

# CALIBRATION PROCEDURE

# NI USB-TC01

This document contains information for calibrating the National Instruments USB-TC01. For more information about calibration, visit [ni.com/calibration](http://ni.com/calibration).

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## Conventions

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The following conventions are used in this document:

» The » symbol leads you through nested menu items and dialog box options to a final action. The sequence **File»Page Setup»Options** directs you to pull down the **File** menu, select the **Page Setup** item, and select **Options** from the last dialog box.



This icon denotes a note, which alerts you to important information.

**bold**

Bold text denotes items that you must select or click in the software, such as menu items and dialog box options. Bold text also denotes parameter names.

*italic*

Italic text denotes variables, emphasis, a cross-reference, or an introduction to a key concept. Italic text also denotes text that is a placeholder for a word or value that you must supply.

monospace

Text in this font denotes text or characters that you should enter from the keyboard, sections of code, programming examples, and syntax examples. This font is also used for the proper names of disk drives, paths, directories, programs, subprograms, subroutines, device names, functions, operations, variables, filenames, and extensions.

# Documentation Requirements

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For information about the NI USB-TC01, you can consult the following documents:

- *Getting Started with the NI USB-TC01*—provides instructions for installing and configuring the NI USB-TC01.
- *NI USB-TC01 User Guide and Specifications*—includes detailed information about NI USB-TC01 and provides the published specification values for the NI USB-TC01. Refer to the most recent *NI USB-TC01 User Guide and Specifications* online at [ni.com/manuals](http://ni.com/manuals) for specifications.

You can also find the latest versions of the documentation at [ni.com/manuals](http://ni.com/manuals).

## Test Equipment

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National Instruments recommends that you use the equipment in Table 1 for calibrating the NI USB-TC01.

**Table 1.** Recommended Equipment

Equipment	Recommended Model	Requirements
Calibrator	Fluke 5500A	If this instrument is unavailable, use a high-precision simulated thermocouple output module capable of type J with an accuracy of $\pm 0.4$ °C at 0 °C and 1000 °C simulated outputs.
Thermocouple wire	—	Type J
Two miniature thermocouple connectors	—	Type J

## Test Conditions

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The following setup and environmental conditions are required to ensure the NI USB-TC01 meets published specifications.

- Keep connections to the device as short as possible. Long cables and wires act as antennae, picking up extra noise that can affect measurements.
- Verify that all connections to the device are secure.
- Maintain an ambient temperature of  $25 \pm 5$  °C.

- Keep relative humidity below 80%.
- Allow a warm up time of at least 15 minutes for the NI USB-TC01 and 30 minutes for the calibrator to ensure that the measurement circuitry is at a stable operating temperature.

## Calibration Procedures

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The calibration process includes the following steps:

1. *Initial Setup*—Install the device.
2. *Verification*—Verify the existing operation of the device. This step confirms whether the device is operating within the published specifications prior to adjustment.
3. *Adjustment*—If the device does not fall within the desired specifications, you can return the device to NI for a factory test to adjust the calibration constants. Go to [ni.com/calibration](http://ni.com/calibration) for information about returning a device to NI for a factory test.
4. *Reverification*—Repeat the verification procedure to ensure that the device is operating within the published specifications after adjustment.

The first two procedures are described in more detail in the following sections.

### Initial Setup

Refer to the *Getting Started with the NI USB-TC01* for information about how to install the hardware.

### Verification

This section provides instructions for verifying the NI USB-TC01 specifications. The limits are based on the specifications that the device should meet if it has been one year since the original factory calibration.

#### Verifying Temperature Measurement Accuracy

Complete the following steps to verify temperature measurement accuracy.

1. Connect the thermocouple output of the calibrator to the NI USB-TC01.
2. Set the calibrator to output a 0 °C type J measurement.
3. Acquire a temperature measurement with the NI USB-TC01.
4. Verify that the NI USB-TC01 measurement is  $0 \pm 2.05$  °C.
5. Set the calibrator to output a 1000 °C type J measurement.
6. Acquire a temperature measurement with the NI USB-TC01.
7. Verify that the NI USB-TC01 measurement is  $1000 \pm 1.96$  °C.



**Note** Limits are based upon the January 2010 edition of the NI USB-TC01 specifications. Refer to the most recent NI USB-TC01 specifications online at [ni.com/manuals](http://ni.com/manuals).

## Where to Go for Support

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The National Instruments Web site is your complete resource for technical support. At [ni.com/support](http://ni.com/support) you have access to everything from troubleshooting and application development self-help resources to email and phone assistance from NI Application Engineers.

National Instruments corporate headquarters is located at 11500 North Mopac Expressway, Austin, Texas, 78759-3504. National Instruments also has offices located around the world to help address your support needs. For telephone support in the United States, create your service request at [ni.com/support](http://ni.com/support) and follow the calling instructions or dial 512 795 8248. For telephone support outside the United States, contact your local branch office:

Australia 1800 300 800, Austria 43 662 457990-0,  
Belgium 32 (0) 2 757 0020, Brazil 55 11 3262 3599,  
Canada 800 433 3488, China 86 21 5050 9800,  
Czech Republic 420 224 235 774, Denmark 45 45 76 26 00,  
Finland 358 (0) 9 725 72511, France 01 57 66 24 24,  
Germany 49 89 7413130, India 91 80 41190000, Israel 972 3 6393737,  
Italy 39 02 41309277, Japan 0120-527196, Korea 82 02 3451 3400,  
Lebanon 961 (0) 1 33 28 28, Malaysia 1800 887710,  
Mexico 01 800 010 0793, Netherlands 31 (0) 348 433 466,  
New Zealand 0800 553 322, Norway 47 (0) 66 90 76 60,  
Poland 48 22 328 90 10, Portugal 351 210 311 210,  
Russia 7 495 783 6851, Singapore 1800 226 5886,  
Slovenia 386 3 425 42 00, South Africa 27 0 11 805 8197,  
Spain 34 91 640 0085, Sweden 46 (0) 8 587 895 00,  
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United Kingdom 44 (0) 1635 523545

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