



INSTRUCTION MANUAL

VIBRATING WIRE DATA RECORDER

Model MB-3TL

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Tel.: 1.450.465.1113 • 1.877.ROCTEST (Canada, USA) • 33 (1) 64.06.40.80 (Europe) • www.roctest-group.com

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1 MB-3TL VIBRATING WIRE DATA RECORDER

1.1 INTRODUCTION

The MB-3TL is a recording readout for vibrating wire sensors. Roctest MB-3TL Manager program, which is supplied on CD with the recorder, is used to transfer readings from the recorder to a PC.

1.2 CONTROL AND CONNECTORS

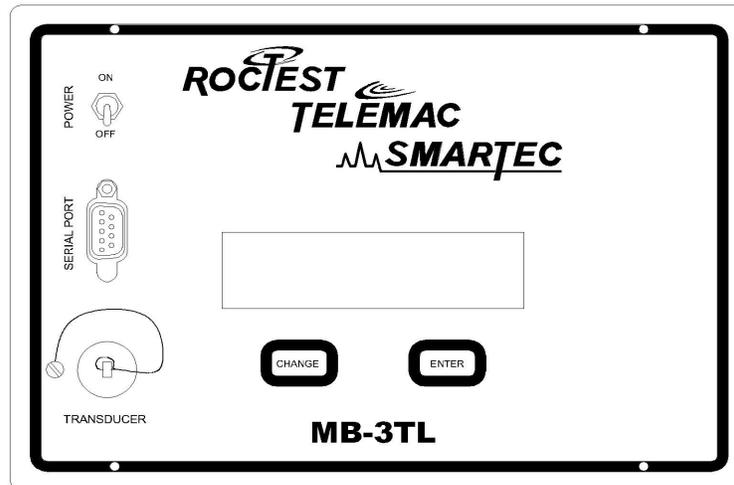


Figure 1

1.2.1 POWER SWITCH

The power switch toggles power on and off.

If no keys are pressed for a period of time, the MB-3TL goes into standby mode. To restore full power, press any key, or switch the MB-3TL off and on. When you are finished taking readings, switch the recorder off.

1.2.2 SERIAL PORT AND SERIAL INTERFACE CABLE

The serial port is used for communication with a PC. Use the supplied serial interface cable to connect the serial port on the MB-3TL to the serial port on your computer.

The cable is a standard "modem" cable that can be found at any computer supply store.

1.2.3 JUMPER CABLE WITH ALLIGATOR CLIPS

Connect the jumper cable with Canon connector to alligator clips. Then, connect the clips to the signal cable from the sensor.

	Clip Colors	Signal Cable*
VW (+)	Red	Red
VW (-)	Black	Black
Temp (-)	White	White
Temp (+)	Green	Green
Shield (Drain)	None	Bare Wire

*Standard IRC-41A, IRC-390 cable

1.2.4 KEYPAD AND DISPLAY

Change: Displays different options.

Enter: Accepts the option.

To show that an option is available, the recorder displays a prompt and a colon (:). Examples of option prompts are: **Type: Save As:**

When you see an option prompt, press the Change key to display the various options. When you see the option that you want, press Enter.

1.3 BATTERIES

The MB-3TL requires two D-cell alkaline batteries. The recorder displays battery voltage when you switch it on. Replace the batteries when voltage falls below 2V:

1. Remove the four screws from the panel.
2. Place your hand on the panel, then turn the recorder over, so that the panel drops out of the box to rest on your hand.
3. Remove the batteries from the battery holder.
4. Replace with fresh batteries. The battery holder indicates the proper orientation of the batteries.

2 TAKING READINGS

2.1 OVERVIEW

The steps in taking a reading are:

1. Connect sensor signal cable to the jumper cable.
2. Choose frequency units and temperature sensor.
3. Choose a sweep frequency.
4. Observe the reading.
5. Record the reading.

2.2 CONNECT SIGNAL CABLE

Connect jumper cable on the front panel and signal cable from the sensor to the jumper cable.

	Jumper Cable	Signal Cable*
VW (+)	Red	Red
VW (-)	Black	Black
Temp (-)	White	White
Temp (+)	Green	Green
Shield (Drain)	None	Bare Wire

*Standard IRC-41A, IRC-390 cable

2.2.1 CHOOSE TYPE

Switch on the MB-3TL and press Enter. At the Type prompt, choose the appropriate frequency and temperature settings. Press Change to display a different combination. Press Enter to select the option that is displayed.

Piezo: LU + THRM for PW, TPC, SSG = Displays Linear Units and Celsius degrees for for RocTest PW type piezometers, TPC (total pressure cell) and SSG (soil settlement gage) sensors using 3K type thermistor.

Suitable for sensor with a gauge factor of 1.0156. The display value is *in* linear unit or $1.0156 \times \text{Hz}^2/1000$ and Celsius degrees.

VWSG: $\mu\text{Strain} + \text{THRM}$ for spotweld SM-2 = Displays microstrain value and Celsius degrees for 3K thermistor, for spot weld able SM-2W sensors, IRHP.

Suitable for sensor with a gauge factor of 0.3911.

VWSG: $\mu\text{Strain} + \text{THRM}$ for SM-5, EM = Displays microstrain value and Celsius degrees for 3K thermistor, for SM-5, EM-5, EM-10 and others EM sensors.

Suitable for sensor with a gauge factor of 4.0624

Type: Hz + Thermistor = Displays frequency in Hz and Celsius degrees for 3K thermistor.

Type: $\text{Hz}^2 + \text{Thermistor}$ = Displays frequency² in $\text{Hz}^2/1000$ and Celsius degrees for 3K thermistor for JM sensors and other types.

Type: $\text{Hz}^2 + \text{RTD}$ = Displays $\text{Hz}^2/1000$

2.3 CHOOSE A SWEEP FREQUENCY

By exciting the sensor with a sweep of frequencies rather than a single pluck, the MB-3TL decreases the chance of error due to harmonics. However, it is necessary to choose the correct sweep range.

Check your sensor calibration sheet to find the highest and lowest frequencies in the calibration. Then choose the sweep that includes those frequencies.

Sweep mode	Starting Frequency in Hz	Ending Frequency in Hz
Sweep A	450	1125
Sweep B	800	2000
Sweep C	1400	3500
Sweep D	2300	6000

Typical sweep ranges for Roctest sensors are listed in the table below. Note that most sensors work with sweep C:

Gage Type	Gage Factor	LU Conversion	Sweep
VBS-2	N/A	Hz	C, D
JM, VH	1.0000	Hz ² /1000	B, C
SM-2, EM-2, IRHP	0.3911	Hz ² /1000 x G.F.	B, C
PW, TPC, EPC, SSG	1.0156	Hz ² /1000 x G.F.	A, B, C
EM-5, EM-10, SM-5	4.0624	Hz ² /1000 x G.F.	A

$$L = \frac{K \times F^2}{1000}$$

$$F = \frac{10^6}{N}$$

Where L = Linear units (LU)

Where F = Frequency (Hertz)

K = Gage factor

N = Normal reading (micro seconds)

F = Frequency (Hertz)

2.4 OBSERVE THE READING

The MB-3TL excites the sensor at two second intervals and displays the VW reading and the temperature reading (degrees C).

2.4.1 READING STABILITY

You may see some variation in the decimal digit due to sensor performance, site conditions, electromagnetic noise, and the actual resolution of the recorder. Variations of up to ± 0.3 Hz are not considered significant, since values within this range maintain the stated accuracy for VW sensors.

2.4.2 QUESTIONABLE READINGS

The MB-3TL performs a "quality" test on each reading and displays a question mark (?) in front of readings that fail the test. If the reading varies more than ± 0.3 Hz or if you see a question mark, try to change the sweep frequency in order to obtain a more stable reading.

2.5 RECORD THE READING

When you save a reading, the MB-3TL tags the reading with an ID number, the date, and the time. You must choose an ID number from a fixed set of numbers (1 to 99).

The MB-3TL remembers the most recently used ID. This lets you record a second reading with the same ID or advance to the next ID with a single press of the Change key.

This ID system eliminates the need to pre-program the MB-3TL with sensor serial numbers or other IDs. However, it does require some planning on your part because later, when you process the data, you must match these IDs to the actual sensor serial numbers and calibration records.

1. Press Enter when you want to save a reading. The MB-3TL prompts **Save as: n.** (n is an ID for the sensor that you are reading).
2. Choose an ID number from 1 to 99. Press Change to increment the number. Press Change + Enter to decrement the number.
3. Press Enter to save the reading.
4. Press Enter again to continue.

2.5.1 SPECIAL IDS

When you save a questionable reading, the MB-3TL adds 100 to the sensor ID that you chose, so that the reading is clearly identified as questionable. For example, if you have a questionable reading as #4, the MB-3TL stores it as #104.

3 ROCTEST MB-3TL MANAGER PROGRAM

3.1 INTRODUCTION

The program is used to transfer readings from the MB-3TL to a PC. It is also used to change some of the MB-3TL default settings. Roctest MB-3TL Manager program can be found on the resource CD that is supplied with the recorder. Updates can be downloaded from www.roctest-group.com.

3.2 INSTALLATION

1. Close all programs.
2. Place the resource CD in your CD-ROM drive. Wait for a menu to appear.
3. Choose Software.
4. Click on Roctest MB-3TL Manager.
5. Choose "Run this program from its current location". This starts the setup program. Follow on screen instructions.
6. Afterwards, you will find the program on your Start menu under "Roctest MB-3TL" and on your hard disk under Program Files\Roctest\MB-3TL.

3.3 ALTERNATIVE INSTALLATION

If you have downloaded the setup file or if autorun is disabled on your computer, run the resource CD as explained below.

1. Start your browser.
2. Choose File Open and navigate to your CR-ROM drive.
3. Click on "Start CD", and then follow the instructions above.
4. Click the Start button.

3.4 TESTING COMMUNICATIONS

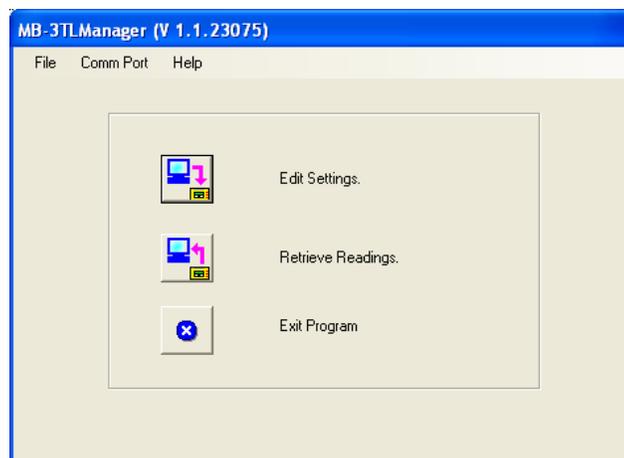
Roctest MB-3TL Manager program communicates with the MB-3TL through a serial connection. The steps below tell how to check the connection.

3.4.1 CONNECT THE DATA RECORDER TO YOUR PC

1. Find the serial port on your PC. It will have a 9-pin or a 25-pin connector. Desktop PCs typically have two or more serial ports. Laptops typically have one.
2. Connect the interface cable (supplied) to the serial port. The interface cable is a "modem cable" that is available at any computer supply store. An USB-RS232 adaptor is also supplied with the accessory kit for connecting directly to the USB port.
3. Connect the other end of the interface cable to the serial port on the front panel of the MB-3TL.
4. Switch on the recorder.

3.4.2 START THE PROGRAM

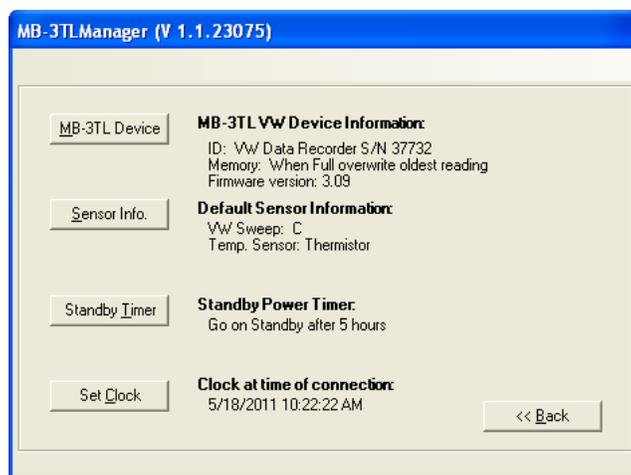
1. Click the Start button. Choose Programs from the Start menu.
2. Click on Roctest MB-3TL.
3. Roctest MB-3TL Manager program appears.
4. Click on the Edit Settings button.



3.4.3 TROUBLE SHOOTING

The Edit Settings screen should appear. If you see an error message, click OK to clear the message, and then perform these actions:

- Try choosing a different comm port. Click "Comm Port" on the menu bar and choose a different port from the drop-down list.
- Check that the cables are firmly connected to the MB-3TL and to the computer.
- If you are using Hot Sync or a similar serial communications program with a palm top computer, try disabling the program temporarily.



4 CHANGING DEFAULT SETTINGS

4.1 OVERVIEW

Roctest MB-3TL Manager program lets you edit some of the recorder's default settings. The most important of these is the recorder's clock, since it is used to time-stamp recorded readings.

1. Connect the MB-3TL to your PC.
2. Start Roctest MB-3TL Manager program.
3. Click on the "Edit Settings" button.
4. Click on any of the four buttons to edit a setting. Text to the right of each button shows the current values of settings



4.2 RECORDER ID

Recorder ID: Enter an identifier for the recorder. This ID does not appear in the data file.

When memory is full: You can record more than 2,000 readings before memory is full, so this parameter is not critical.

When "Stop recording" is selected, the recorder will store readings until its memory is full and will then stop and wait for you to retrieve the readings. No readings are overwritten.

When "Continue recording" is selected, the recorder will store readings normally until memory is full. Then it will continue to record new readings, overwriting the earliest reading.

4.3 SENSOR INFO

The dialog box lets you set a default sweep frequency and temperature device. Note that both settings can be changed via the recorder's keypad.

Sweep frequency: Choose a default sweep frequency. Most sensors use the "C" sweep, but yours may not. You can find a list of sensors and recommended sweep frequencies in Section 2, "Taking Readings".

Default temperature device: Choose Thermistor. This choice affects the Type menu. Choosing Temperature makes Hz, Hz², and uStrain with Thermistor appear first.

4.4 STANDBY DELAY

This setting controls how long the recorder waits before going into standby mode. For example, if you choose 30 minutes, the recorder will wait 30 minutes after the last key press before going into standby mode. Note that the standby mode still requires power, so when you are finished taking readings, always switch the recorder off.

4.5 SET CLOCK

Click the "Match Computer" button to synchronize the recorder's clock with your computer's clock.

To set a different time, click in the date and time fields, type in values, and click OK. The date display format in the dialog box is controlled by the short date setting in Windows (Control Panel > Regional Settings > Date).

5 RETRIEVE READINGS

5.1 OVERVIEW

1. Connect the MB-3TL to your PC.
2. Start Roctest MB-3TL Manager program.
3. Choose Retrieve Readings.
4. Save the data in a file.
5. Clear the data recorder's memory.

5.2 RETRIEVE DATA

1. Click the "Retrieve Readings" button. The Manager program performs some checks and then displays a progress counter.
2. The Manager program then displays the retrieved readings in tabular form.

3. Click the "Save" button to open the Save dialog box. Specify a location and file name, then click the dialog's Save button. The Manager program confirms when the readings are saved.

5.3 CLEAR MEMORY

Click the Erase button to clear the recorder's memory.