chapter 10: CREATING TASK - Provides step-by-step instructions for setting up analog input tasks for Temperature acquisition.

### CONVENTIONS USED IN THIS MANUAL

The following symbols and type styles may be used in this manual to highlight certain parts of the text:



**NOTICE**

INDICATES INFORMATION CONSIDERED IMPORTANT BUT NOT HAZARD RELATED. THIS IS INTENDED TO DRAW THE OPERATOR'S ATTENTION TO COMPLEMENTARY INFORMATION OR ADVICE RELATING TO THE SUBJECT BEING TREATED. IT INTRODUCES INFORMATION ENABLING THE CORRECT AND OPTIMAL FUNCTION OF THE PRODUCT.



**CAUTION**

INDICATES A HAZARDOUS SITUATION THAT, IF NOT AVOIDED, COULD RESULT IN MINOR OR MODERATE INJURY. THIS IS ALSO USED TO DRAW THE OPERATOR'S ATTENTION TO INFORMATION, DIRECTIVES, PROCEDURES, ETC. WHICH, IF IGNORED, MAY RESULT IN DAMAGE TO THE MATERIAL BEING USED. THE ASSOCIATED TEXT DESCRIBES THE NECESSARY PRECAUTIONS TO TAKE AND THE CONSEQUENCES THAT MAY ARISE IF THESE PRECAUTIONS ARE IGNORED.



**WARNING**

INDICATES A HAZARDOUS SITUATION THAT, IF NOT AVOIDED, COULD RESULT IN DEATH OR SERIOUS INJURY. THIS INTRODUCES DIRECTIVES, PROCEDURES, PRECAUTIONARY MEASURES, ETC. WHICH MUST BE EXECUTED OR FOLLOWED WITH THE UTMOST CARE AND ATTENTION, OTHERWISE THE PERSONAL SAFETY OF THE OPERATOR OR THIRD-PARTY MAY BE AT RISK. THE READER MUST ABSOLUTELY TAKE NOTE OF THE ACCOMPANYING TEXT, AND ACT UPON IT, BEFORE PROCEEDING FURTHER.



**DANGER**

INDICATES A HAZARDOUS SITUATION THAT, IF NOT AVOIDED, WILL RESULT IN DEATH OR SERIOUS INJURY. THE SIGNAL WORD «DANGER» IS TO BE LIMITED TO THE MOST EXTREME SITUATIONS. THIS INTRODUCES DIRECTIVES, PROCEDURES, PRECAUTIONARY MEASURES, ETC. WHICH MUST BE EXECUTED OR FOLLOWED WITH THE UTMOST CARE AND ATTENTION, OTHERWISE THE PERSONAL SAFETY OF THE OPERATOR OR THIRD-PARTY MAY BE AT RISK. THE READER MUST ABSOLUTELY TAKE NOTE OF THE ACCOMPANYING TEXT, AND ACT UPON IT, BEFORE PROCEEDING FURTHER.

The safety symbol may subsequently vary depending on the source of the hazard. Below are examples:



Figure 1 Various safety pictograms according to ISO 7010



# 1. INTRODUCTION

## 1.1 ABOUT TORQUE 10

Magtrol's TORQUE 10 is a program designed for use with Windows® 7 SP1/10/11 operating systems for PC-based data acquisition. Used in conjunction with Magtrol's Torque Sensors or Display Equipment, TORQUE 10 is equipped to interface and measure mechanical parameter of device under test.

The data generated can be stored, displayed and printed in tabular or graphic formats, and is easily imported into a spreadsheet.

Magtrol can also make custom modifications to the software to meet your specific requirement.

## 1.2 SYSTEM REQUIREMENTS

Minimum Recommended:

- Personal computer with Intel i3 Processor (or equivalent, i5 recommended)
- Microsoft® 7SP1/10/11 (32-bit or 64-Bit Operating system)
- 4 GB of RAM
- 4 GB of available hard drive space
- VGA color monitor with minimum screen resolution 1024 x 768
- A USB interface for TS Series and Model 3411. LAN can be also used for Model 3411. the Model 3410 require a RS-232 interface.

## 1.3 SOFTWARE FEATURES

### 1.3.1 NEW FEATURES OF TORQUE 10

- Dual Channel functionality is available to test gearbox, with Mechanical efficiency parameter.
- TS 100 Series High Speed acquisition 10kSamples for 1 second for post analysis.

### 1.3.2 OTHER FEATURES

- Graphical User Interface has user friendly tabbed pages for quick navigation
- TS 100 Series, MODEL 3411 TORQUE Display and MODEL 3410 TORQUE Display support.
- Supports the optional Analog Input for Thermocouple measurement.
- Options selected by menu at the top of windows
- Export Data to Excel sheet functionality
- Export Graph image to clipboard or file.
- Customizable the sampling of acquisition.
- Save/Load Setup function
- Save/Load Data function



## 2. SOFTWARE INSTALLATION

### 2.1 INSTALLATION PROCEDURE

Plug the USB flash memory or insert the TORQUE 10 DVD-Rom disk into your target computer's DVD drive. The installer package can be downloaded from the Magtrol Internet Site.

<https://www.magtrol.com/software-downloads/>

Installation listing:

- TORQUE 10 files
- LabVIEW™ Runtime 2020
- NI-DAQmx Runtime 20.1
- NI-Serial Runtime 20.0
- NI-VISA Runtime 20.0

Navigate inside the USB flash drive / DVD-Rom under TORQUE 10 folder.

Then Run install.exe.

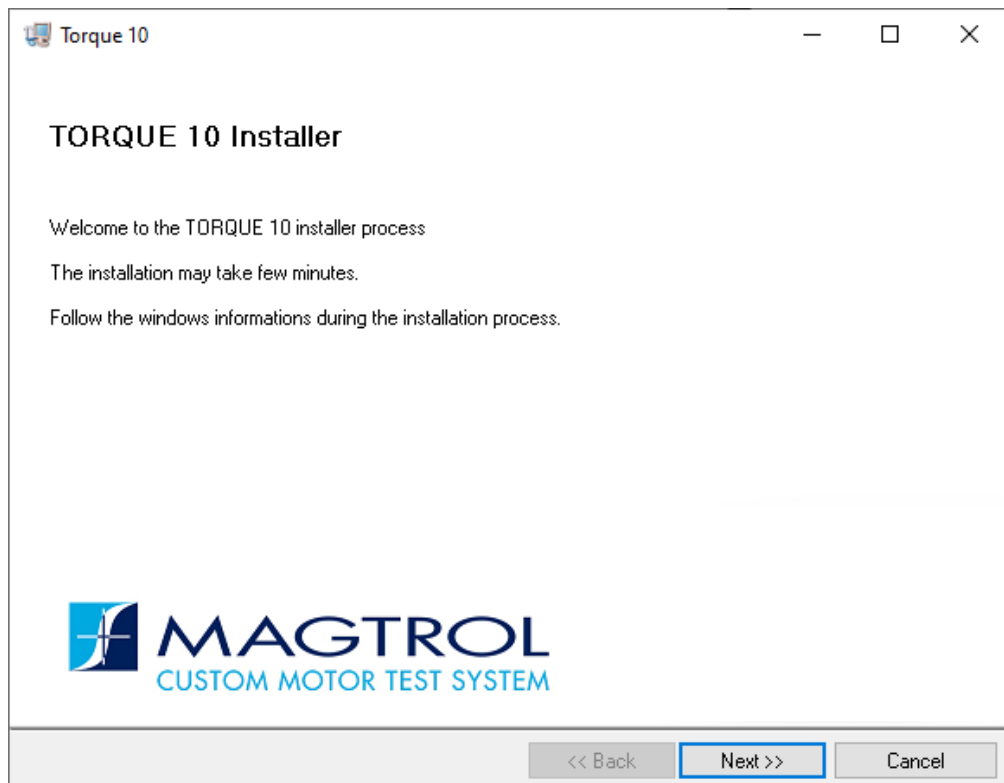


Figure 2 Run Setup Windows

Use Explorer to find the intall.exe file on the disk. Double-click this file to begin the installation process.

If security is enabled, allow Windows to install this program.

The default installation folders for TORQUE 10 and the required drivers appear in the next window



#### CAUTION

CAUTION! YOU MAY CHANGE THESE IF NECESSARY BUT DO NOT INSTALL TORQUE 10 IN THE WINDOWS PROGRAM FILES (X86) FOLDER.

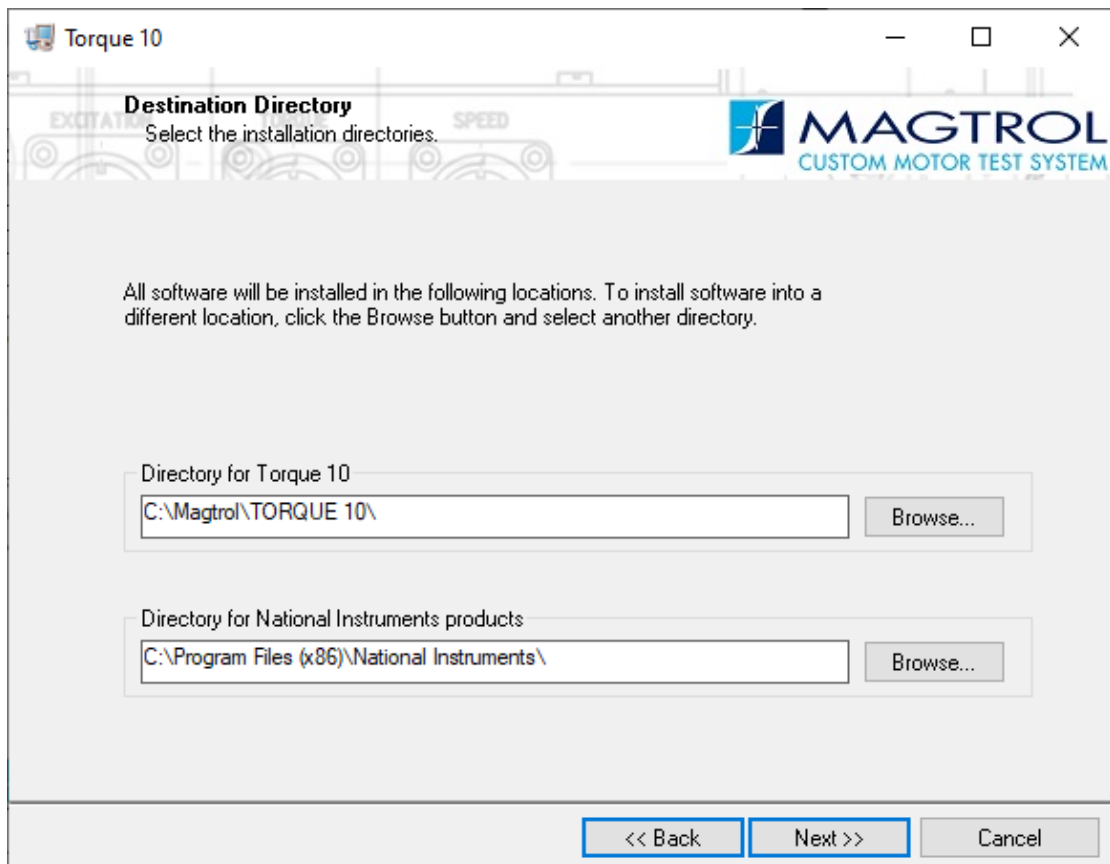


Figure 3 Destination Directory Window

This process can take several minutes to an hour depending upon the computer being used. Please plan accordingly.

When all programs are installed, the following window will appear. Click Finish to complete the installation.

## 3. DRIVER INSTALLATION

### 3.1 TS 1XX SERIE DRIVER

The TS can be controlled in USB (TMC) interface or COM (CDC) interface.

**NOTICE**

TORQUE 10 supports the USB (TMC) interface for TS 100 Series.

The COMx could be used, but not recommended.

The USB interface doesn't require any specific driver except the basic installation delivered with the TS 100 Series

The COM driver could be installed from the DVD or USB flash

→ \DRIVERS\TS Series\

TorqueSensor.x64.msi → 64-bit operating system.

TorqueSensor.x86.msi → 32-bit operating system.

Double-click on the correspondent driver.

### 3.2 MODEL 3411 DRIVER

The MODEL 3411 can be controlled in USB (TMC) interface or COMx (CDC) interface.

**NOTICE**

TORQUE 10 supports the USB (TMC) interface for Model 3411.

The COMx could be used, but not recommended.

The USB interface doesn't require any specific driver except the basic installation delivered with the MODEL 3411

The COM driver could be installed from the DVD or USB flash

→ \DRIVERS\3411\

Depending on the 3411 firmware select the driver corresponding.

Select x64 or x86 depending on operating system.

**CAUTION**

LAN interface is also available but the configuration of LAN setting must be done via USB interface before configurate LAN connection via NI MAX

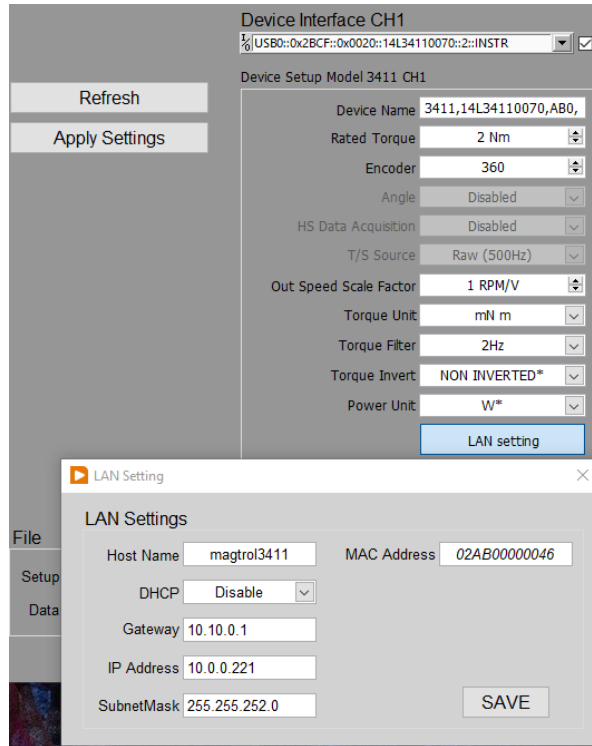


Figure 4 3411 LAN Settings

### 3.2.1 LAN CONFIGURATION

Run NI MAX.exe from National Instruments software tools

Open Devices and Interfaces

Right click on Network Devices, select Create New VISA TCP/IP Resource

Select Manual Entry of RAW Socket

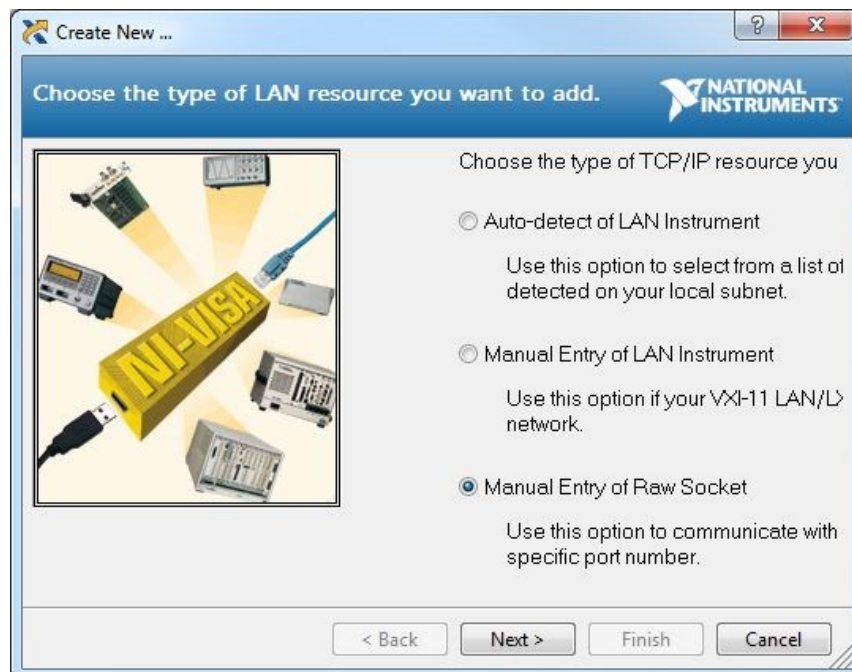


Figure 5 NI MAX

Press Next

Enter IP address and Port Number (3411) then press Validate

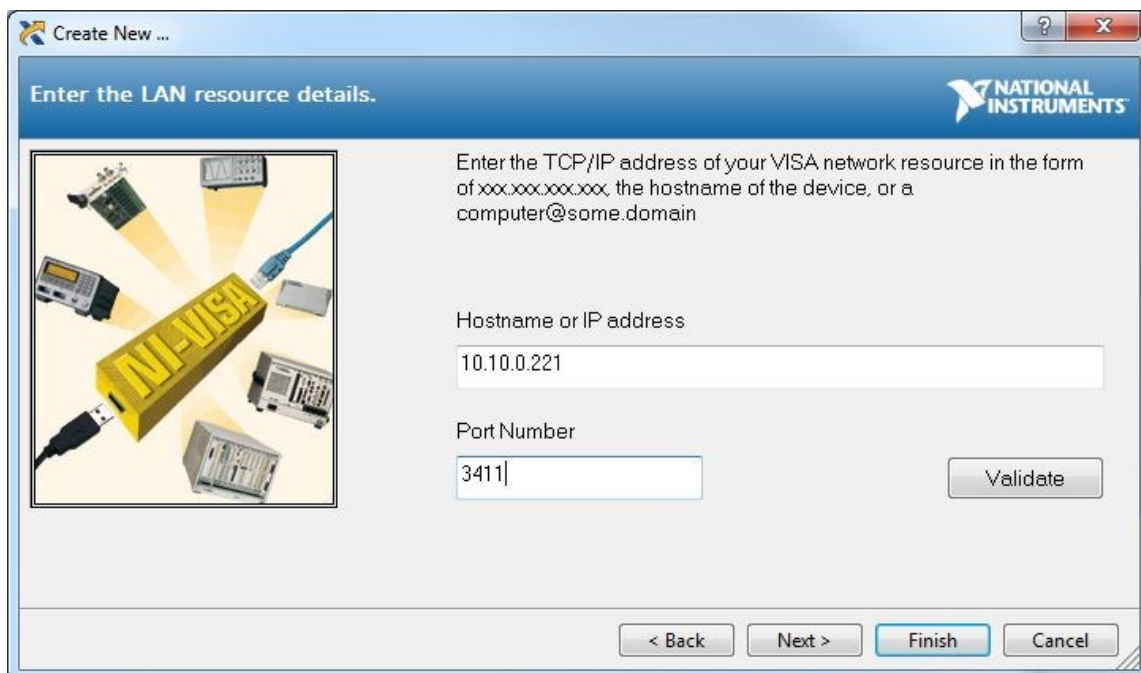


Figure 6 NI MAX TCP/IP

Press Validate

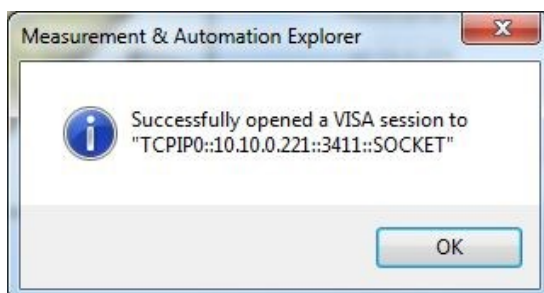


Figure 7 NI MAX Validate

Press OK and Next

Enter the name of port which will appears in Interface field.

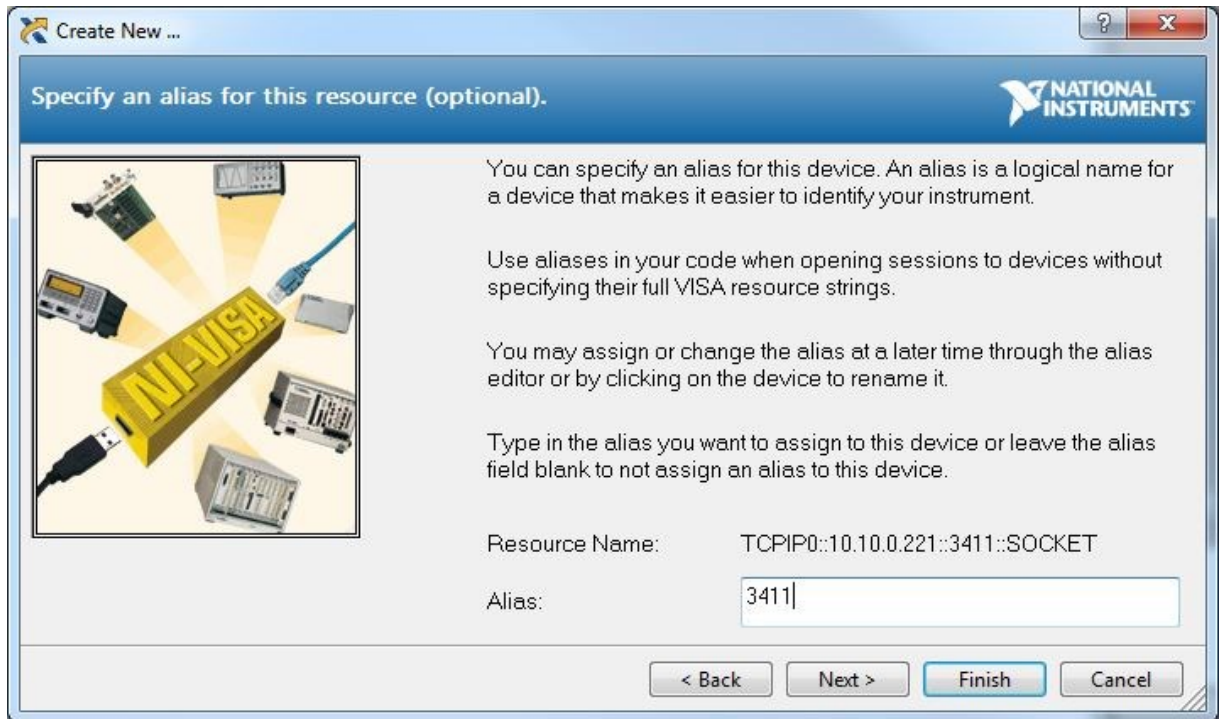


Figure 8 NI MAX TCP/IP Alias name

Then Press Finish.

If you have some problem to configure correctly the LAN, please ask your IT service to have some help.

### 3.3 MODEL 3410 DRIVER

No specific driver requested. This MODEL 3410 has a true RS-232 interface.



**NOTICE** RS-232 cable Female-Female 1:1 SUB-D 9 poles  
An USB to RS-232 converter can be used if the computer hasn't a RS-232 native port.



## 4. TORQUE 10 EXECUTATION

Double click on TORQUE 10.exe

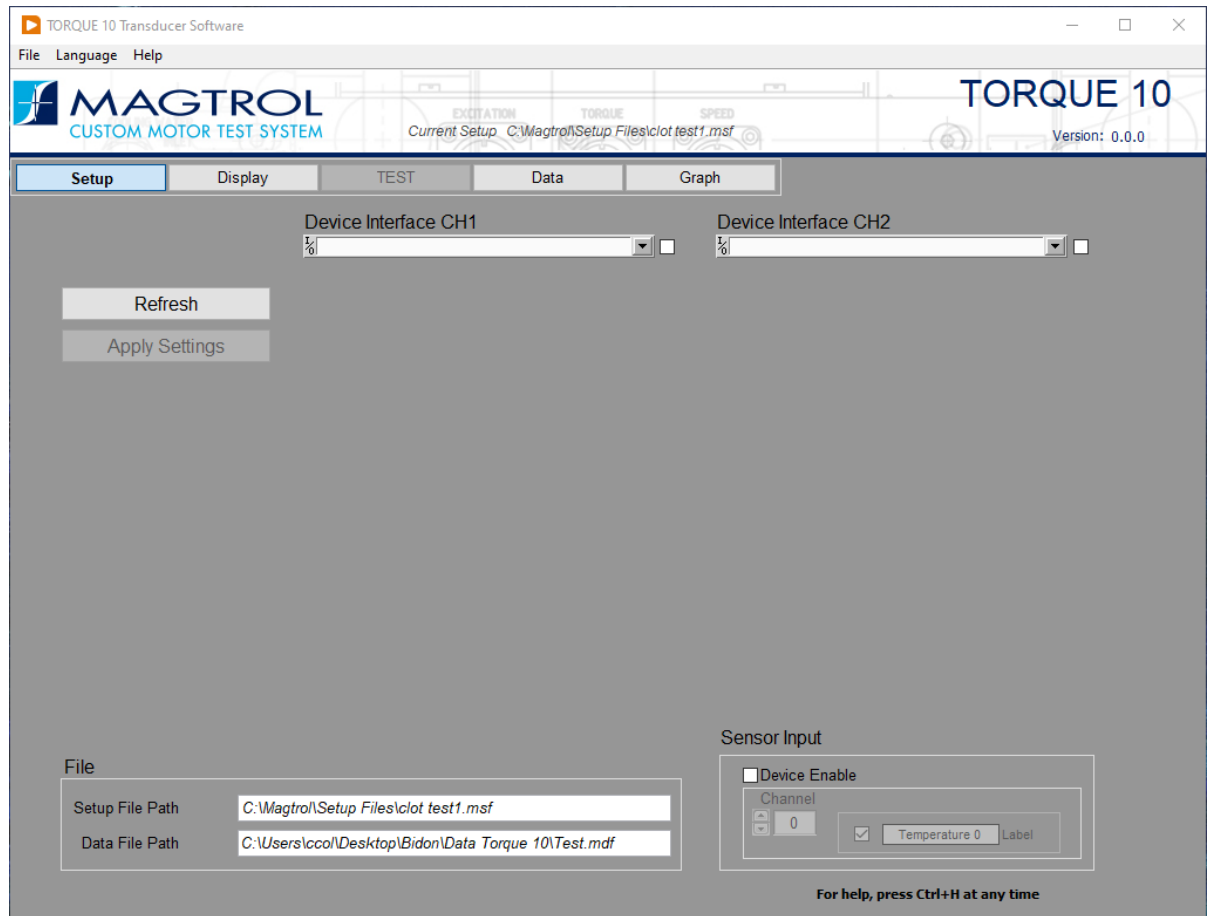


Figure 9 Main window

### 4.1 MENU

On top of the window, 3 menus are available

#### 4.1.1 FILE MENU

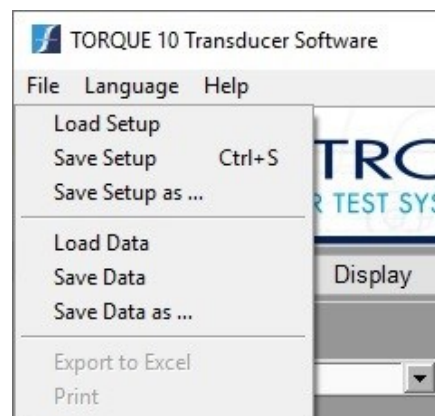


Figure 10 File Menu

CONTROL	FUNCTION
<b>Load setup</b>	Press to load a specific Setup file.
<b>Save Setup [Ctrl+S]</b>	Press to save the current configuration in current filename. If the current filename is empty, a dialog windows opens to select the filename to save. The shortcut Ctrl+S is the same function
<b>Save Setup as ...</b>	Press to save the current configuration in specific filename. The filename and path will be use when press "Save Setup"
<b>Load Data</b>	Press to load a specific data file.
<b>Save Data</b>	Press to save the current data in current data filename. If the current filename is empty, a dialog windows opens to select the filename to save.
<b>Save Data as ...</b>	Press to save the current data in specific filename. The filename and path will be use when press "Save Data"
<b>Export to Excel</b>	Press to export directly current data in Excel application. This function requires to have Excel 2010 or higher.
<b>Print</b>	Press to print the Data or Graph

Depending of the function or position in the program, some of the menu can be disable and greyed.

### 4.1.2 LANGUAGE MENU



Figure 11 Language Menu

**Language** menu allow the user to select the language used throughout the program. The current language is a flag.

### 4.1.3 HELP MENU

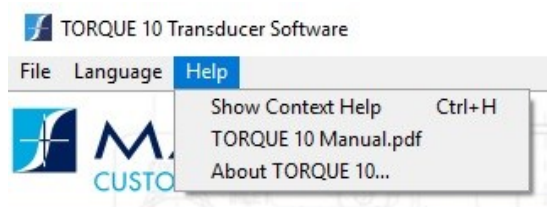


Figure 12 Help Menu

CONTROL	FUNCTION
<b>Show Context Help Ctrl+H</b>	Enable or disable the context help
<b>TORQUE 10 Manual.pdf</b>	Load the manual to Acrobat Reader.
<b>About TORQUE 10...</b>	Show information's about this software

## 5. SETUP CONFIGURATION

This is the default button when starting the TORQUE 10 program.

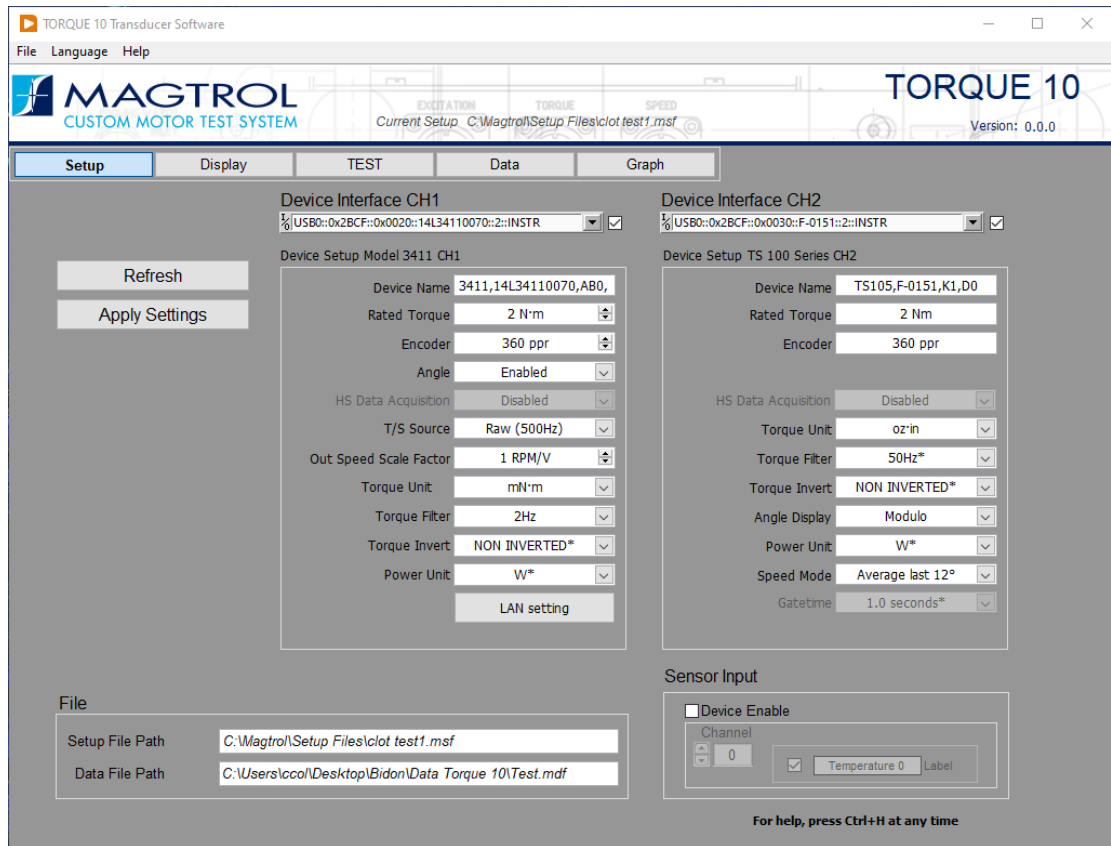


Figure 13 Setup display

## 5.1 DEVICE INTERFACE

- TS Series: `USB0::0x2BCF::0x0030::C-0052::2::INSTR` → Chapter [TS 1xx Setup](#)
- 3411: `USB0::0x2BCF::0x0020::14L34110070::2::INSTR`  
or LAN → Chapter [3411 Setup](#)
- 3410: COMx → Chapter [3410 Setup](#)



**NOTICE**

To know the COMx port select, go to Device Manager windows

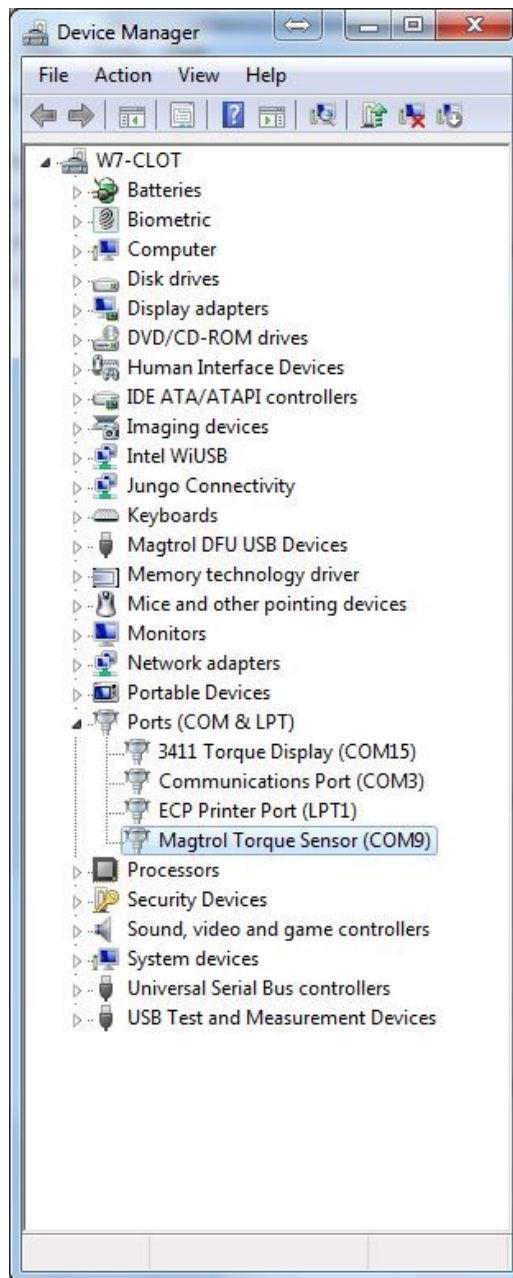


Figure 14 Device Manager

TS Series = Magtrol Torque Sensor

3411 Torque Display = 3411

## 5.2 TS 1XX SETUP

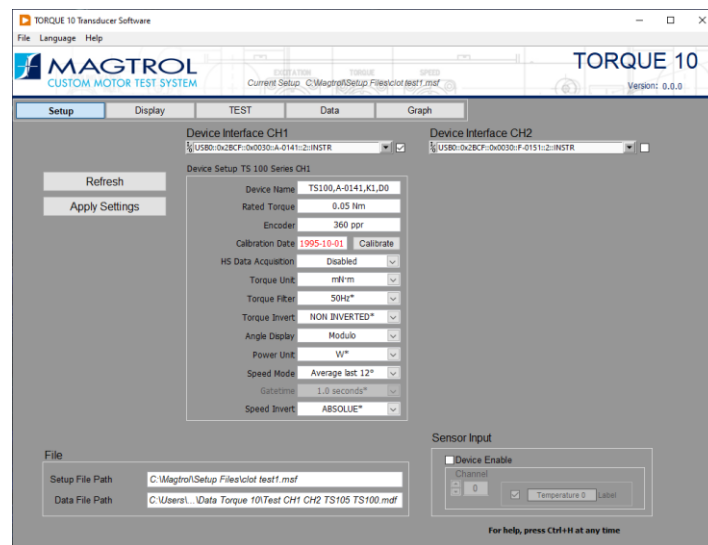


Figure 15 TS 1xx Setup

Select the Device Interface of the TS 1xx connected. USB0::.....

CONTROL	FUNCTION
<b>Device Name</b>	Identification of the device
<b>Rated Torque</b>	Display the Rated Torque of the device
<b>Encoder</b>	Display the Pulse per Revolution of the encoder measure system
<b>Calibration Date</b>	This control shows the last calibration date. If the calibration date has expired, the Calibrate button appears. Pressing it will take you to the official Magtrol website to contact the calibration service.
<b>HS Data Acquisition <sup>1</sup></b>	This mode is used to acquire 10000 torque samples in 1 second. This mode can only be activated on one channel at a time
<b>Torque Unit</b>	Select the Units that you wish to display the Torque value
<b>Torque Filter</b>	Select the Torque Filter value
<b>Torque Invert</b>	Select the sign of Torque
<b>Angle Display</b>	Selects cumulative angle of rotation (ABSOLUTE) or resets the reading when +/- 360° is reached (MODULO).
<b>Power Unit</b>	Select the unit of Mechanical power
<b>Speed Mode</b>	Set the method to calculate the speed <ul style="list-style-type: none"> <li>• Slide average of last 360°</li> <li>• Slide average of last 12°</li> <li>• Gated determinate by gate setting<sup>2</sup></li> <li>• Sum &amp; Average each 360°</li> </ul>
<b>Gatetime</b>	Select the time in case of Speed is set to Gated <sup>2</sup>
<b>Speed Invert</b>	Select the sign of Speed

<sup>1</sup> Parameter only available in USB0::..... Communication, not in COMx

<sup>2</sup> If Gated selected, the Gatetime field appears to select the time for the averaging speed. This time can be selected of the following value [ 0.2 | 0.5 | 1.0 | 2.0 | 5.0 ] second.

### 5.3 3411 SETUP

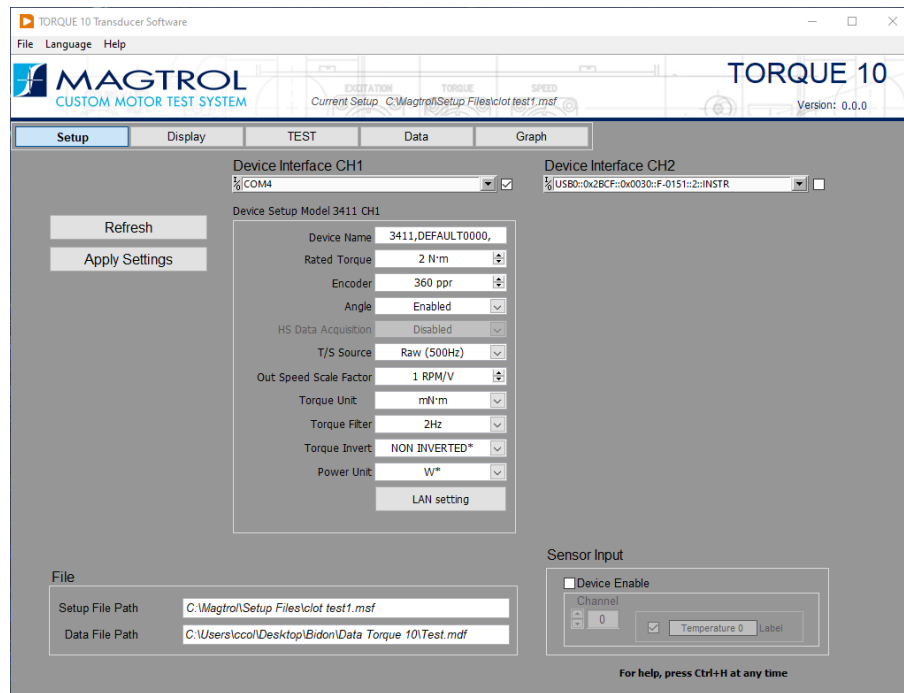


Figure 16 3411 Setup

When Interface of 3411 is selected the Device Name is displayed.

Model,SerialNumber,FirmwareVersion

CONTROL	FUNCTION
Device Name	Identification of the device
Rated Torque	Set the nominal torque of the Torquemaster connected to the unit
Encoder	Selects the pulse count per revolution of the encoder being used.
Angle <sup>1</sup>	Enable this field to acquire the Angle parameter
HS Data Acquisition <sup>1</sup>	Enable the High-Speed acquisition (488 S/sec)
T/S Source <sup>1</sup>	Select the source of data in High-Speed mode
Out Speed Scale Factor	Set the transfer of analog speed output [RPM/V] Range from 0 to 999,999.
Torque Unit	Selects the torque unit used in software
Torque Filter	Selects the cutoff frequency for the low-pass filter in the torque measurement.
Torque Invert	Select the sign of Torque
Power Unit	Select the mechanical power unit to display. In 3410 case, select the power unit matched with selected in the device.

<sup>1</sup>Parameter only available in USB0::..... Communication, not in COMx

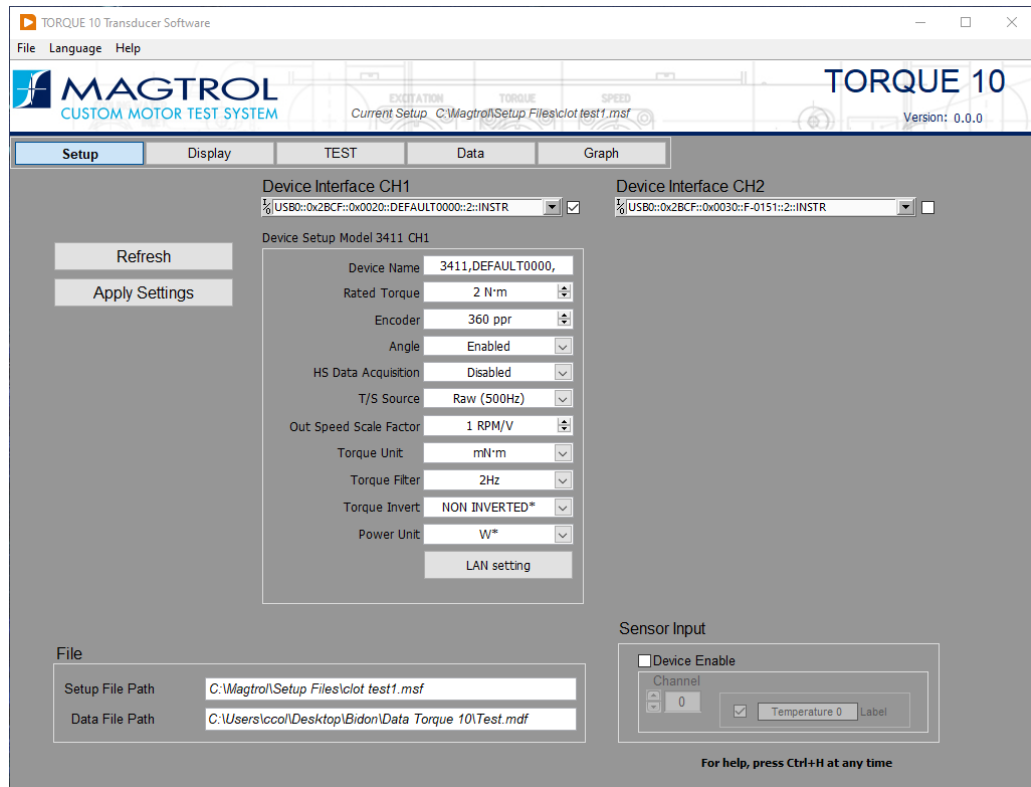


Figure 17 3411 USB setup

### 5.3.1 3411 LAN SETTING

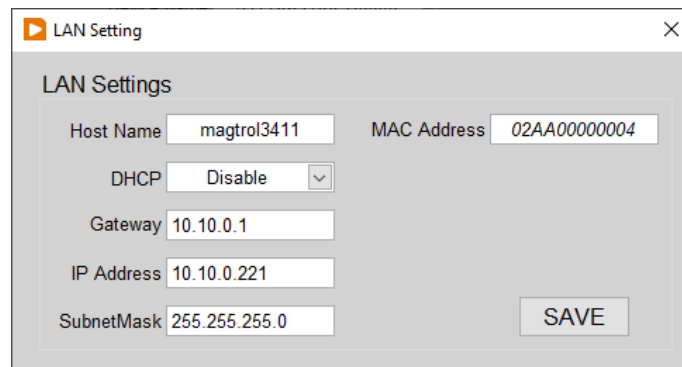


Figure 18 3411 LAN Setting

Enter correct parameter for LAN settings. Please contact your IT administration if you need more information.

### 5.4 3410 SETUP

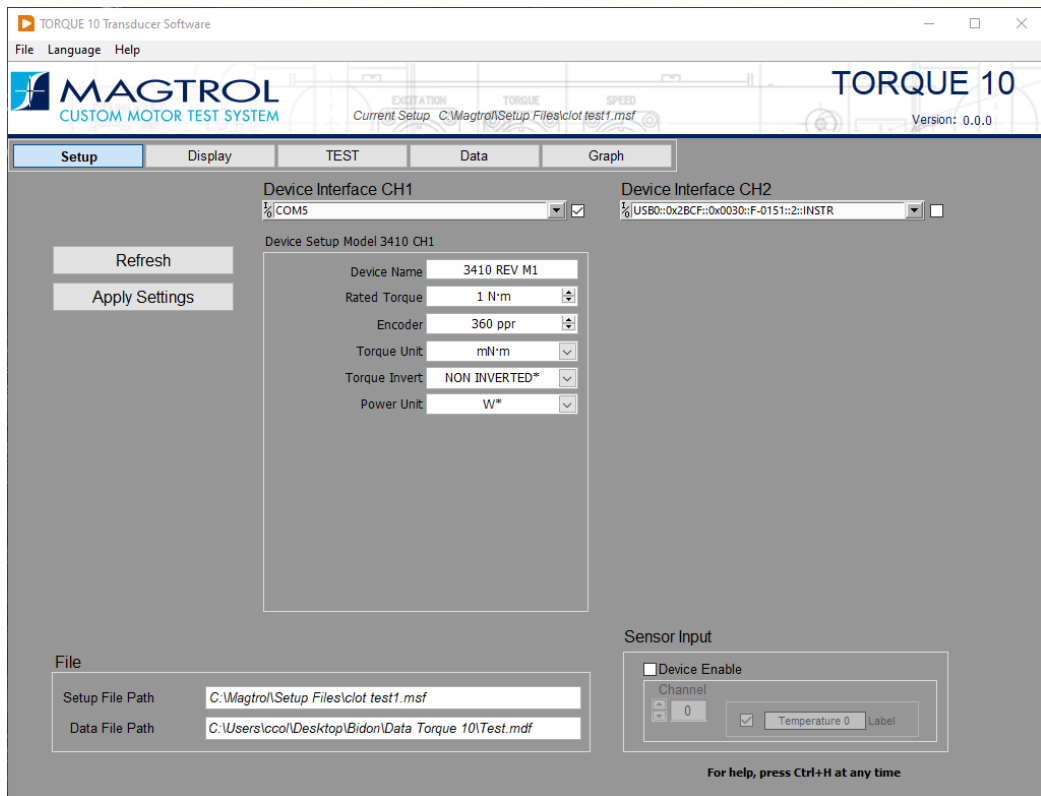


Figure 19 3410 Setup

When Interface of 3410 is selected the Device Name is displayed.

Model and Firmware Version

CONTROL	FUNCTION
<b>Device Name</b>	Identification of the device
<b>Rated Torque</b>	Set the nominal torque of the Torquemaster connected to the unit
<b>Encoder</b>	Selects the pulse count per revolution of the encoder being used.
<b>Torque Unit</b>	Selects the torque unit used in software
<b>Torque Invert</b>	Select the polarity of the torque measurement.
<b>Power Unit</b>	Select the mechanical power unit to display. In 3410 case, select the power unit matched with selected in the device.



### 5.5 INSTRUMENTS SETUP COMPATIBILITY

Thanks to the flag next to "Device Interface", it is Possible to activate two channels simultaneously. All the instruments can be combined with each other in any combination.

It is important to note that the HS Data Acquisition mode cannot be activated when both channels are activated.

The following images show some of these combinations.

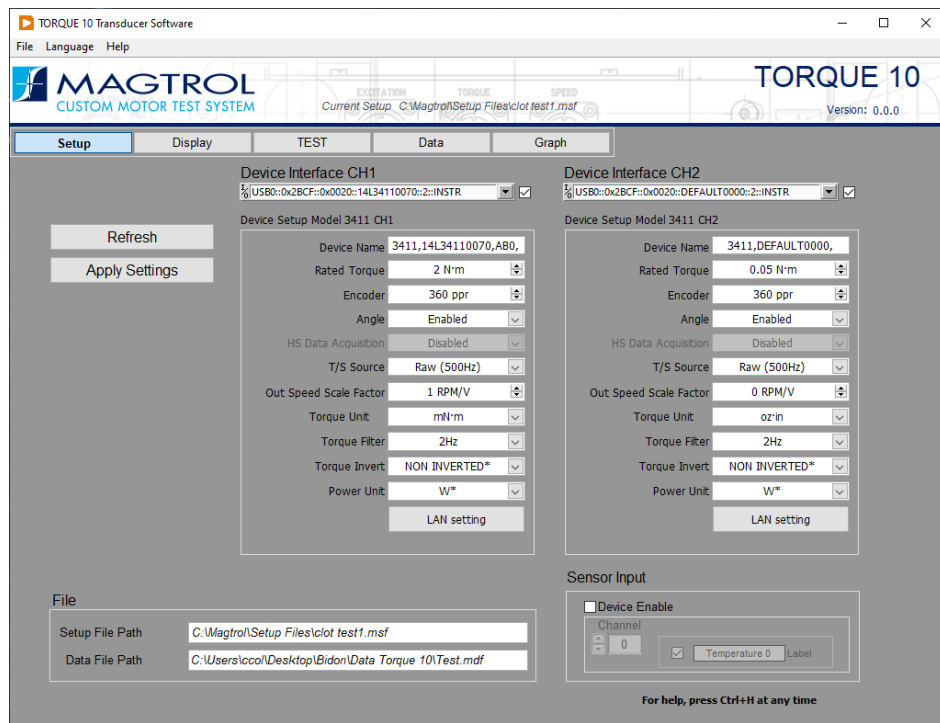


Figure 20 Setup 3411 & Setup 3411

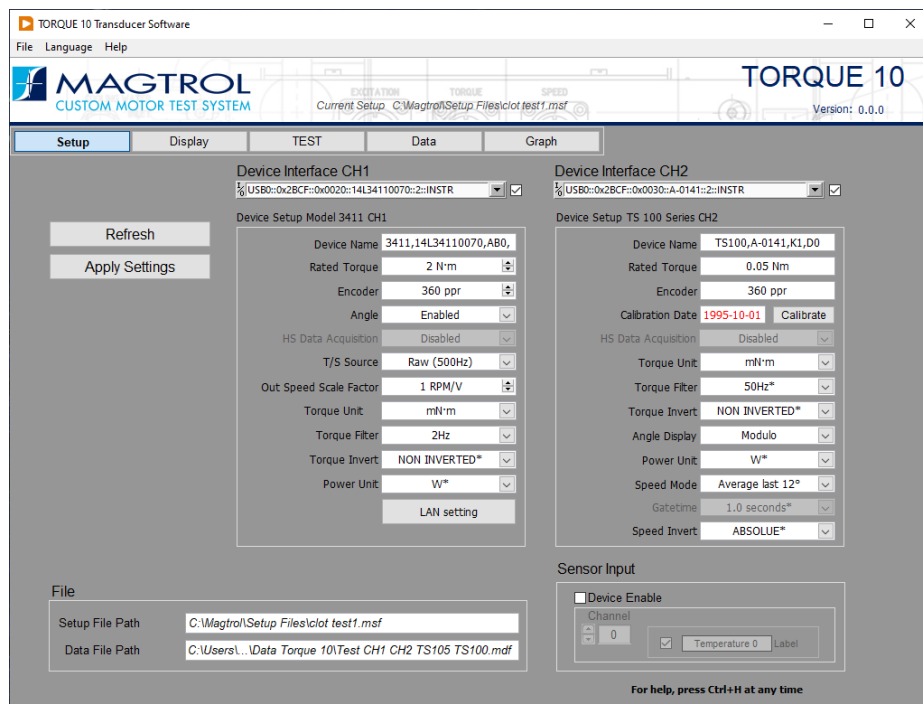


Figure 21 Setup 3411 & Setup TS

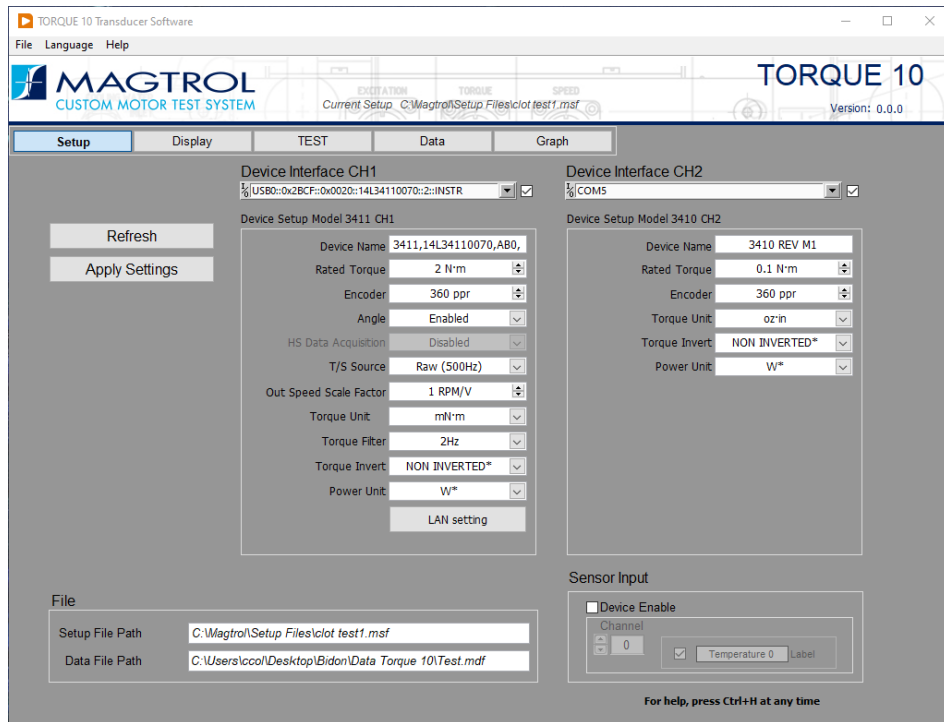


Figure 22 Setup 3411 & Setup 3410

## 5.6 SENSOR INPUT (TEMPERATURE)

The accessory temperature input device. This requires a USB or PCI data acquisition device and an TI Task configured in Measurement and Automation Explorer. For more information on TI Task refer to Section 10.1

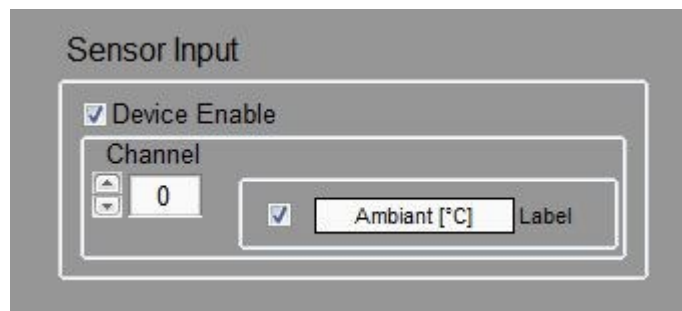


Figure 23 Sensor Input Setting

CONTROL	FUNCTION
<b>Device Enable</b>	Check this box to enable the accessory temperature input device.
<b>Channel (0 - n)</b>	The channel number of the accessory analog output device.
<b>Enable</b>	Check this box to enable the accessory analog output channel.
<b>Label</b>	Enter a name for this analog output. This name will appear in the Curve and Pass/Fail test Control Data table for programming output voltages in each step.

## 5.7 FILE

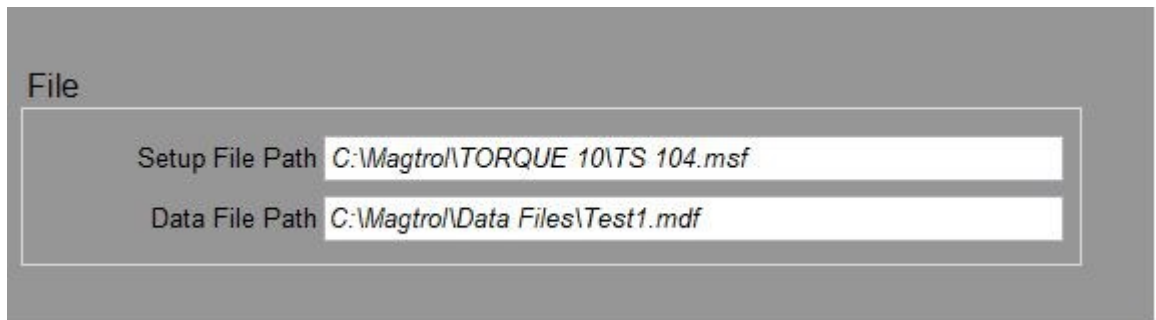


Figure 24 File indicator

INDICATOR	FUNCTION
Setup File Path	Show the current Setup file path and name.
Data File Path	Show the current Data file path and name.



### NOTICE

Right click on field can be used to Open the file location. This is a helpful to locate and manage the Setup and Data files.

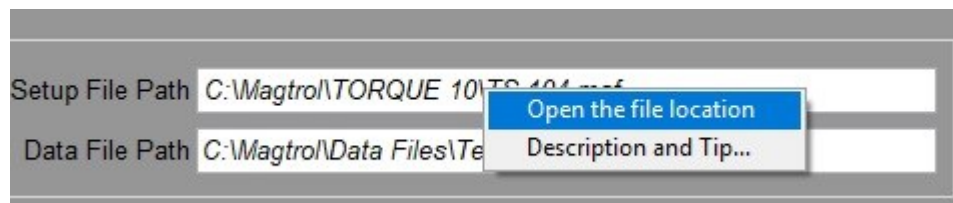


Figure 25 Right Click



## 6. DISPLAY CONFIGURATION

Keynote:

You cannot access this menu if you have selected the HS Data Acquisition mode of the TS 100 Series.

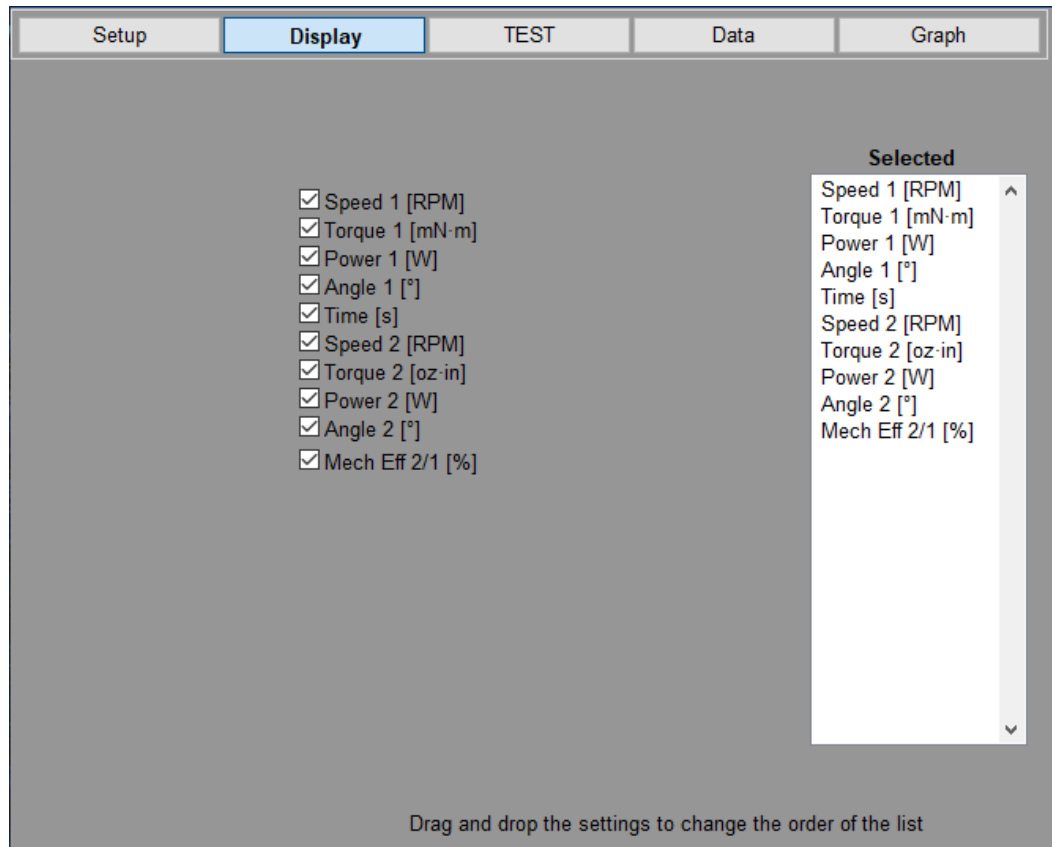


Figure 26 Configure Display

### 6.1 FLAG PART

This is the list of parameters that can be measured and displayed during a test. Select an item by click on the flag. This will add parameters in Selected listbox.

The number of parameters in the list depends on the number of channels activated in the Setup page.

### 6.2 SELECTED

The selected parameters that will be measured and recorded during the test. The order of parameters in the selected panel may be changed by clicking on that parameter and dragging it to the desired location. The order in which they appear in the panel is the same order they will appear in the data table during a test.

Use the File menu to save the Setup or directly via the short key [Ctrl+S] !



## 7. TEST FUNCTION

This example shows the activation of both channels TS 100 Series connected in USB mode. The LED next to the Tare buttons indicate the status of the Tare value for each channel.

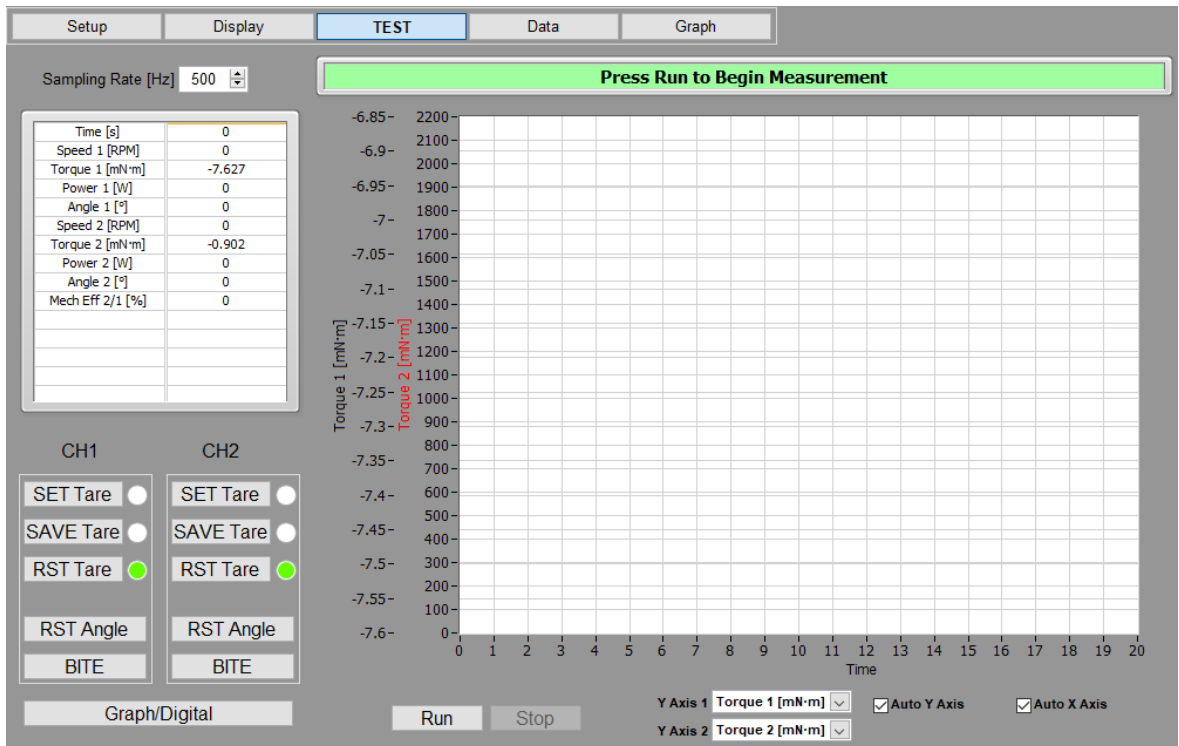


Figure 27 Test button

The parameters are refreshed each second when the test not running

CONTROL	FUNCTION
<b>Sampling Rate [Hz]</b>	The frequency at which a data point will be stored. The maximum frequency is: TS = 500Hz (10k Samples for 1 second in HS) 3411 = 50Hz (488 in HS) 3410 = 20Hz
<b>SET Tare CH1/CH2</b>	Set the current torque to the Tare value. The tare is not saved.
<b>SAVE Tare CH1/CH2</b>	Set the current torque to the Tare value. The tare is saved inside the TS
<b>RST Tare CH1/CH2</b>	Remove the Tare value.
<b>RST Angle CH1/CH2</b>	Reset Angle to zero before Run Test
<b>BITE CH1/CH2</b>	Set the Bite function for about 10sec.
<b>Graph/Digital</b>	Swap between graphical or numeric display. For long term test, it is recommended to set the Digital display → memory management
<b>Y Axis 1</b>	Select the parameter to show on Y axis 1
<b>Y Axis 2</b>	Select the parameter to show on Y axis 2
<b>Auto Y axis</b>	Enables auto-scaling of the Y-axis parameter.
<b>Auto X axis</b>	Enables auto-scaling of the X-axis parameter.
<b>Run</b>	Start the test.
<b>Stop</b>	Stop the test.

The Sampling rate is depending of the model connected and if 1 or 2 channels are selected.  
 Vales for normal mode (HS data acquisition → disable)

The following table shows the Sampling rate per second.

MODEL	Channel 1 or 2		Channel 1+2		High-Speed
	COMx	USB	COMx	USB	
<b>TS 100 Series</b>	-	500	-	300	10'000
<b>Model 3411</b>	-	50	-	30	488
<b>Model 3410</b>	-	20	-	10	-

Figure 28 Sampling rate Table.



## 7.1 RUN TEST “NORMAL” TWO CHANNELS

Press RUN button to start the measurement.

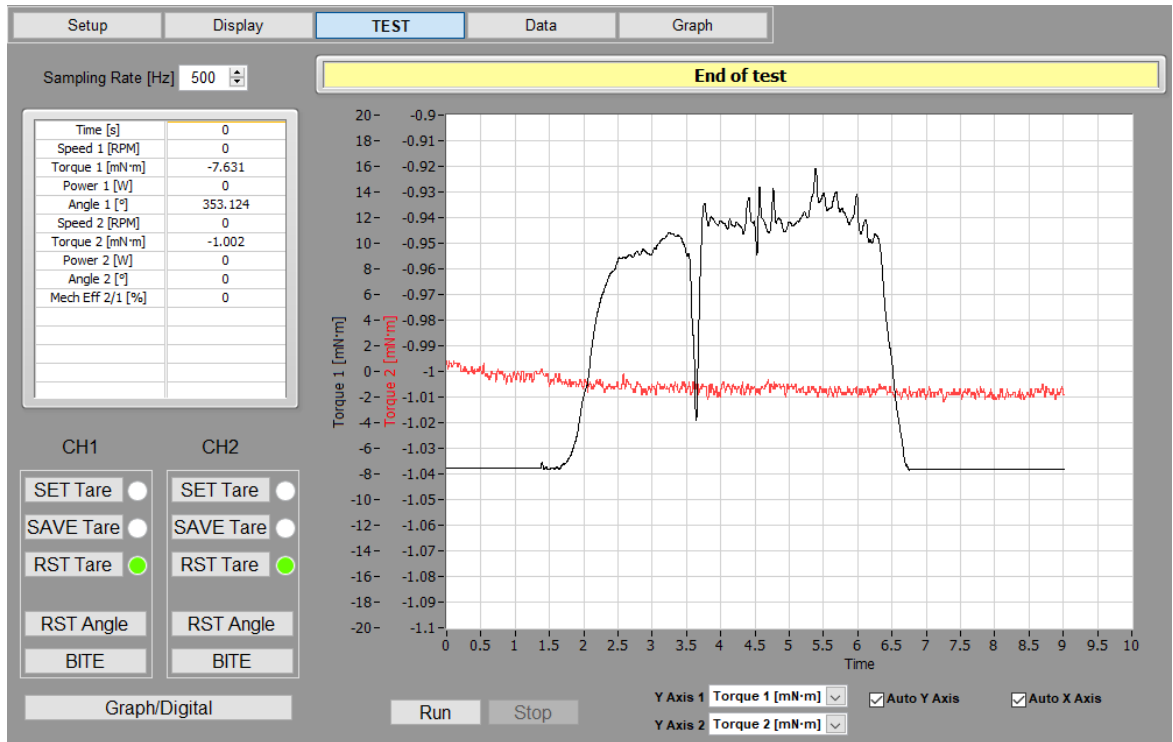


Figure 29 Run “Normal” mode Two Channels

This example shown a test at the maximum speed of acquisition in “Normal” mode!

### 7.1.1 RESULT OF ACQUISITION

The screenshot shows the 'Data' tab of the software interface. It displays a table with the following columns: Time [s], Speed 1 [RPM], Torque 1 [mN·m], Power 1 [W], Angle 1 [°], Speed 2 [RPM], Torque 2 [mN·m], Power 2 [W], Angle 2 [°], and Mech Eff 2/1 [%]. The table contains 25 rows of data, showing a constant speed of 0 RPM and a constant torque of approximately -7.56 mN·m for Torque 1 and -0.997 mN·m for Torque 2. The angle for both channels is constant at 111.024 degrees.

Time [s]	Speed 1 [RPM]	Torque 1 [mN·m]	Power 1 [W]	Angle 1 [°]	Speed 2 [RPM]	Torque 2 [mN·m]	Power 2 [W]	Angle 2 [°]	Mech Eff 2/1 [%]
0	0	-7.559	0	111.024	0	-0.996	0	0	0
0.005	0	-7.56	0	111.024	0	-0.997	0	0	0
0.012	0	-7.56	0	111.024	0	-0.998	0	0	0
0.018	0	-7.559	0	111.024	0	-0.999	0	0	0
0.022	0	-7.558	0	111.024	0	-0.999	0	0	0
0.032	0	-7.558	0	111.024	0	-0.998	0	0	0
0.036	0	-7.559	0	111.024	0	-0.997	0	0	0
0.039	0	-7.56	0	111.024	0	-0.997	0	0	0
0.042	0	-7.56	0	111.024	0	-0.996	0	0	0
0.046	0	-7.56	0	111.024	0	-0.997	0	0	0
0.049	0	-7.56	0	111.024	0	-0.997	0	0	0
0.051	0	-7.56	0	111.024	0	-0.997	0	0	0
0.054	0	-7.561	0	111.024	0	-0.997	0	0	0
0.056	0	-7.562	0	111.024	0	-0.997	0	0	0
0.059	0	-7.562	0	111.024	0	-0.997	0	0	0
0.062	0	-7.562	0	111.024	0	-0.997	0	0	0
0.065	0	-7.562	0	111.024	0	-0.997	0	0	0
0.069	0	-7.562	0	111.024	0	-0.997	0	0	0
0.072	0	-7.563	0	111.024	0	-0.997	0	0	0
0.074	0	-7.563	0	111.024	0	-0.998	0	0	0
0.078	0	-7.564	0	111.024	0	-0.998	0	0	0
0.08	0	-7.564	0	111.024	0	-0.998	0	0	0
0.083	0	-7.565	0	111.024	0	-0.998	0	0	0
0.085	0	-7.565	0	111.024	0	-0.998	0	0	0
0.088	0	-7.565	0	111.024	0	-0.998	0	0	0
0.09	0	-7.565	0	111.024	0	-0.998	0	0	0
0.093	0	-7.564	0	111.024	0	-0.998	0	0	0
0.096	0	-7.563	0	111.024	0	-0.997	0	0	0
0.099	0	-7.563	0	111.024	0	-0.996	0	0	0
0.101	0	-7.563	0	111.024	0	-0.996	0	0	0
0.104	0	-7.563	0	111.024	0	-0.996	0	0	0
0.107	0	-7.564	0	111.024	0	-0.996	0	0	0
0.11	0	-7.563	0	111.024	0	-0.996	0	0	0
0.113	0	-7.562	0	111.024	0	-0.997	0	0	0

Figure 30 Acquisition from 2 channels

## 7.2 RUN TEST “NORMAL” SINGLE CHANNEL

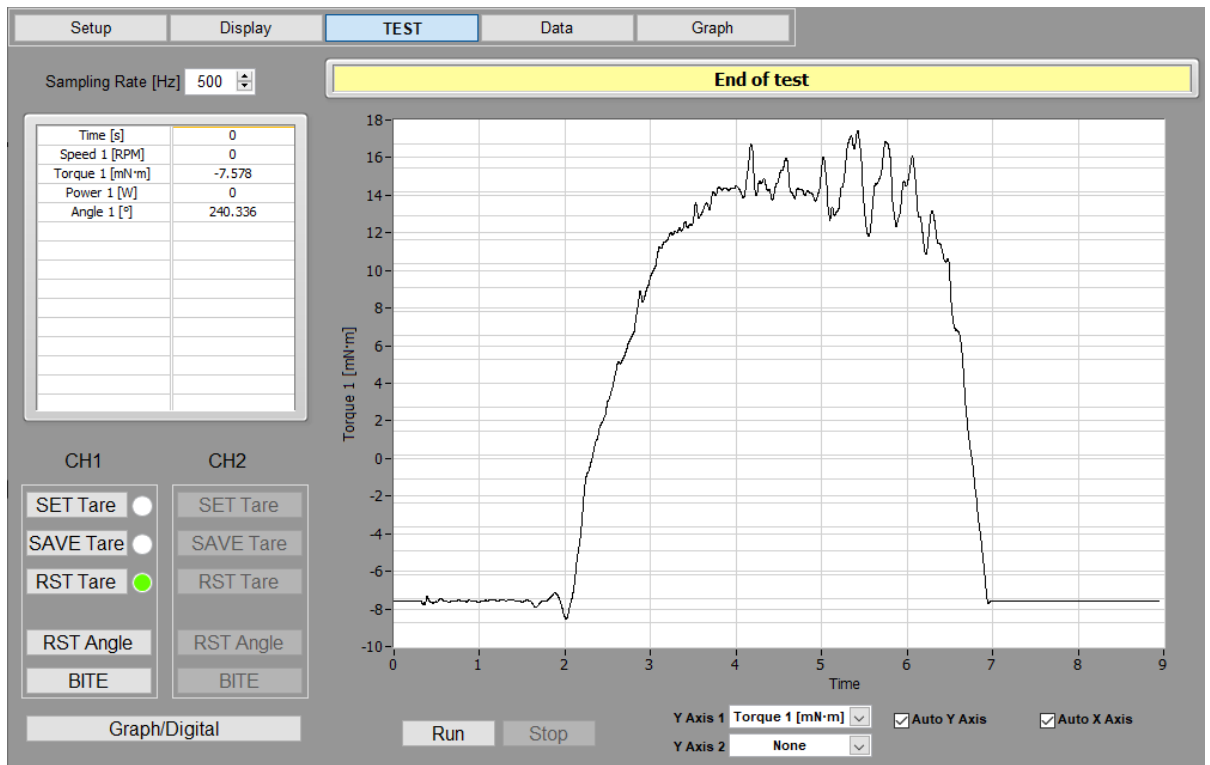


Figure 31 Run “Normal” mode Single Channels

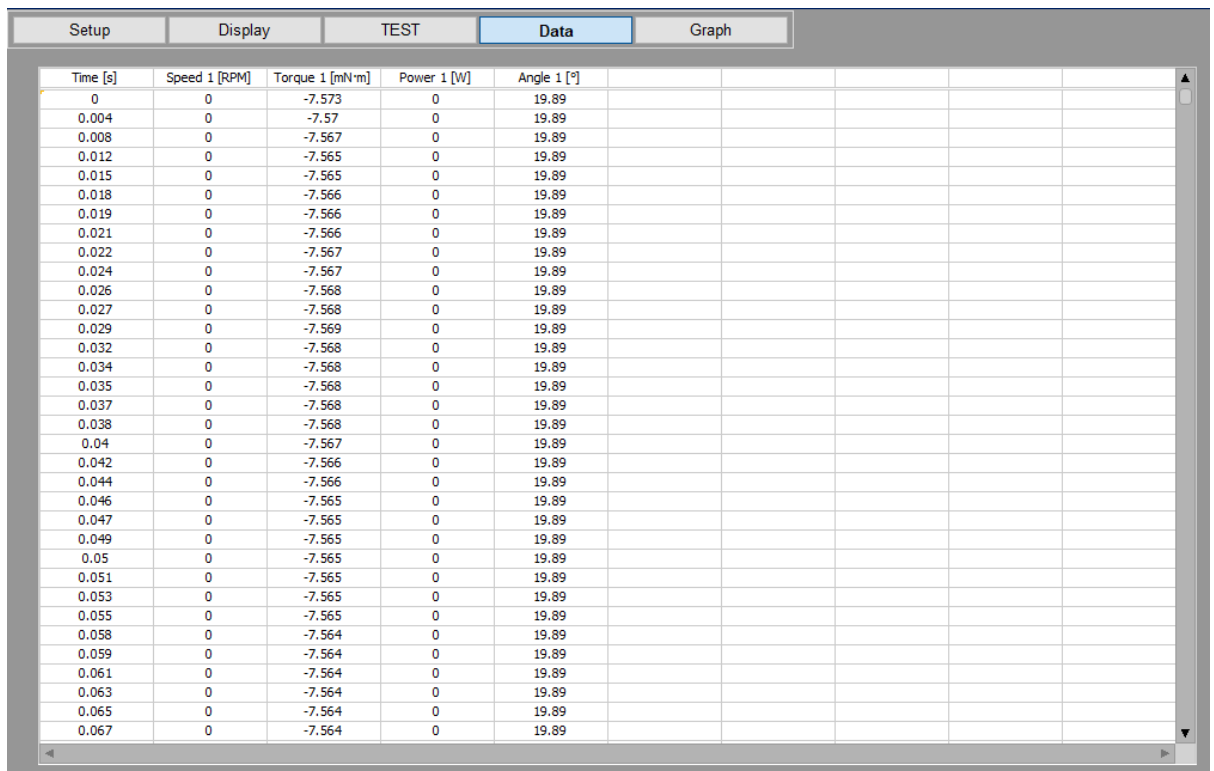


Figure 32 Acquisition from single channel

### 7.3 RUN TEST IN “HS DATA ACQUISITION” MODE

The High-Speed Data Acquisition mode is used to increase the sampling rate of data. For the TS 100 Series, this is the one shoot acquisition of 10'000 values of torque in 1 second. For Model 3411, this is a continue acquisition at 488 Samples /second.

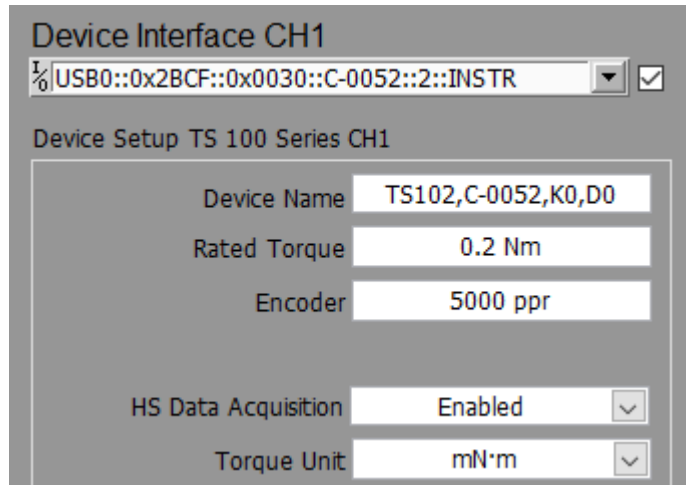


Figure 33 HS configuration

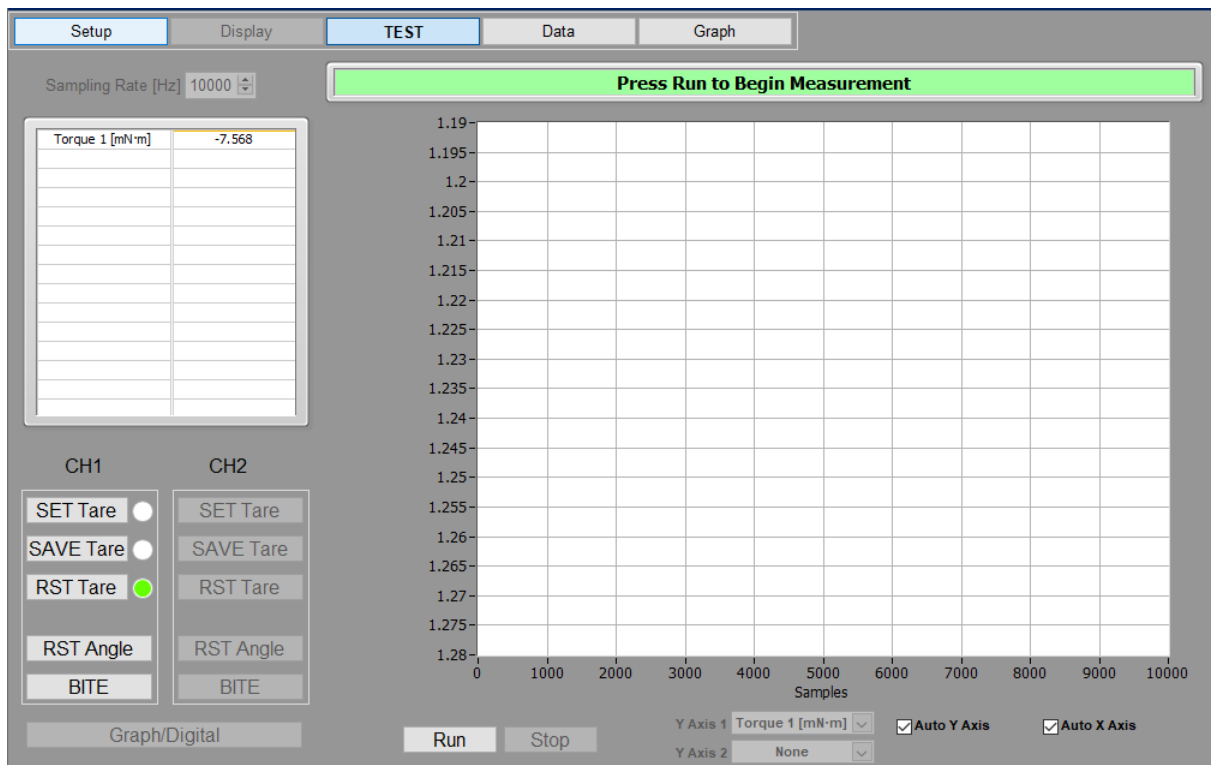


Figure 34 Test HS ready



**NOTICE** For TS 100 Series, only the Torque is acquired in HS data acquisition. The Torque value acquired is the raw value without the digital filtering.

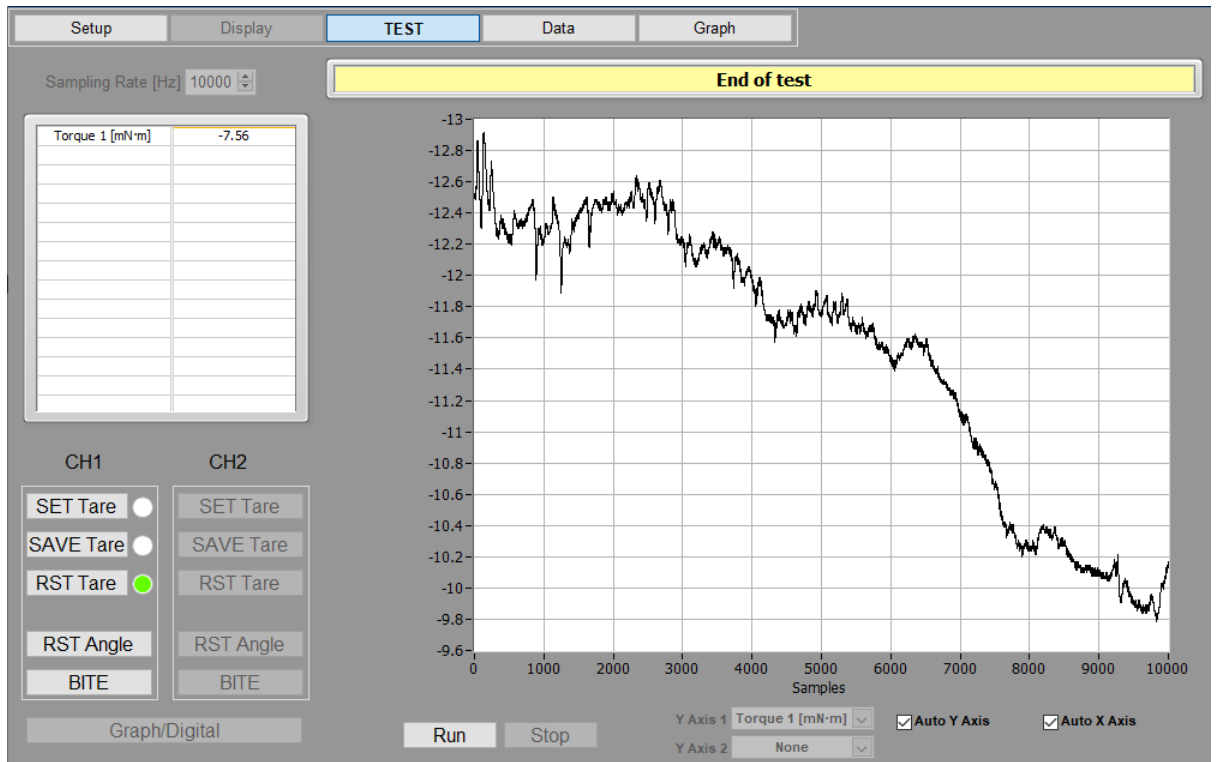


Figure 35 Result of HS data acquisition

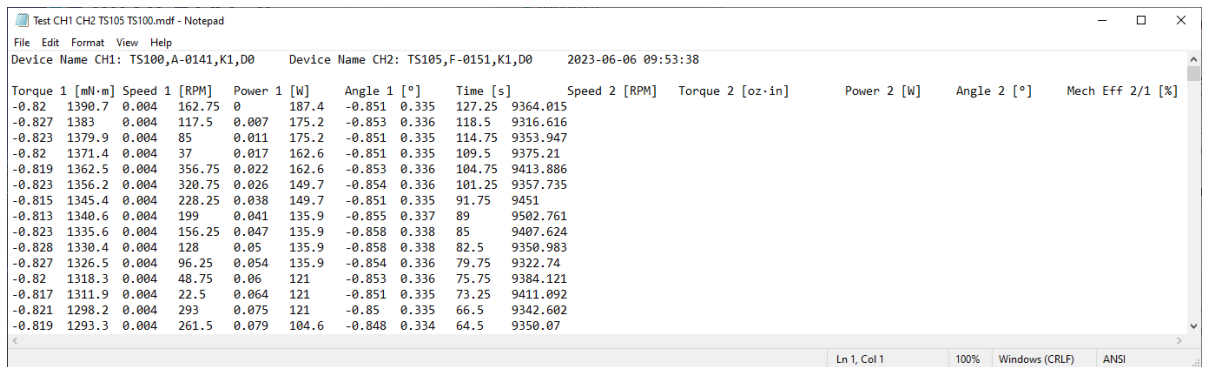
Time stamp will be added for each torque value

Time [s]	Torque [mN·m]
0	-12.5216
0.0001	-12.5216
0.0002	-12.5216
0.0003	-12.5044
0.0004	-12.5044
0.0005	-12.5044
0.0006	-12.5044
0.0007	-12.5044
0.0008	-12.5044
0.0009	-12.4872
0.001	-12.5044
0.0011	-12.5044
0.0012	-12.5216
0.0013	-12.5216
0.0014	-12.5044
0.0015	-12.5044
0.0016	-12.5044
0.0017	-12.5216
0.0018	-12.5216
0.0019	-12.5388
0.002	-12.5216
0.0021	-12.5216
0.0022	-12.5388
0.0023	-12.556
0.0024	-12.5732
0.0025	-12.5732
0.0026	-12.556
0.0027	-12.556
0.0028	-12.5904
0.0029	-12.6076
0.003	-12.6076
0.0031	-12.642
0.0032	-12.6936
0.0033	-12.7452

Figure 36 HS data acquisition Display

Use File menu to save data. Data are not automatically saved at the end of the test. This operation must be done manually by the operator.

## 7.4 EXAMPLE OF DATA FILE



Test CH1 CH2 TS105 TS100.mdf - Notepad

File Edit Format View Help

Device Name CH1: TS100,A-0141,K1,D0 Device Name CH2: TS105,F-0151,K1,D0 2023-06-06 09:53:38

Torque 1 [mN·m]	Speed 1 [RPM]	Power 1 [W]	Angle 1 [°]	Time [s]	Speed 2 [RPM]	Torque 2 [oz·in]	Power 2 [W]	Angle 2 [°]	Mech Eff 2/1 [%]
-0.82	1398.7	0.004	162.75	0	187.4	-0.851	0.335	127.25	9364.015
-0.827	1383	0.004	117.5	0.007	175.2	-0.853	0.336	118.5	9316.616
-0.823	1379.9	0.004	85	0.011	175.2	-0.851	0.335	114.75	9353.947
-0.82	1371.4	0.004	37	0.017	162.6	-0.851	0.335	109.5	9375.21
-0.819	1362.5	0.004	356.75	0.022	162.6	-0.853	0.336	104.75	9413.886
-0.823	1356.2	0.004	320.75	0.026	149.7	-0.854	0.336	101.25	9357.735
-0.815	1345.4	0.004	228.25	0.038	149.7	-0.851	0.335	91.75	9451
-0.813	1340.6	0.004	199	0.041	135.9	-0.855	0.337	89	9502.761
-0.823	1335.6	0.004	156.25	0.047	135.9	-0.858	0.338	85	9407.624
-0.828	1330.4	0.004	128	0.05	135.9	-0.858	0.338	82.5	9350.983
-0.827	1326.5	0.004	96.25	0.054	135.9	-0.854	0.336	79.75	9322.74
-0.82	1318.3	0.004	48.75	0.06	121	-0.853	0.336	75.75	9384.121
-0.817	1311.9	0.004	22.5	0.064	121	-0.851	0.335	73.25	9411.092
-0.821	1298.2	0.004	293	0.075	121	-0.85	0.335	66.5	9342.602
-0.819	1293.3	0.004	261.5	0.079	104.6	-0.848	0.334	64.5	9350.07

Ln 1, Col 1 100% Windows (CRLF) ANSI

Figure 37 Data file example

This file (.mdf) is a text file formatted with tabular separator. Use Torque 10, Notepad, Excel or others to open this file.



## 8. DATA DISPLAY

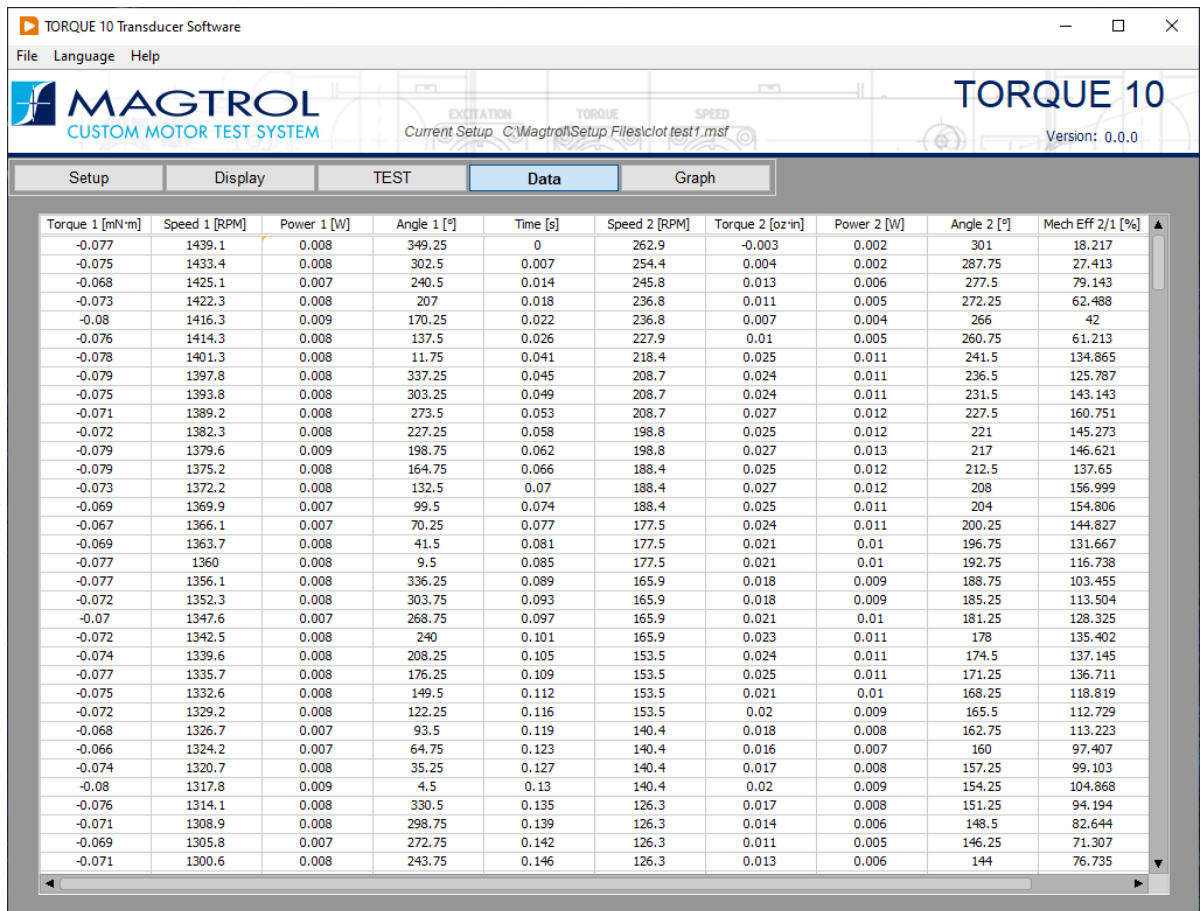


Figure 38 Data Button

This view shows the measurement in spreadsheet windows.

Use the scrollbar to navigate at the end of the file.

Use File menu to save, export or print data.

## 8.1 EXPORT TO EXCEL FUNCTION

From the Data or Graph View, it possible to export the table directly to Excel sheet.

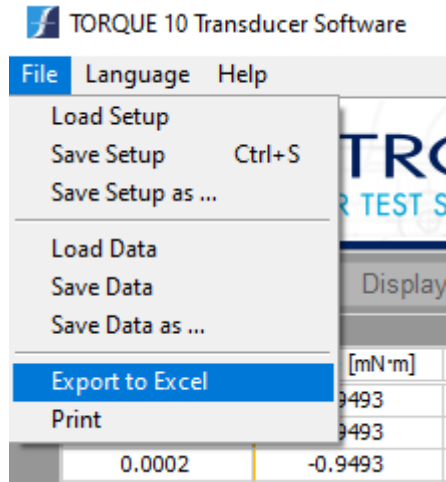


Figure 39 Export to Excel function



**NOTICE**



This operation requires to have a licenced Microsoft Excel 2009 or later installed on the computer

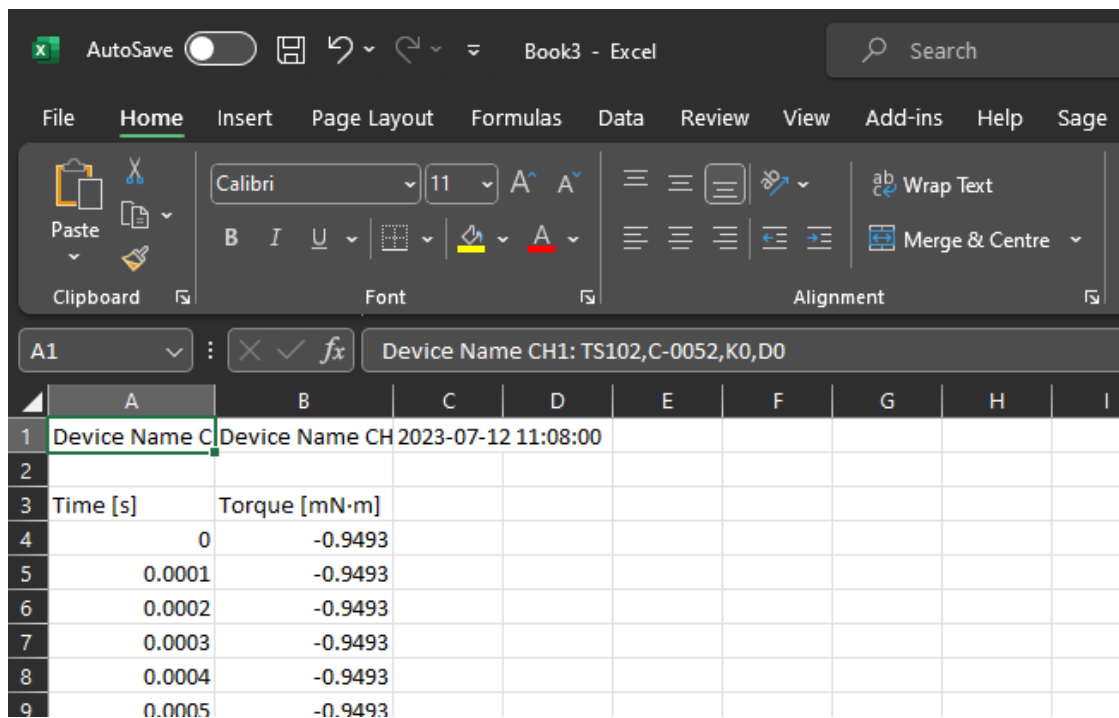


Figure 40 Excel view

The Excel application is automatically opened and the data are displayed. Use the standard function of Excel to manage the data.



## 8.2 PRINT

From the Data View, it is possible to print the table directly



**NOTICE**

The printing function is only available on the Default printer of Windows environment. Before print, check the default printer configured

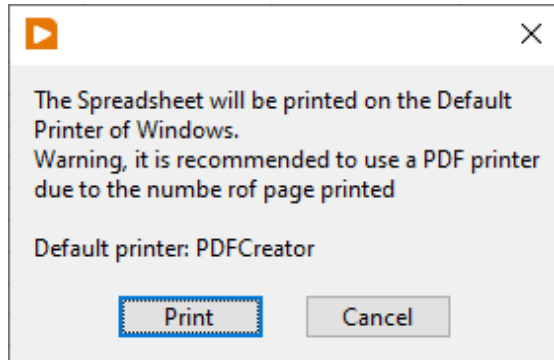


Figure 41 Printer function dialog

The printer cannot be selected for this operation, the spreadsheet will be printed on the Default printer of Windows. The default printer appears on the last line of dialog box.

Page 1 of 3

Time [s]	Speed 1 [RPM]	Torque 1 [mN·m]	Power 1 [W]	Angle 1 [°]	Speed 2 [RPM]	Torque 2 [mN·m]	Power 2 [W]	Angle 2 [°]	Mech Eff 2/1 [%]
0	0	-0.026	0	0	0	23.52	0	0.5	0
0.06	0	-0.026	0	0	0	23.52	0	0.5	0
0.121	0	0.056	0	0	0	23.52	0	0.5	0
0.153	0	0.028	0	0	0	23.52	0	0.5	0
0.215	0	0.089	0	0	0	23.52	0	0.5	0
0.278	0	0.151	0	0	0	23.48	0	0.5	0
0.309	0	0.151	0	0	0	23.48	0	0.5	0
0.371	0	0.14	0	0	0	23.48	0	0.5	0
0.401	0	0.066	0	0	0	23.48	0	0.5	0
0.465	0	0.138	0	0	0	23.48	0	0.5	0
0.527	0	0.138	0	0	0	23.44	0	0.5	0
0.558	0	0.135	0	0	0	23.44	0	0.5	0
0.621	0	0.115	0	0	0	23.44	0	0.5	0
0.652	0	0.115	0	0	0	23.44	0	0.5	0
0.713	0	-0.018	0	0	0	23.44	0	0.5	0

Figure 42 Print Data Example

This example shows us an example to print in PDF.



**CAUTION**

For long test, or HS data acquisition, it is recommended to select a PDF printer by default. In case of print 10'000 lines, that create a file with 244 pages and 1.2MB



# 9. GRAPH DISPLAY

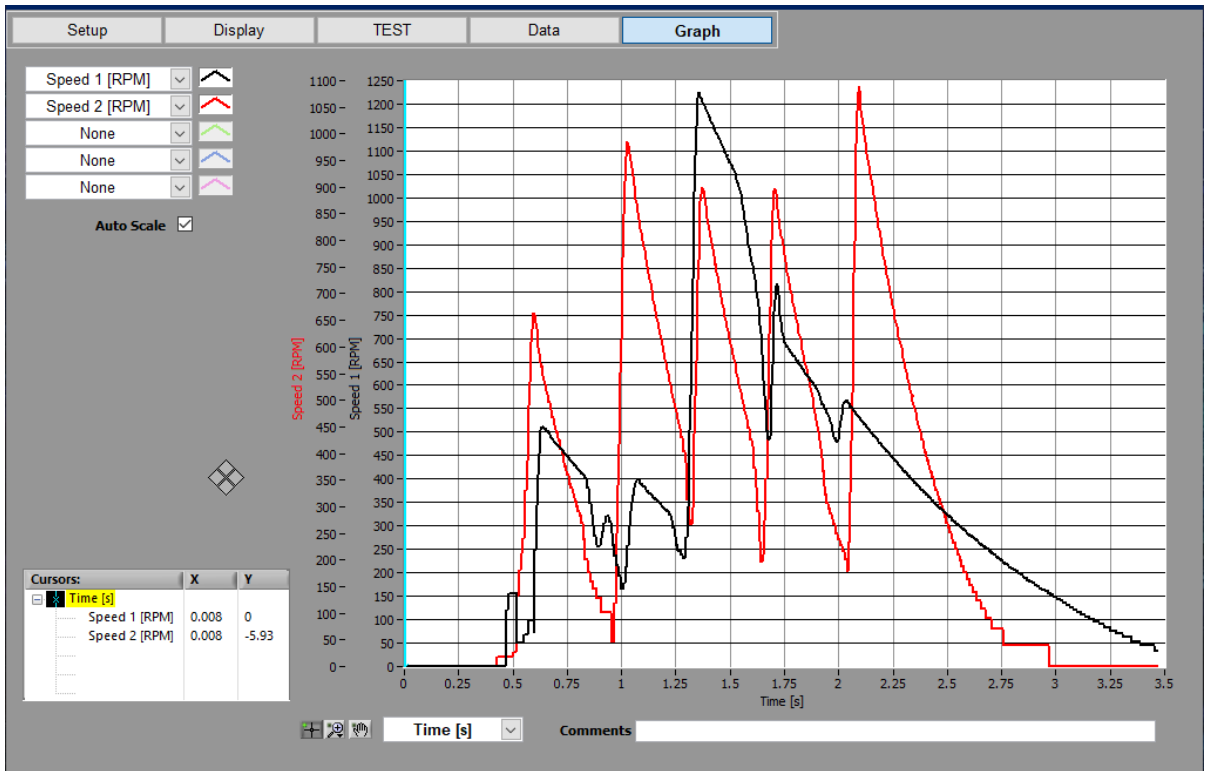


Figure 43 Graph display

Control	Function
<b>Graph Legend</b>	Located to the upper left of the graph the legend expands as more plot parameters are selected. Each plot is identified with an abbreviated name and is color coded. There are many plot options available by right-clicking on the plot indicator in the legend. You can change color, line style, line width, etc. from the pop-up menu.
<b>Cursors</b>	<p>You may create single or multiple cursors on the graph. Each cursor will have a numeric X-Y value shown in the cursor display table. The cursor can then be dragged along the plot with your mouse, or moved with the left and right cursor buttons.</p> <p><b>CREATE A CURSOR</b>                      Right-click in the cursor window. Select Create Cursor and Single-Plot.                      Cursor 0 will now appear in the plot area and in the cursor window. The cursor attributes are the default settings.                      You may change the parameter the cursor is locked to by selecting Snap To and dragging to the new parameter. The color, style, point style, etc. of the cursor itself can be changed from the Attributes menu.                      Repeat this process to add more cursors to the graph.</p>
<b>Y1,2,3,4,5 (None - n) Axis</b>	Selects the parameter to plot on the first Y-axis. The available parameters are the ones selected for acquisition during the test.
<b>X Axis (None - n)</b>	Selects the parameter to plot on the X-axis. The available parameters are the ones selected for acquisition during the test.

Control	Function
<b>Auto Axis</b>	Enables auto-scaling of the Y-axis and X-axis parameter.
<b>Graph Palette</b>	This provides several features for manipulating the plot being displayed. By clicking on the various icons, you can move the plotted data within the boundaries of the graph and zoom in or out on small portions of the plot.
<b>Comment</b>	You may type any comments you wish to retain with the data for this test, and also print on the hard copy of the graph.

Use File menu to save, export or print data.

Export to Excel is the same function than Data Display.

Print export graphic to printer. The printer can be selected for this operation.

By right click inside the Graph, it is possible to Export Simplified Image

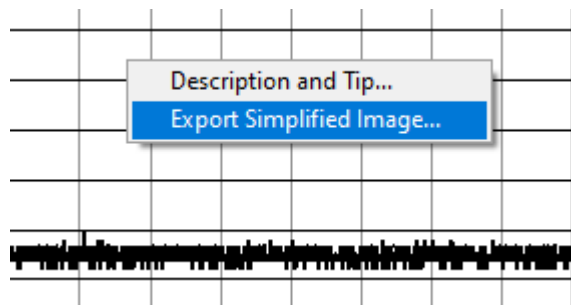


Figure 44 Export Simplified Image function

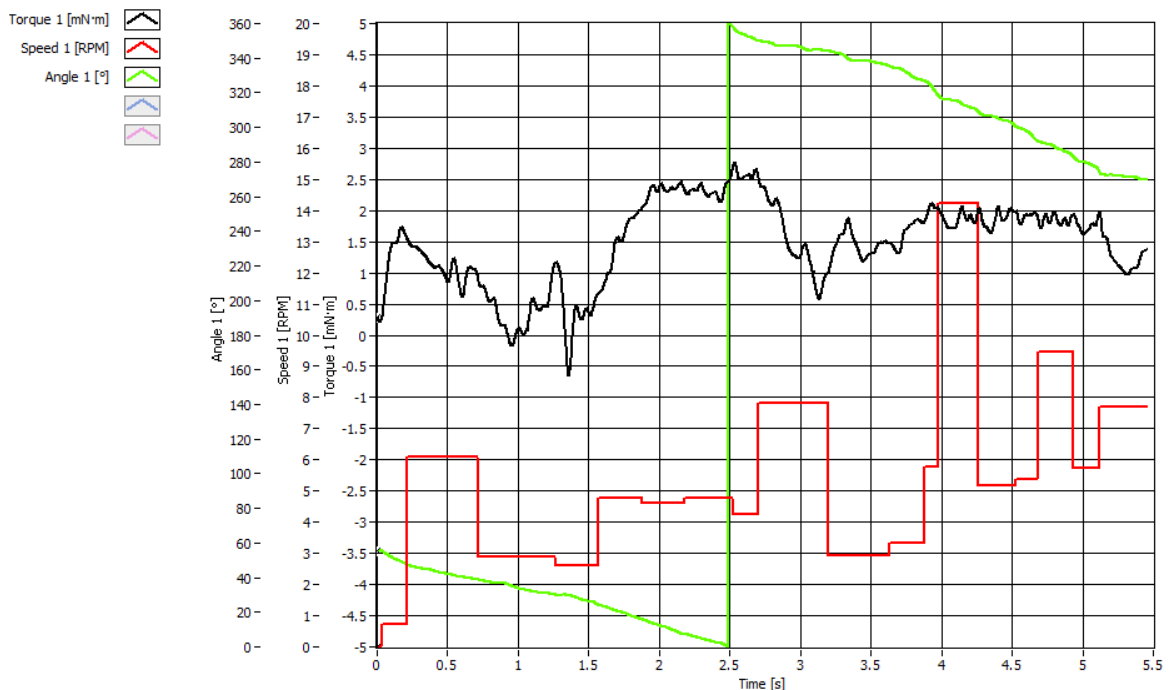


Figure 45 Export Simplified Image View

## 10. CREATING TASK

### 10.1 TEMPERATURE INPUT (TI) TASKS

To create a temperature input task, double-click the Measurement & Automation Explorer (MAX) shortcut on your desktop.

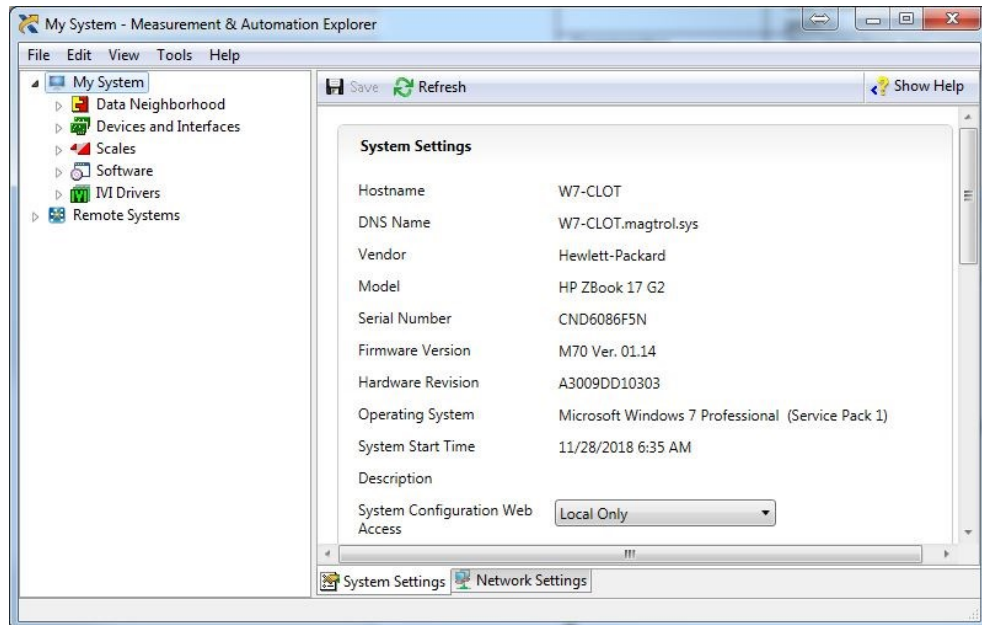


Figure 46

Expand Data Neighborhood by clicking on the small triangle next to it. If you see NI-DAQmx Tasks as one of the items, skip to step #6.

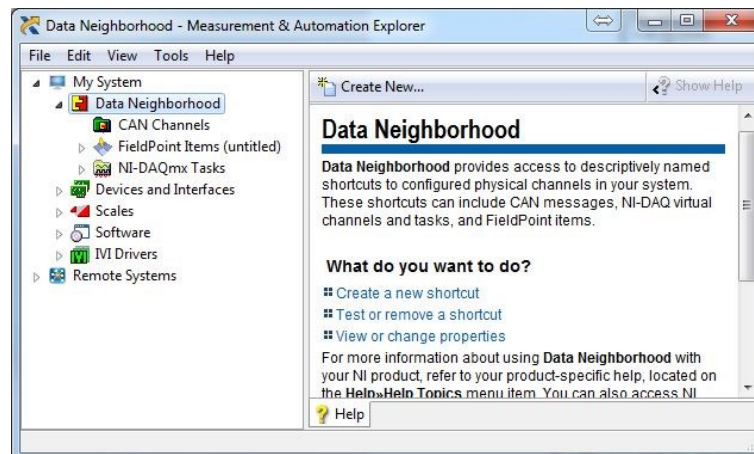


Figure 47

Right-click on Data Neighborhood and click Create New...

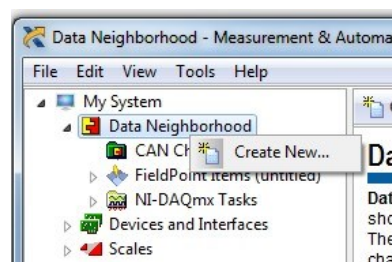


Figure 48

Click NI-DAQmx Task and then Next.

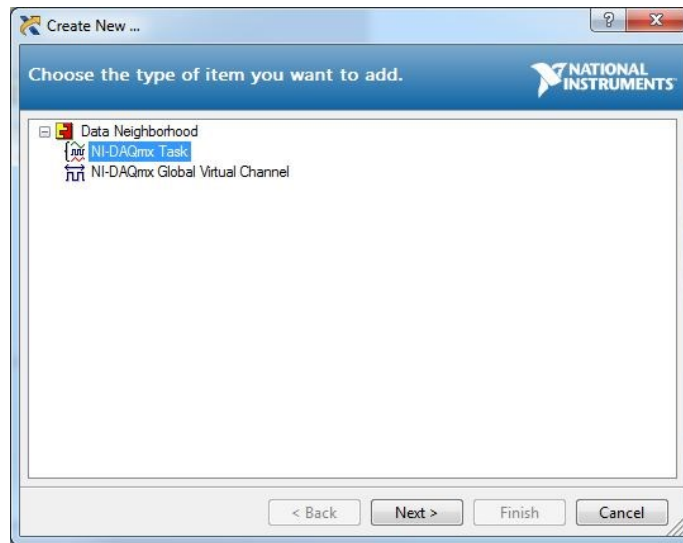


Figure 49

Skip to step #7.

Right-click NI-DAQmx Tasks and click Create New NI-DAQmx Task...

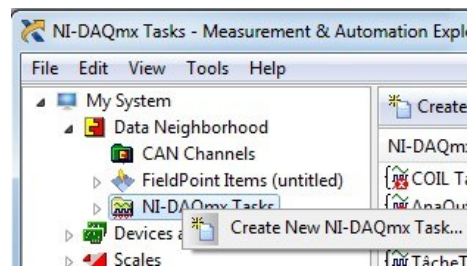


Figure 50

Expand Acquire Signals.

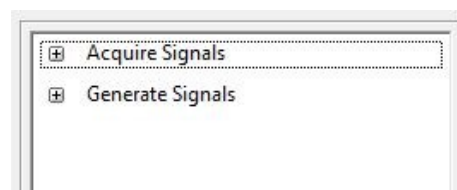


Figure 51

Expand Analog Input.

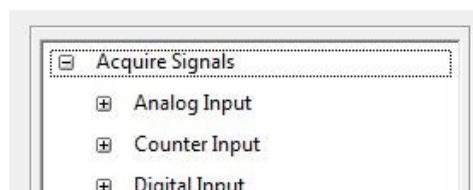


Figure 52

Expand Temperature.

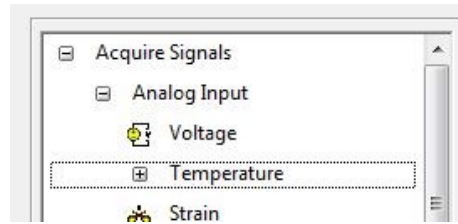


Figure 53

Select the type of device used for measurement. In this example we will measure temperature with thermocouples. Click Thermocouple.

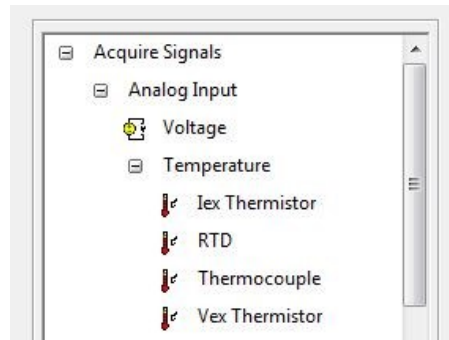


Figure 54

The product being configured for thermocouple temperature measurement is a NI 9211 in the cDAQ chassis. This is a four channel device and the tree will show the available channels. Expand cDAQ1Mod1 (NI 9211).

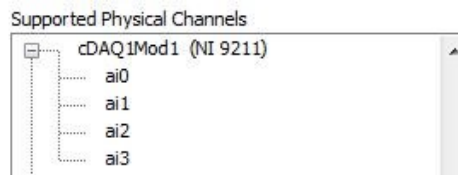


Figure 55

Click on the device so that all channels are highlighted.

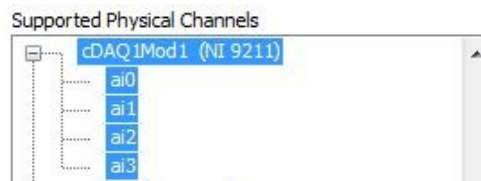


Figure 56

Click Next.

Type TI Task in the Enter Name: field. It is imperative that the name is entered exactly as shown.

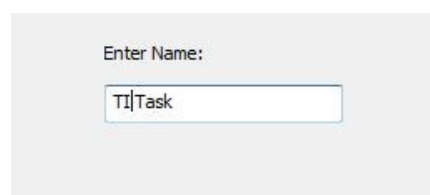


Figure 57

Click Finish.

TI Task will now appear in the Data Neighborhood tree.

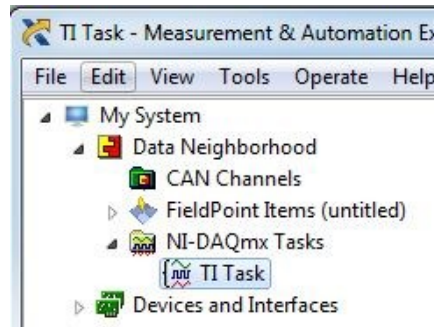


Figure 58

The middle pane of MAX contains configuration settings for this thermocouple module.

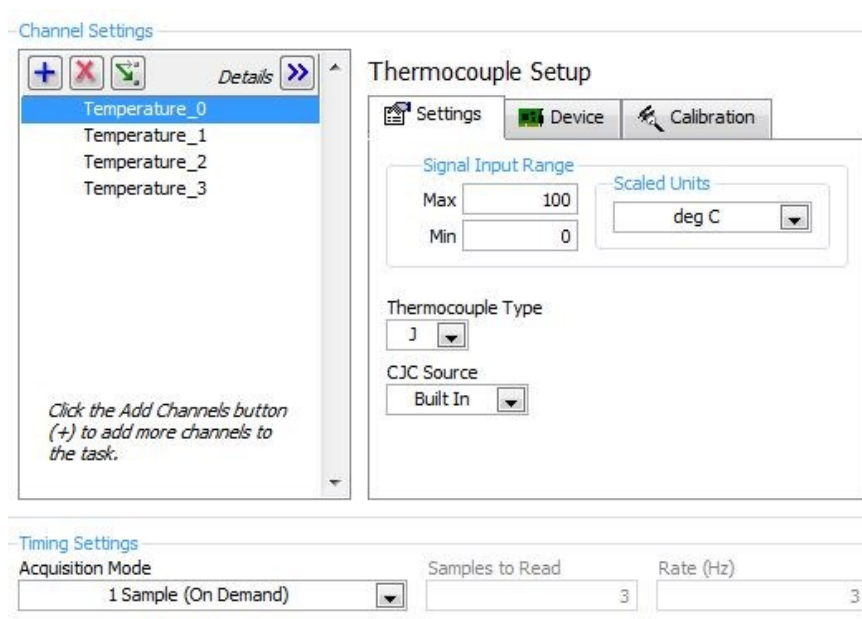


Figure 59

To configure all channels the same, click the first channel, scroll down to the last channel, then press the Shift key and click on the last item. Select the signal input range, scaled units and thermocouple type. Select the built-in CJC source and the acquisition mode (1 Sample [On Demand]).

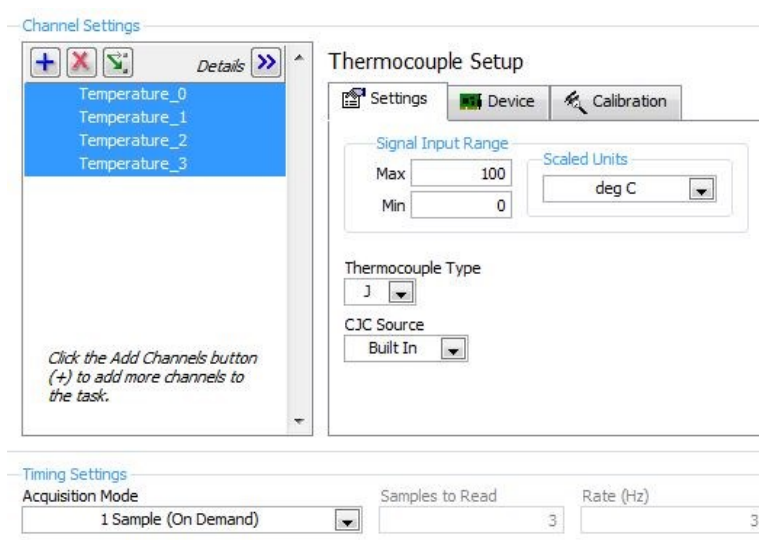


Figure 60



Press the Save button.

Exit MAX by clicking the X in the upper right corner of the window.

This is all that is needed to enable the device for use in TORQUE 10. You are not limited to thermocouple inputs; you may select any of the temperature input options that the device is capable of providing. You can change parameters for each individual channel of that device by selecting the channel and setting its parameters. You may also test the temperature inputs by clicking the Run button. The acquired data will display in the table or you may select the graph from the Display Type control.



## Service Information

### RETURNING MAGTROL EQUIPMENT FOR REPAIR AND/OR CALIBRATION

Before returning equipment to Magtrol for repair and/or calibration, please visit Magtrol's Web site at <https://www.magtrol.com/magtrol-return-material-authorization-rma> to begin the Return Material Authorization (RMA) process.

Depending on where the equipment is located and which unit(s) will be returned, you will be directed to either ship your equipment back to MAGTROL, Inc. in the United States or MAGTROL SA in Switzerland.

### RETURNING EQUIPMENT TO MAGTROL, INC. (UNITED STATES)

When returning equipment to MAGTROL INC. in the United States for repair and/or calibration, a completed Return Material Authorization (RMA) form is required.

1. Visit Magtrol's Web site at <https://www.magtrol.com/magtrol-return-material-authorization-rma-us/https://www.magtrol.com/magtrol-return-material-authorization-rma-us/> to begin the RMA process.
2. Complete the RMA form online and submit.
3. An RMA number will be issued to you via e-mail. Include this number on all return documentation.
4. Ship your equipment to:  
**MAGTROL, INC.**  
**70 Gardenville Parkway**  
**Buffalo, NY 14224**  
**Attn: Repair Department**
5. After Magtrol's Repair Department receives and analyses your equipment, a quotation listing all the necessary parts and labor costs, if any, will be faxed or e-mailed to you.
6. After receiving your repair estimate, provide Magtrol with a P.O. number as soon as possible. A purchase order confirming the cost quoted is required before your equipment can be returned.

### CONTACT FOR AFTER SALES SERVICE AT MAGTROL INC.

After Sales, Repair & Calibration Services

Phone +1 716 668 5555 ext. 115

Fax +1 716 668 3162

e-mail [service@magtrol.com](mailto:service@magtrol.com)

## RETURNING EQUIPMENT TO MAGTROL SA (SWITZERLAND)

If you are directed to ship your equipment to Switzerland, no RMA form/number is required. Just send your equipment directly to MAGTROL SA in Switzerland and follow these shipment instructions:

1. Ship your equipment to: **MAGTROL S.A.**  
**After Sales Service**  
**Route de Montena 77**  
**1728 Rossens | Switzerland**  
VAT No: CHE-105.475.279 TVA

You can call our official carrier, TNT (account n° 154 033), and return in Economy Express mode (maximum 3 days for shipments to Europe), or choose your usual carrier.

2. Include the following documents with your equipment:
  - Delivery notes with Magtrol SA's address (as listed above)
  - Five (5) pro forma invoices with:
    - **Your VAT number**
      - Mention «Definitive Exportation»
      - Description of returned goods
      - **Value for customs purposes only. This value should not exceed 1000 CHF for repair units**
      - Origin of the goods (Switzerland or USA)
      - **Noticed failures or complaints**
3. A cost estimate for services will be sent to you as soon as the goods have been evaluated.  
**Any repair or calibration job with charges below 850 EUR / 1000 CHF / 1000 USD, will be directly serviced.** You will then receive a quote that you must approve to allow the return of your material.  

For all other jobs, a detailed service quote will be provided in the coming days. Please note that, for special products, the process time could be longer.
4. If you choose to not repair your equipment, Magtrol reserves the right to charge you the following fees:
  - **Return of unrepaired equipment:** 250 EUR / 300 CHF / 300 USD
  - **Disposal of the equipment:** 170 EUR / 200 CHF / 200 USD

## CONTACT FOR AFTER SALES SERVICE AT MAGTROL S.A.

After Sales, Repair & Calibration Services

Phone +41 26 407 30 00

Fax +41 26 407 30 01

E-mail [repair@magtrol.ch](mailto:repair@magtrol.ch)

## Revisions To This Manual

The contents of this manual are subject to change without prior notice. The latest updated versions of our manuals are available and downloadable at any time on Magtrol's website [www.magtrol.com](http://www.magtrol.com) in the « SUPPORT » section.

Please compare the date of this manual with the revision date on the web site, then refer to the manual's table of revisions for any changes/updates that have been made since this edition.

### REVISION DATES

DATE	Edition	CHANGES	SECTION
2019-05-09	1	Original Issue	All
2023-07-12	2	Adding Dual Channel function and update for 012 release	All

[www.magtrol.com](http://www.magtrol.com)

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## MAGTROL INC

70 Gardenville Parkway  
Buffalo, NY 14224 | USA  
phone +1 716 668 55 55  
fax +1 716 668 87 05  
e-mail [magtrol@magtrol.com](mailto:magtrol@magtrol.com)

## MAGTROL SA

Rte de Montena 77  
1728 Rossens | Switzerland  
phone +41 26 407 30 00  
fax +41 26 407 30 01  
e-mail [magtrol@magtrol.ch](mailto:magtrol@magtrol.ch)

## Subsidiaries

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of Sales Agents

