TorqueMate 200®

The Portable, Accurate & Versatile Torque/Angle Display

OPERATION MANUAL

Model TM200fi
Operation Manual
Version 1.0

Mountz Incorporated
1080 N. 11th Street
San Jose, CA 95112
Phone: 408-292-2214
Customer Service: 800-456-1828
Fax: 408-292-2733

Printed in U.S.A.

Table of Contents

Table of Contents (cont.)

Introduction

The TM200 can be used for many torque applications in virtually any Engineering department or environment. The TM200 is modeled, in style, after the Fluke (trademark symbol) meter and was designed for ease of use and portability. Here are a few common applications for the TorqueMate and an appropriate torque sensor (transducer).

EXAMPLES OF USAGE:

Production Applications - Hand Use: Use a Mountz TWX or SMX torque sensor connected to the TorqueMate to apply torque to any assembly.The TWX is suited for wrench style applications, while the SMX is perfect for screwdriver or socket style functions. The unit has a Go/No Go light and alarm system to notify the operator when they obtain the low tolerance setting or exceed the high tolerance setting. The TM200 can also be used with other strain gauge torque sensors for applying torque and/or torque and angle.

Production Applications - Power Tool Use: Use a Mountz RTSX or RTSX with angle (rotary transducer) attached to a power tool to measure applied torque of an actual dynamic rundown. The unit has a Go/No Go light and alarm system to notify the operator when they obtain the low tolerance setting or exceed the high tolerance setting. The TM200 can be used with a strain gauge rotary sensor for applying torque and/or torque and angle.

Quality Control Applications - Inspection/Auditing: Use any strain gauge torque sensor and the TM200 to measure or check the applied torque by using First Movement method (listed in this manual). Readings can be saved to memory for statistical recall and record keeping or cleared at the touch of one key.

Quality Control Applications - Joint Evaluation and Test: Use the TM200 with a torque sensor with optical encoder and apply torque and angle to a joint. Also, use it for determining joint rate (hard, medium or soft) by setting unit to Angle mode and measuring the amount of torque and rotation (angle). This can be done both statically (with a hand device) or dynamically (with a power drive or rotating device) depending on torque sensor selection. Using the TM for joint rate testing is explained in this manual.

Calibration or Gauge Laboratory Applications: Use the TM200 with Mountz torque sensors to verify or calibrate hand torque wrenches and screwdrivers or power driven torque tools. The TorqueMate can be used in any measurement system at the touch of a key and provide an accuracy that allows use as a main standard.

R&D and Design Applications: Use the TM200 with proper torque sensor to determine make up of joints, strength of fasteners, clamp force or tension.

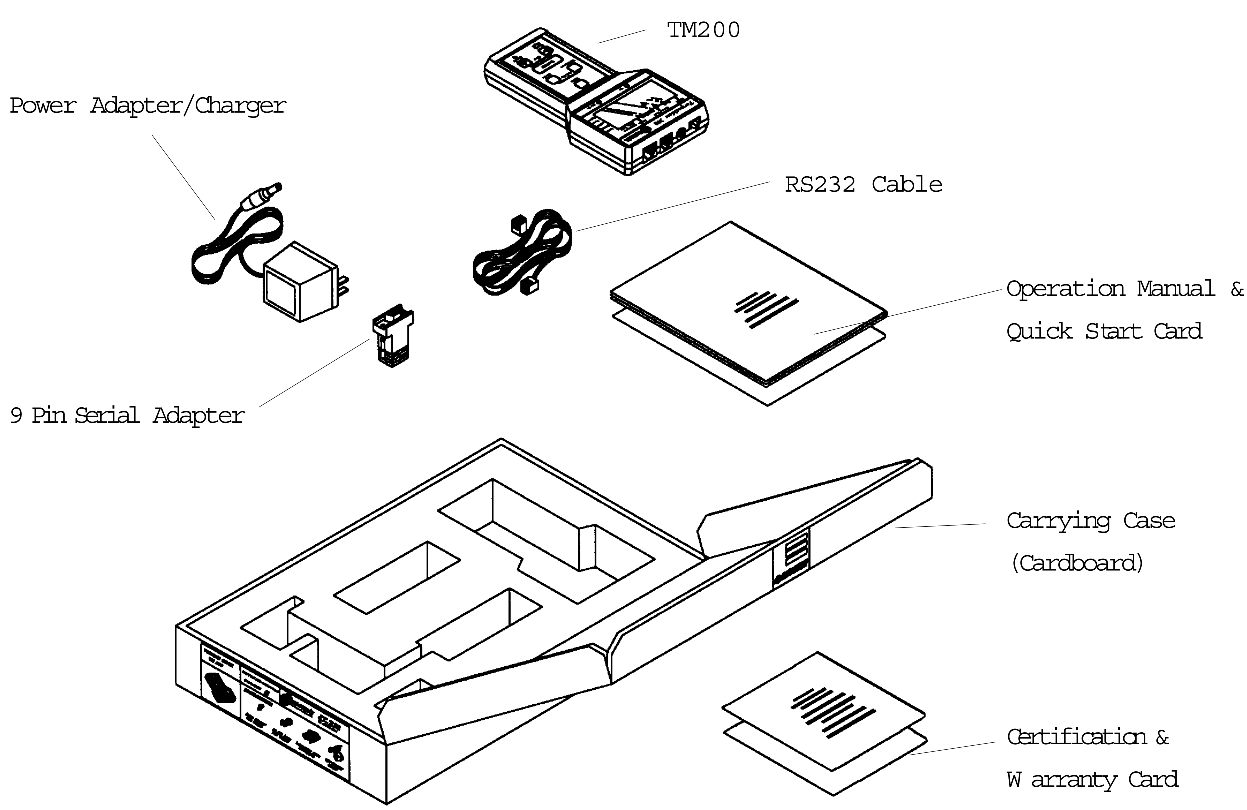
i

Note: Transducer Selection
It is recommended that the TorqueMate be used with Mountz torque or torque and angle sensors. However, the unit has been developed to accept a range of 1.000-4.000mv/v input and therefore can be used with most strain gauge torque sensors whether Mountz brand or other.

Parts Check List

Check to make sure that you have all of the following accessories. Retain the packing materials in case you need to send the unit in for service or to be calibrated with a transducer using Dead Weights.

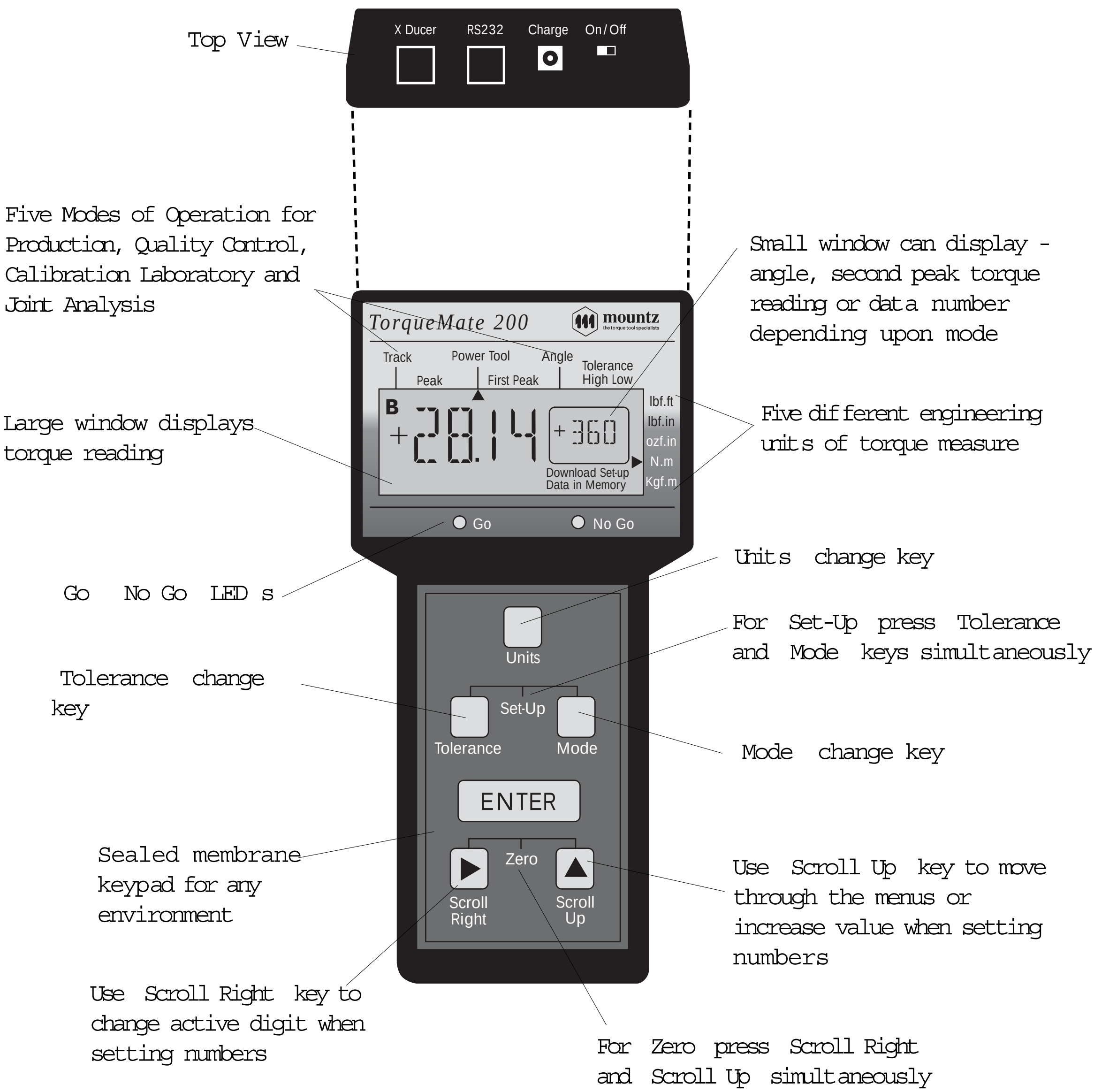
- TM200
- Power Adapter/Charger (available for Europe or other)
- Operation Manual & Quick Start Card
- Warranty Card and Certifications
- RS232 cable with 9 Pin Computer Adapter



i

Note: Please Send in Warranty Card
Complete and return warranty card to validate purchase date.
If this is not done warranty period becomes effective on date when distributor/reseller received shipment.

Features



Top View
X Ducer
RS232
Charge
On/Off
Five Modes of Operation for Production, Quality Control, Calibration Laboratory and Joint Analysis
TorqueMate 200
mountz
Track
Power Tool
Angle
Peak
First Peak
Tolerance
High Low
B
+28.14
+360
lbf.ft
lbf.in
ozf.in
N.m
Kgf.m
Download Set-up
Data in Memory
Go
No Go
Small window can display - angle, second peak torque reading or data number depending upon mode
Large window displays torque reading
Five different engineering units of torque measure
Go No Go LED s
Units change key
Units
Set-Up
Tolerance
Mode
ENTER
Zero
Scroll Right
Scroll Up
For Set-Up press Tolerance and Mode keys simultaneously
Tolerance change key
Mode change key
Sealed membrane keypad for any environment
Use Scroll Up key to move through the menus or increase value when setting numbers
Use Scroll Right key to change active digit when setting numbers
For Zero press Scroll Right and Scroll Up simultaneously

Features (cont.)

Accuracy: ± .25% of reading from 10% to 100% of full scale – 1 digit - Accurate enough for any calibration laboratory yet economical and portable enough for any production or quality control requirement.

Output: RS-232C port for data transfer to printer, data logger or computer.

Engineering Units: 5 different units of torque measure are available. lbf.ft., lbf.in., ozf.in., N.m., Kgf.m (Other measurement units available as special order)

Battery Operated: NiMH batteries provide long life, without memory . Up to 8 hours of operation per charge. Low battery indicator turns on when battery is low. Automatically shuts down when battery is critically low.

Memory: Stores up to 1000 torque and/or angle values. Simply press the Enter Key to store data in memory.

Up To 15 Transducers: Program & calibrate transducers for a variety of applications.

High Impact Plastic Housing: Provides portable belt or bench mounting.

Set (Go/No Go) Tolerance: Easily set user high and low limits for Torque and Angle with green and red Go/No Go LED s and an audible buzzer.

Auto Reset: Automatically resets the display when a new torque cycle is sensed (Peak & First Peak mode). Resets in 3 seconds (Power Tool Mode).

Manual Display Reset: Data is held on the display until: 1. The Enter key is pressed clearing the display and storing the data in memory or 2. The Scroll Right key is pressed clearing the display without storing the data in memory.

Calibration: Fast Calibration allows the user to quickly enter and store the full scale mv/v and range value of each transducer. True Calibration allows the user to apply torque with dead weights and capture and store 3 calibration points in each direction. Both calibration procedures are quick and user friendly.

Filters: Three software selectable filters allow the user to filter out unwanted noise , minimizing non-torque spikes that can occur when testing pulse or power tools.

IMPORTANT

Transducer Number

You must have a calibrated transducer with a transducer number assigned to it. Always make sure the TM200 is set to the transducer number that you have attached. Every time you turn on the TM200 the current transducer number and its associated range will be displayed (depicted by c-XX where XX is the transducer number). Press Enter to confirm that the proper transducer is attached. If it is not the proper transducer number you must change it to the correct number or you will be using incorrect calibration data. To change the number press the Scroll Right key once - this will activate the Scroll keys. Now press the Scroll Up or Scroll Right keys until the proper transducer number is displayed. Press Enter to select and go into the operation mode.

> i
> Note: When Programming Transducers
> The torque range and the measurement units of the transducer are also shown. The torque range will default to 3333 if a transducer has never been assigned to the number displayed.

Charging

Always leave the TM200 turned on when charging. The microprocessor monitors the charging cycle of the NimH batteries and must be turned on to do so. The TM200 will go into battery saving PAUSE mode after 5 minutes without use, but will still be charging. The TM200 can be used when the batteries are low and the AC adapter is plugged in. See more on charging on page 22.

Transducer Selection

Transducer selection is very important. Whenever possible, select a transducer range that is approximately 2 times the range to be used or tested. If you are typically using the tester at 50 lbf.ft., select a 100 lbf.ft. transducer. This significantly reduces the chance that you will overload and damage the transducer.

Operation

The TM200 is an accurate, user friendly torque display that allows a user to quickly change functions and features without getting lost in a menu structure. Any change made after pressing the enter key returns you directly to the operation mode.

CHANGING MODES AND UNITS

With the Scroll and Enter Keys - The most used functions are changed by simply pressing the key labeled with the feature you want to modify. Change the value easily with the Scroll Up. Once you have selected the new setting or feature simply press the Enter key to accept and return to operation with the new setting.

FOR EXAMPLE - to change the operation mode from Track to First Peak, press the Mode key(5) once and then press the Scroll Up key(3) until the display icon points to the First Peak mode(7). Press Enter(1) to accept and return to the operation mode in the First Peak setting. The Mode icon will point to First Peak.

CHANGING NUMBERS

With the Scroll and Enter Keys - To change numbers such as the high and low tolerance, the TM200 is much like setting an alarm clock. The active digit (blinking) is changed with the Scroll Up key, to move to the next digit, simply press the Scroll Right key (the next digit will now blink). To set all the Digits in the same manner, press Enter again and the number is set.

FOR EXAMPLE - to set a tolerance when in peak or first peak mode, press the Tolerance key(4). The display will show the Low tolerance set point. The first digit will be flashing. Change the value of the flashing digit by pressing the Scroll Up key(3). Change to the next digit by pressing the Scroll Right key(6). When the value is reached press the Enter key(1). To set the High tolerance value, follow the same procedure as with setting Low tolerance. Press Enter(1) when the high value is set and you will be returned to the operation mode.

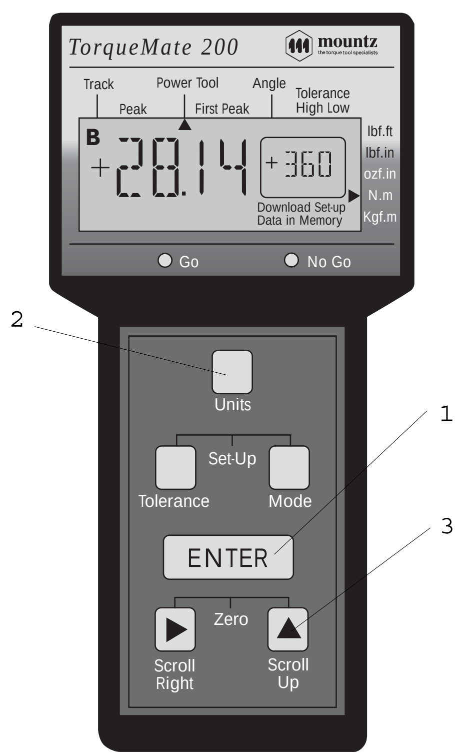
PAUSE (PAUS) MODE

The TM200 automatically conserves battery power after 5 minutes without use.
The display will show PAUS . Pressing the Enter key returns the TM200 to the operation mode.

UNIT OF MEASURE (Engineering Units)

To change the unit of measurement:

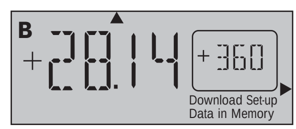
1. Press the Unit (2) key on the front panel.
2. Press the Scroll Up (3) key until the arrow on the right side of the display points to the desired units.
3. Press Enter (1) to accept the new torque units and return to the operation mode.



MODE OF OPERATION

To change the mode of operation:

1. Press the Mode key.
2. Press the Scroll Up key until the mode arrow points to the desired mode of operation:
   a) Track Mode: The display tracks the applied torque in clockwise and counterclockwise directions.
   b) Peak Mode: The display holds the highest peak torque applied.
   c) Power Tool Mode: Used for measuring torque with power tools such as nutrunners and impulse tools. Always use a quality joint rate simulator (run down adapter) when testing power tools in a simulated application. If you do not use a joint rate simulator, damage to the transducer and or erratic readings might occur.
   d) First Peak Mode: The display holds the first peak torque applied and disregards any further input. This function is primarily used for testing and calibrating click type mechanical torque wrenches by hand (without a calibration loading bench).
   The TM200 captures the point the wrench clicks, and disregards any further input from the operator. Second peak, if any is shown in the window on the display.



   e) Angle Mode: Combined with a transducer with angle encoder, the TM200 measures the angle of rotation of a fastener (with high and low angle tolerance) after a programmed threshold torque has been reached. This feature is used when an angle is specified rather than a final torque. Joint rate and breakaway torque can also be measured. (See application notes.)
3. Press the Enter key to accept the new mode of operation.

Examples of Mode Applications

Track Mode: Use for reading, running or varying torque on motors and machinery. Use for calibrating Dial type wrenches on a calibration loading bench.

Peak Mode: Use for calibrating any hand type torque (dial, beam, screwdriver) wrench except hand testing of clicker type wrenches. Use Peak Mode with the Go/No Go feature. Not for use with power tools.

Power Tool Mode: Use Power Tool Mode whenever testing dynamic tools such as nutrunners, electric screwdrivers and impulse tools.

First Peak Mode: Designed exclusively for manually calibrating clicker type torque wrenches (by hand). Reads the point at which the wrench clicks (first peak), and the point when the operator stopped applying torque (second peak). Also good for operator training. Apply torque smoothly to avoid false first peak readings.

Angle Mode: Use Angle Mode to apply a specified angle to a fastener after reaching a threshold torque. Also used to verify break away torque of a fastener and to determine the joint rate of a fastener (see page 12 and applications notes for detailed information on Angle mode usage).

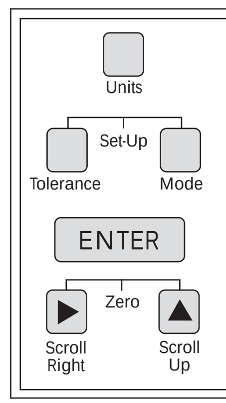
SETTING GO AND NO/GO TOLERANCE (High/Low) LIMITS

In the Peak, Power Tool or First Peak mode:

1. Press the Tolerance key (the arrow icon will point to Low Tolerance).
2. Change the value of the flashing digit by pressing the Scroll Up key (and the decimal will be fixed).
3. Scroll to the next digit by pressing the Scroll Right key.
4. Press Enter to save the low limit and display the High Tolerance limit.
5. Repeat to set the High limit. Press Enter when finished.

The TM200 will now activate the Green LED and buzzer when reaching a peak over the low limit, and will activate the Red LED and buzzer when going over the high limit.

In Angle mode:
First enter the threshold torque then the angle tolerance.



1. Press the Tolerance key to display the threshold torque (depicted by torque threshold in window).
2. Change the value of the flashing digit by pressing the Scroll Up key.
3. Change to the next digit by pressing the Scroll Right key.
4. Press the Enter key when the correct digits are selected for torque threshold.
5. Now set the angle high/low tolerance.
6. Set the low angle tolerance with the Scroll Keys.
7. Press Enter to save the low angle limit.
8. Repeat for the high angle limit.
9. Press Enter to save the high angle limit and return to the operation mode.

The TM200 display will now track the applied torque until the threshold torque is reached and then begin monitoring the angle. When the low angle is limit is reached the green LED will illuminate. When the High angle limit is reached the Red LED will illuminate. When the peak angle is reached the torque at that angle will now be displayed.

Break Away (Using the Angle mode)
To check breakaway (first movement) of a fastener: The TM200 will enter a special breakaway sensing mode when you set the low angle tolerance to a small value, usually 1 to 3 degrees, and the high angle tolerance to zero. Apply torque to an already tightened fastener, when the TM200 senses the threshold torque (set at approximately 50% of the expected torque) it will start looking for the fastener to move the number of degrees set as the low tolerance. When this number of degrees has been reached it will automatically capture the torque at that point and will disregard any further torque input, even if you keep turning the fastener.

i

Note: Use of Go/NoGo
Be sure to set a tolerance if you want to use the Go/No Go feature.
The Go/No Go feature is not active when in the Track Mode.

Operation (cont.)

To check the joint rate:
Check the rate of a joint (soft, medium or hard) by tightening the fastener to the specified torque and measuring the rotation angle of the fastener from 50% to 100% of the torque applied.

Set the threshold to 50% of expected torque.
Set the low angle tolerance to zero.
Set the high angle tolerance to a high value (over 900).

Testing of the Joint Rate:
Determine if the application joint is a hard, medium or soft joint. This is determined by measuring the angle of rotation of the fastener from approximately 50% of the final torque to the final torque. If the angle is less than 30 degrees the joint is considered hard. If the angle is 30 to 360 degrees the angle is considered medium. If the angle is 360 degrees or more it is considered soft

A quick method to do this is to use the TM200 with a hand held transducer in Peak Mode. First tighten the application fastener to 50% of the required torque with the TM200 in peak mode. Now mark the head of the fastener so you can roughly determine the angle of further rotation. Once again place the TM200 wrench on the fastener and tighten to the final desired torque. Measure or approximate the angle of rotation. You do not need to know the exact angle, only the range. This angle of rotation should be simulated on the test fixture, with a joint rate simulator, when testing pulse tools (or any power tool).

Clearing Numbers On The Display During Operation - When a reading is on the display, press the Enter key to clear the number and send it to memory and out the RS 232C port. If you want to clear the display and bypass sending the data to memory press the Scroll Right key.

If Auto Clear is set to ON and the TM200 is in Peak or First Peak mode, the unit will automatically clear tiself upon sensing additional torque saving you the step of having to press the Scroll Right key. If you want to save the data on the display in memory, press the Enter Key before you apply a new torque value or the unit will automatically clear the display and you will lose the data.

When in power tool mode, and Auto Clear is ON, the display automatically clears in 3 seconds. So you must press the Enter key within three seconds to save the data to memory.

If this is not enough time, set Manual Clear to ON and press the Enter key to clear the display and send the data to memory, or the Scroll Right key to clear the display and bypass sending the data to memory.

i

Note: Pressing The Wrong Key
If at any time you press the wrong key, and you do not want to make changes to the function you incorrectly selected simply press the Enter key to keep the current setting (you can also turn the TM200 off and on again). If you press the wrong key while calibrating turn the unit off then on again and start over (data is not saved until the final operation is entered).

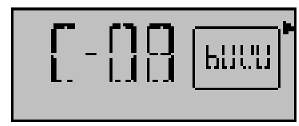
Set-Up Mode

Enter the Set-Up mode by pressing the Tolerance and Mode key simultaneously (the Set-Up icon will turn on). Scroll through the various Set-Up functions by pressing the Scroll Up key. When you get to the option you want to change press the Enter key. Upon changing any option, you will be returned to the operation mode.

The following seven paragraphs (DISP, DOWNLOAD, CLR, MANUAL/AUTO CLEAR, TRANSDUCER CODE, CAL, FIL) is the sequence of functions in the Set-Up menu:

1. DISP - DATA IN MEMORY

(Display The Values Stored In Memory)
DISP and the Data in Memory icon will be shown.



a. Press Enter to select this option.

b. The number of data in memory will be displayed on the large digits.

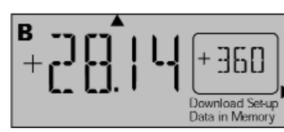
c. Press the Scroll Right key to view the last data in memory. Press Scroll Up to read the next higher data number. If the data number has both Torque and Angle associated with it then the TM200 will first display the torque value and then the Angle (as shown by the Torque or Angle Icon in the Window).

c. Press the Scroll Right key to read the next lower data number (i.e., 100, 99...98). The Scroll Up key will not scroll from the last data number to the first (i.e., 100 to 1).

d. Press Enter to exit and return to normal operation.

2. DOWNLOAD DATA IN MEMORY

(Downloads Data In Memory To A Computer or Printer)
Make sure an RS232 cable is attached and press the Enter key to download data to a computer. The data number will count down on the torque window as the values are downloaded to a dot matrix printer or computer. Press the Enter key at any time to stop the transfer of data. Data is sent in the following stream: Data #, Torque, Units, Angle. The protocol is 8, 1, n at 4800bps.

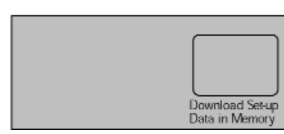


3. CLR - DATA IN MEMORY

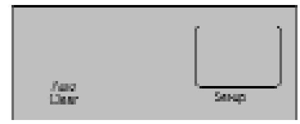
(Clears the data In memory)

a. Press the Enter Key to select the Clear Memory (Clr) option (Clr flashes on the LCD and the Data in Memory icon is shown).

b. Press the Scroll Right key and the Scroll Up key simultaneously to clear the memory. Press the Enter key to avoid clearing memory, and return to the operation mode.



4. MANUAL CLEAR/AUTO CLEAR



(Selects The Reset (Clear) Mode For The Display)

a. Press Enter to select this option.

b. Press the Scroll Up key to toggle between Manual Clear ON or Auto Clear ON.

c. Press Enter to save and exit.

During operation, if you have selected the Auto Clear mode, and you want to save data to memory, you must press the Enter key before applying additional torque, otherwise the data will be lost when you apply additional torque (auto clear).

5. c-XX (c stands for Code Number)

(Selects The Attached Transducer Number)

The transducer number, full scale range and the units icon will show in the window.

If the Window shows a range of 3333 (indicates an open cell which can be programmed to the transducer) the associated transducer number has never been calibrated.

a. Press Enter to select this option.

b. Press Scroll-Up to select available transducer numbers (1-15).

c. When the number corresponds to the attached transducer, press the Enter key. The TM200 will now use the appropriate torque calibration data for that transducer (if it has been previously calibrated).

6. CAL

(Calibration)

See the calibration section of this manual.

7. FIL

(Selects One of Three Electronic Low Pass Filters)

a. Press Enter to select this option.
The display shows the current filter setting:
Fil 1 = 500 (Hz)
Fil 2 = 1500 (Hz)
Fil 3 = 3600 (Hz)

b. Scroll to the desired filter setting and press enter to accept the new filter.
If you do not know what filter to use, set filter to 1500 Hz.

Set-Up Mode (Fast Cal)

Quickly Entering Calibration Data For A Transducer (Fast Cal)

To quickly enter calibration data for a transducer you must know the mv/v signal output at full scale and the range of the transducer (both should be marked on the transducer).
If the transducer is not marked with this information then contact manufacturer of the transducer to obtain it.

Turn the TM200 on and press Enter when it shows the current cell number.

1. Enter Set-up by pressing the Mode and Tolerance key simultaneously.
2. Press the Scroll Up key until the display shows CAL .
3. Press the Enter key. Now press the sequence: Enter, Scroll Right, Tolerance.
4. Select the proper units with the Scroll Up key then press the Enter key.
5. Select the cell number for the transducer to be calibrated (1-15) with the Scroll Up key, then press Enter.
6. Enter the full scale range of the new transducer (default is 3333). Use the Scroll Up key to change the digit value, the Scroll Right key to select a different digit. Do not worry if the decimal is wrong, you will change that next. Press Enter when the numbers are correct.
7. Now set the decimal place with the Scroll Right key. Press Enter to save the decimal place.

> i Note: Setting Decimal Place
> Always enter the range value starting with the first decimal place.
> For example 10 ft.lb. transducer should be programmed to 10.00 <u>not</u> 010.0 or 0010.

8. Now enter the mv/v range of the transducer at full scale (default 2.000). Use the Scroll Up and the Scroll Right key as you did with the range (you cannot change the decimal place). Press Enter when finished.

   Note: The TM200 will always display 2.000, even if you have previously programmed a different value.
9. The display will now show Fast (FAST) Cal. Press Enter.
10. The transducer is now coded and calibrated using mv/v and range. The calibration data will be written to memory. Whenever you select the corresponding code number the TorqueMatefi Plus will use the calibration data that was saved.

> i Note: Calibration Security
> To ensure that inadvertent alteration of calibration data does not occur a Key Sequence Override is required to be entered at the CAL prompt. After hitting Enter to activate the Cal Menu the Key Sequence Override is accomplished by pressing Enter, Scroll Right & Tolerance. Press these keys in exact order to access the CAL menu.

IMPORTANT

The TM200 can be used with 1 to 4 mv/v transducers. Simply assign a code number to the transducer (1-15) and calibrate it with dead weights (True Cal), or enter the known mv/v at full scale and the range (Fast Cal). The TorqueMatefi Plus will store the calibration data in memory for that transducer under the code number you assigned.

SELECTING TRANSDUCER CABLES

The TM200 is delivered with a cable that has a 10 pin modular jack to go into the TM200 and bare wires on the other end. Adapt your third party transducers to the bare wires using the following graphic for pin-out specifications.

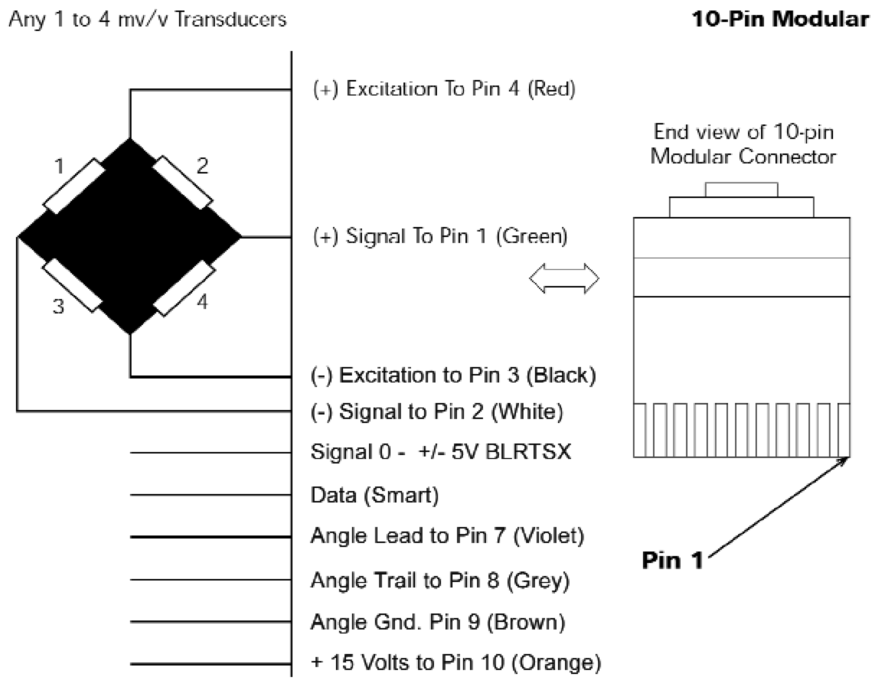
If you have a transducer that has a special connector Mountz can make a custom connector for the TM200. For example, if your transducer has a Bendix type connector you can order a cable with the TorqueMatefi Plus 10 pin connector on one end and a Bendix connector on the other. (See list of cables below)

Calibration Notes

When using the Fast Cal option on the TM200, the TM200 will take the mv/v entry that you manually programmed during transducer calibration, and adjust the gain and span automatically. For example, if the transducer has a mv/v signal of 2.010 at a full range of 50 lbf.ft. then the TM200 will assume when it senses 2.010 mv/v of output from the transducer that a torque of 50 lbf.ft. is being applied (the display will show 50 lbf.ft).

When using the True Cal option, the TM200 will take an actual reading of the output of the transducer when certified dead weights are applied.

Configuration	Part Number
Connections to the TorqueMatefi Plus	
1. RTSX to TorqueMate (6 pin Bendix)	065138
2. BTSX to TorqueMate (4 pin Bendix)	065123
3. TorqueMate connector/no connector (to connect to other transducers)	065145
4. GSE (with Angle indication and 10 pin Bendix)	065151
5. RTSXA (with Angle indication and 10 pin Bendix)	065152



IMPORTANT

The TM200 and transducers are instruments that should be handled with care. Never overload transducers above full capacity. Avoid using impact tools on transducers*. Before use, load the transducer to full scale in the direction to be used, then zero the display to compensate for any zero offset. Zero offset is a normal characteristic of transducers.

The TM200 will accept transducers with up to 2% zero offset. If the transducer has more than 2% offset the transducer is most likely damaged due to overload. This may result in the inability to zero the display of the TM200.

*If testing impact tools select a transducer that is twice the expected range of the impact tool and use for reference only. Do not expect to receive repeatable results when testing impact type wrenches.

Transducer Calibration

Always calibrate the TM200 with the unit plugged into the AC power adapter and make sure the batteries are fully charged.

Calibration data for up to 15 transducers can be memorized by the TM200.

There are two options available for calibrating a transducer:

1. FAST - Fast Cal means that you do not use dead weights for calibration. The TM200 will assume the mv/v signal entered is accurate and automatically span the range of the transducer and store it in memory.
2. TRUE -True Cal means that you use calibration arms and dead weights to calibrate the transducer. The TM200 will take three readings in each direction and create a calibration table in memory.

Procedure for Calibration

Attach the transducer to be calibrated.

Enter Set-up by pressing the Mode and Tolerance keys at the same time. The Set-up icon will show and the display will be blank.

Press the Scroll Up key until the LCD shows CAL.

Press Enter to select this option. The Units icon will be flashing.

Press Enter to select this option. See not below.

Press the Scroll Up key to select the units that you will be calibrating this transducer to. Press Enter to select the Units.

The display will now show the expected transducer number (c-1 to c-15). Press the Scroll Up key until the desired transducer number is displayed. If the TM200 transducer number has never been used it will show 3333 for the range (default). This will change as soon as you assign a range to the transducer. Press Enter to select the proper transducer number.

Enter the range of the transducer to be calibrated. Press the Scroll Up key to change the value of the flashing digit. Press the Scroll Right key to select a different digit. When the desired value has been selected press Enter to accept. Now set the decimal by pressing the Scroll Right key. Press the Enter key to save the range of the transducer.

i

Note: Calibration Security
To ensure that inadvertent alteration of calibration data does not occur a Key Sequence Override is required to be entered at the CAL prompt. After hitting Enter to activate the Cal Menu the Key Sequence Override is accomplished by pressing Enter, Scroll Right & Tolerance. Press these keys in exact order to access the CAL menu.

Transducer Calibration (cont.)

The display will now show the mv/v signal of the transducer at full range (1 to 4). The default is 2.000. Enter the actual value by pressing the Scroll up key to change the value of the blinking digit. Press the Scroll Right key to select a different digit. When the value is correct, press the Enter key.

i

Note: mv/v Input
If you do not know the full scale mv/v signal of the transducer then select 2.000 and use dead weights to calibrate the transducer. Contact the manufacturer of the transducer to determine the actual mv/v.The mv/v value will always show 2.000 even if programmed at a different

After entering the mv/v signal the display will show FAST CAL . If you do not want to use dead weights press Enter and the TM200 will use the mv/v signal you entered as the full scale span signal of the transducer.

If you are going to use dead weights press the Scroll Up key to show TRUE CAL . Press Enter to select TRUE CAL.

After selecting TRUE CAL, the display will show -P0 . This means that the tester is waiting for you to enter Point Zero in the negative (counterclockwise) direction (also referred to as the negative zero offset of the transducer).

Exercise the transducer three times to full scale in the CCW direction and wait 30 seconds with no load for the transducer to stabilize. Press the Scroll Right key (not the Enter key) to accept the negative zero point (offset).

i

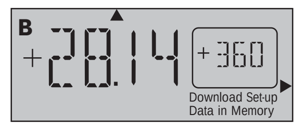
Note: Zeroing Transducer
All transducers have a shift in the zero or zero offset point when going from one direction to the other. As a result, it is important to exercise the transducer in the direction to be calibrated to make sure the TM200 uses the proper zero point for the associated direction. This is a normal characteristic of transducers.

The TM200 will now show -P1 . This means that it is waiting for the input for the first point in the CCW direction, always 10% of the full scale range of the transducer. Place the appropriate weights on the calibration arm and let the weight stabilize.

Transducer Calibration (cont.)

Press the Enter key to display the readings for -P1 . The display will now show what the TM200 thinks is point one in the CCW direction. Use the Scroll Up (increase) and Scroll Right (Decrease) keys to make the TM200 read the torque applied with the weights. Press the Enter key when the value is correct. Make sure the weights are not swinging, otherwise you will have unstable readings.

The TM200 will now show -P2 which means it is time to input point 2 in the CCW direction as you did with point one. Point 2 should always be 50% of the full scale range of the transducer. Press Enter and place the appropriate weights for point two. Make the TM200 read what is correct for -P2 by pressing the Scroll keys. When the TM200 reads the proper torque for point two in the CCW direction press Enter and repeat for point three (always the full scale value since it is the last point in that direction).



After entering the third point in the CCW direction, the display will show +P0 . This means that the TM200 is waiting for you to enter the zero point in the clockwise direction (offset). Exercise the trans-ducer to full scale in the clockwise direction three times and let the transducer stabilize with no load for 30 seconds. Press the Scroll Right key to accept the clockwise Zero point. Proceed in the clockwise direction as you did in the Counterclockwise direction for points +P1 , +P2 and +P3 .

After pressing Enter for the third point in the clockwise direction (+P3), before you remove the weights, the TM200 will go directly into the operation mode and should display the full scale torque in the clock-wise direction. Remove the weights and make sure you have labeled the transducer with the proper transducer code number for future reference.

If you are going to check the accuracy of the calibration. Place unit in track mode and remove all weights, exercise the transducer three times in the direction you are going to check and press the Scroll Right and Scroll Up keys to automatically adjust the zero (offset). Apply the weights in increasing order and check for accuracy. Repeat for all transducers to be calibrated.

Calibration intervals are dependent on the amount that a transducer is used. We recommend that you check the transducer every month at first. If the calibration is within specs after the first few months, increase the interval to 3 months. If you still find that the unit is in calibration increase the interval to 6 months.

i

Note: Calibration Intervals
Mountz Service Centers will calibrate and certify any transducer or transducer / display to N.I.S.T. It is recommended that this happen every 6 months but calibration intervals should be based on usage.

Charging the Batteries

Always leave the TM200 turned on when charging the batteries. This allows the microprocessor to monitor the charging cycle. The TM200 can be used while charging without affecting torque accuracy. The unit will go into battery saving pause (PAUS) mode after 5 minutes without use, but the batteries will still be charging.

The microprocessor monitors the charging process of the batteries. Always keep the TM200 turned on when charging batteries (the TM200 will continue to charge batteries while in Paus Mode).

The TIM200 can be used while charging batteries.

If the batteries are fully discharged, the TM200 may take a few minutes to power up after being plugged into the AC adapter.

BATTERY STRENGTH

The TM200 battery pack should last up to 10 hours with normal use and maximum charge. When the battery charge falls below a certain voltage the B icon will show on the display. At this point you should plug the unit into the AC adapter or replace the battery pack with a freshly charged pack. If the battery pack falls below a level that will effect accuracy it will automatically turn off.

CHARGING TIME

4 Hours Minimum

BATTERY CHARGER

115 volt to 12 Volt DC, 300 mAg, Center Pin Positive

Other Adapters available upon request.

IMPULSE AND POWER TOOL TESTING

IMPORTANT

Always use a quality joint rate simulator (run down adapter) when testing power tools in a simulated application. Do not use the peak mode. The power tool mode is designed to meet the demanding frequency requirements for testing dynamic torque applications.

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

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

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

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

The TorqueMate 200, and the mountz family of transducers have been designed to minimize these variations and are well suited for both the analysis of the application joint and the testing of the impulse tool.

You can test pulse and power tools in different ways:

1. Preferred Method (and quickest): Use the TM200 in Power Tool Mode with a rotary transducer between the pulse tool and the actual application. This is the best way to test since you are using the actual joint as the test station. What the TM200 reads is what the fastener sees . Caution: Variances in tool performance may occur do to the addition of the rotary transducer.
2. Simulated Method: Always use a quality joint rate simulator (run down adapter) when testing power tools in a simulated application. Use Joint rate and Breakaway methods to obtain most accurate torque readings in a simulated rundown. See Breakaway Method 2 and Joint Rate in this manual for descriptive test methods.

> i
>
> Note: Determining Joint Rate
> You can also use the TM200 in angle mode with a rotary transducer that has an angle encoder to determine the joint rate. The TM200 displays peak torque and angle in this mode. This is the most accurate method to enhance simulated test applications.

Break Away Torque Method 1:
A common method of testing a previously fastened joint is to use a TM200 in peak mode with a hand torque transducer (TWX). Run the fastener down with the pulse or power tool. Apply additional torque to the fastener with the TM200 and a hand transducer. As soon as the fastener starts to turn stop pulling on the wrench and note the reading on the TM200. This is a close approximation of the torque achieved with the impulse tool (actually the true value is usually less than what is shown on the tester because of the torque necessary to overcome friction and operator influences). It is wise to take a number of these readings to get a true picture of what is really happening on the application joint. This will also give you a feel for how much variance you are getting from the output of the impulse tool. Remember that most pulse tools are no better than 10% accurate, and frictional variations create even more scatter in results (up to 30% or more).

Breakaway Torque Method 2:
Use the TM200 with a rotary transducer that has an angle encoder built in. To check breakaway (first movement) of a fastener: The TM200 will enter a special breakaway sensing mode when you set the low angle tolerance to a small value, usually 1 to 3 degrees, and the high angle tolerance to zero. Apply torque to an already tightened fastener, when the TM200 senses the threshold torque (set at approximately 50% of the expected torque) it will start looking for the fastener to move the number of degrees set as the low tolerance. When this number of degrees has been reached it will automatically capture the torque at that point and will disregard any further torque input, even if you keep turning the fastener.

CALIBRATING TORQUE WRENCHES

To calibrate torque wrenches, use the TM200 with a bench mounted transducer or mount a TWX or SMX transducer in a fixture. Mount the transducer directly to a bench and apply the torque directly to the wrench by hand, or attach the transducer to a Mountz mechanical loader and isolate the wrench from the operator, reducing the possibility of operator errors (highly recommended).

For manual calibration of click type wrenches use the First Peak mode on the TM200 so the tester will display the point at which the wrench clicked (First Peak) and the point when the operator stopped pulling (Second Peak shown in the torque window). In First Peak Mode the TM200 will disregard any further input once the wrench has clicked. Make sure you apply the torque slowly and smoothly (try not to shake or you may induce a false first peak). To avoid this problem, calibrate click wrenches in Peak mode on a mechanical loader.

For dial type, screwdrivers and cam over torque wrenches put the TM200 in Peak mode.

You can also enter the wrench accuracy tolerance in the TM200 s Tolerance settings making it easier to determine a Go or No/Go condition.

SENDING DATA

To a Computer

When sending data to a computer file, use Windows 95 Hyperterminal or any serial communications software. Set the protocol in your software to 8,1,N 4800 (see your communication software manual). There are two ways to send data:

1. Send all memorized data in memory from set-up mode.

2. Send realtime data, one at a time, when in peak or power tool mode and press the enter key.

Real Time Data to a Dot Matrix Printer

The output of the TM200 when in all modes (except track) and while downloading from set-up can be sent directly to a serial dot matrix printer instead of a computer. The data sent when in the track mode is sent too fast for a dot matrix printer, therefore it must be sent to a computer.

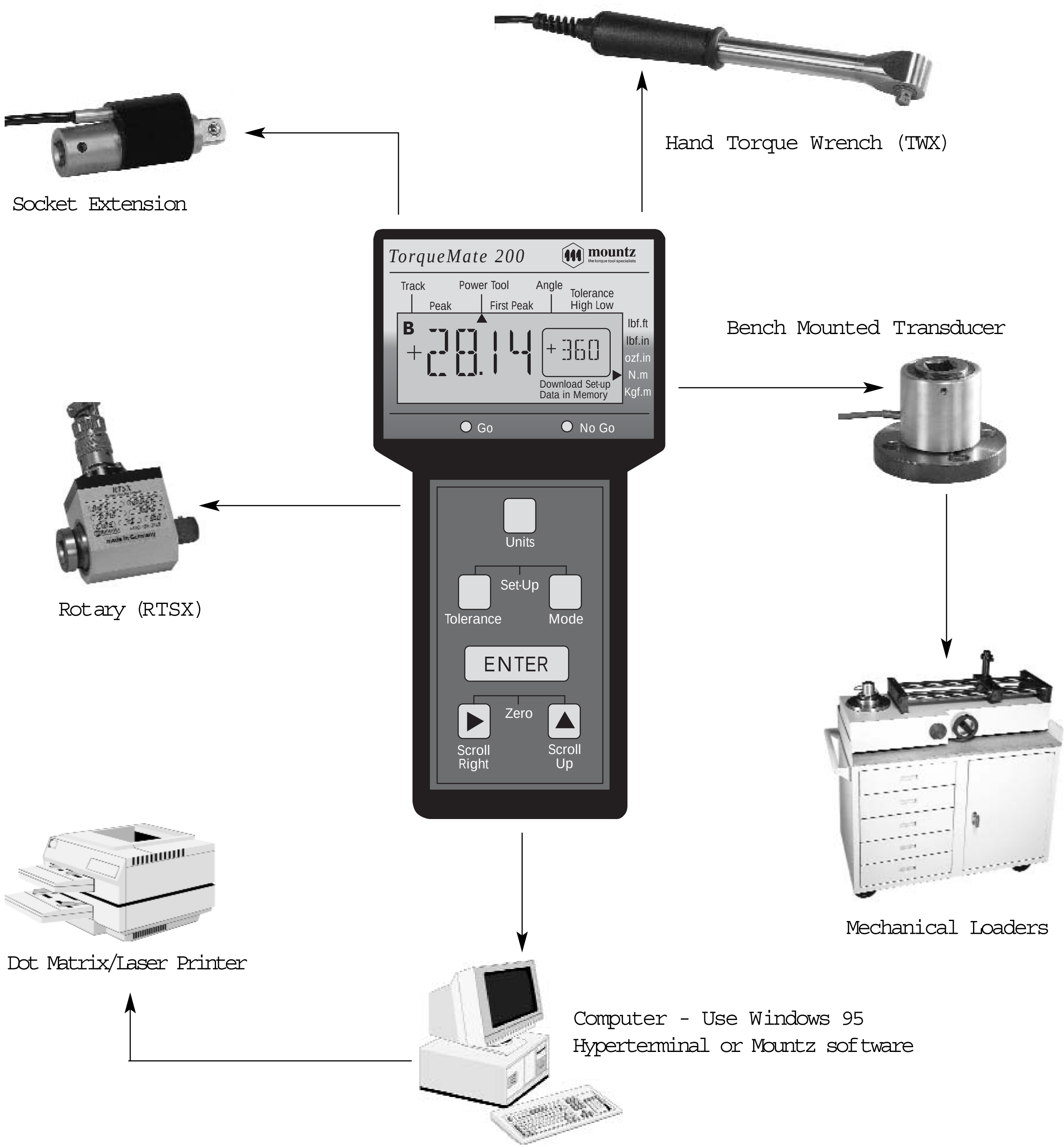
Filters

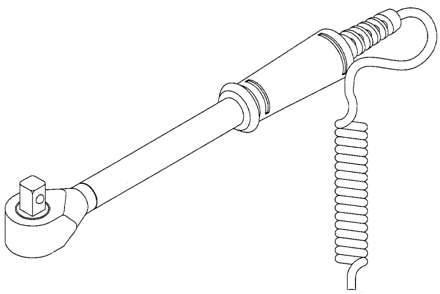
The process of converting pulse type dynamic mechanical torque to an electronic signal using a transducer may result in unwanted inputs (noise), resulting in a distorted torque value (usually high). Often it is possible through the use of appropriate circuitry to selectively filter out some or all of the unwanted noise. Filtering is the process of attenuating unwanted components of a torque measurement (those which are not torque related, noise) while permitting the desired torque measurement to pass.

In general, if a joint is very hard, i.e., two pieces of steel with no washer, the tool may create sharp spikes that may create a great deal of electronic noise and ringing . Noise and ringing, in this case, are defined as readings from the transducer that did not result in torque to the fastener (obviously we do not want to read this on the display). If the joint is very soft (two pieces of plastic with a crush washer) the tool might create more rounded or flat peaks as a result of the energy absorption characteristics of the soft joint, possibly resulting in much less noise. These two situations may create the need for different filters within the tester. A filter acts much like a sieve, it lets certain signals through and stops others. When you select different filters on the TM200, you are selecting different low pass filters . This means that the filter will cut-off or attenuate any signals above the cut off frequency of the filter and let pass signals below. So a 500Hz filter theoretically will cut out any signal that is entering that is over 500Hz. If the power tool you are using inputs torque at a rate above 500Hz you might cut off the peak and get a reading that is too low. When you are using a hand wrench, the rate of application is slow, so a 500Hz should work fine. To be safe, you should first try using the 3600Hz filter with power tools. This will let most of the signal pass through.

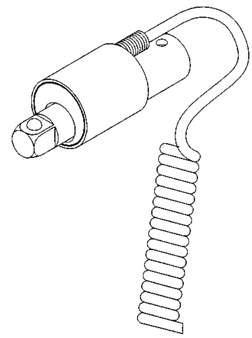
If you find that your readings are consistently high, or you get occasional peaks that are high, compared to the real application torque (see testing of joint) you may be reading noise. Try using the 1500 Hz filter. No single filter can be specified for every application. This is somewhat of a trial and error process, however experience has shown that 1500 Hz is the filter selection that should work the the best for most applications, from hand tools to power tools.

Accessories

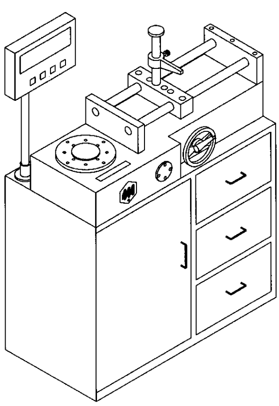




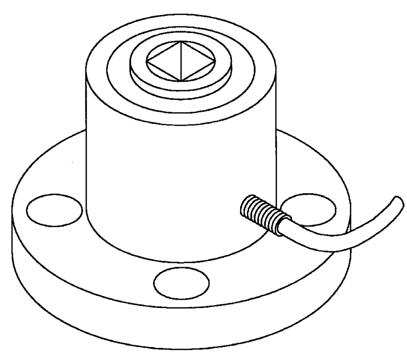
Hand Held Wrenches (TWX)
for Production and Quality Auditing.
See Page # 1.8 of
Mountz MC10 Catalog



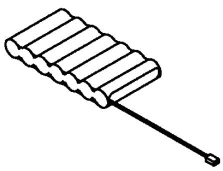
In Line Socket (SMX)
and Rotary (RTSX) Transducers for
Quality Auditing and Production.
See Page # 1.9 of
Mountz MC10 Catalog



Torque Wrench Calibration Loading
Bench
for the Calibration Lab. Use with
Mountz Bench Mounted Transducers
(BMX).
See Data Sheet

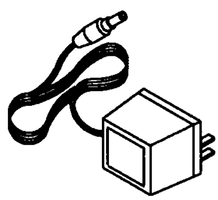


Bench Mounted Transducers (BMX)
for Production Testing and the
Calibration Lab.
See Page # 1.6 of
Mountz MC10 Catalog



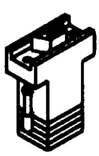
Battery Pack

NiMH 8.4 V 1.1Ah
Part Number: 771170



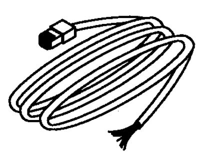
Battery Charger

Input: 115 VAC60 HZ
Output:12 VDC 300 mA
Part Number: 771044



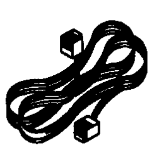
Adapter

D-Sub 9 pin to 6 Pin RJ12 (TorqueMatefi Plus)
Part Number: 701031



Transducer Cable

10 Pin Modular Plug to Open Wire
Part Number: 065145



RS232 Cable

6 Pin to 6 Pin Modular
Part Number: 065150

Specifications

Input Signal ....1 to 4 Mv/v Full Scale

Bridge Excitation ....12 Volts

Software Selectable Filters 3600Hz, 1500Hz, 500Hz
(Other Filter Values Programmed Upon Request)

Calibration ....Dead Weights (true) or Programmable
(fast) (mv/v and range)

Accuracy ....+/- .25% or better of reading
from 10% to 100% of
range +/1 one digit
whichever is greater.

Display ....Large 4 digit LCD with additional
4 digit window.

Memory Capacity ....Up to 1000 Readings

Communications ....RS232C, 8,1,n, 4800 BPS

Power ....NimH for long life

Clockwise and
Counter- clockwise operation ....Automatic, no switch required
Full accuracy in both directions.

Printout ....Data #, Torque, Units, Angle

Angle Input ....Quadrature, 360 Counts per Rev.

Angle Resolution ....1 Degree

Maximum Angle Count 9,999

Battery Life ....Up to 10 Hours