

USER GUIDE

Calibrating the FP-AO-200 with Calibration Executive

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Introduction

This document contains step-by-step instructions for loading and running a calibration procedure for the FP-AO-200 using National Instruments Calibration Executive.

Equipment and Other Test Requirements

This section describes the equipment, documentation, software, and test conditions you need to calibrate the FieldPoint module using Calibration Executive.

Test Equipment

The Calibration Executive procedure requires using a high-precision milliamp meter that is accurate to at least 300 ppm and is supported by NI-IVI. NI recommends that you use the following instruments for calibration:

- Digital multimeter (DMM)—Hewlett-Packard 3458A or 34401A
- FieldPoint FP-1000 serial network module
- FP-TB-CAL FieldPoint Calibration Terminal Base (part number 777519-90), a modified FieldPoint base that enables you to write new calibration constants to the module EEPROM
- 11–24 V power supply—NI PS-2 power supply
- RS-232 serial cable

If an HP 3458A is not available, use the milliamp meter accuracy specifications to choose a substitute milliamp meter as a calibration standard.

Documentation

This section describes the documentation you need to calibrate the FieldPoint module. In addition to this calibration procedure, you may need to refer to the following documentation:

- *Calibration Executive Software User Manual*
- *FP-AO-200 and cFP-AO-200 Operating Instructions*
- *FP-1000/1001 User Manual*
- *FP-1000/1001 Quick Start Guide*

You can download these documents from the NI Web site at ni.com/manuals.

Software

The Calibration Executive setup program installs Calibration Executive, the FieldPoint software, and the associated files listed in Table 1. Refer to the *Calibration Executive Software User Manual* for more information about installing and uninstalling Calibration Executive software and procedures.

Table 1. Calibration Executive Directories and Supporting Files

| Directory Name | Contents |
|--|---|
| Calibration Executive\ Procedures\FP-AO-200\ | Directory structure that contains the calibration procedures. |
| Calibration Executive\ Procedures\FP-AO-200\Support Files | Required support files. |

Test Conditions

Follow these guidelines to optimize connections and test conditions during calibration:

- Keep connections to the module short. Long cables and wires act as antennae, picking up extra noise that can affect measurements.
- Use shielded copper wire for all cable connections to the device. Use twisted-pair wire to eliminate noise and thermal offsets.
- Maintain a temperature between 18 and 28 °C. If you intend to operate the module at a specific temperature outside this range, calibrate the module at that temperature.
- Keep relative humidity below 80%.
- Allow a warm-up time of at least 15 minutes to ensure that the measurement circuitry is at a stable operating temperature.

Calibration Procedures

This section explains how to configure and set up the module for calibration, and how to run the Calibration Executive procedure. In automated mode, the calibration procedure takes approximately five minutes. In manual mode, the calibration procedure takes approximately 12 minutes.

Calibration consists of two main steps:

1. Configuring the module for calibration, which is described in the [Configuring the FP-AO-200 Module for Calibration](#) section of this document.

2. Running the procedure to calibrate the module, which is described in the *Running the Calibration Executive Procedure* section of this document.



Note For an explanation of automated versus manual calibration, refer to the *Automated Versus Manual Calibration* section of the *Calibration Executive Software User Manual*.

Configuring the FP-AO-200 Module for Calibration

To verify the operation of the test fixture, build a FieldPoint bank with an FP-1000 serial network module, an FP-TB-CAL calibration terminal base, an 11–24 V power supply, and the FP-AO-200 you want to calibrate. Complete the following steps:

1. Attach the network module to the calibration base as shown in Figure 1.

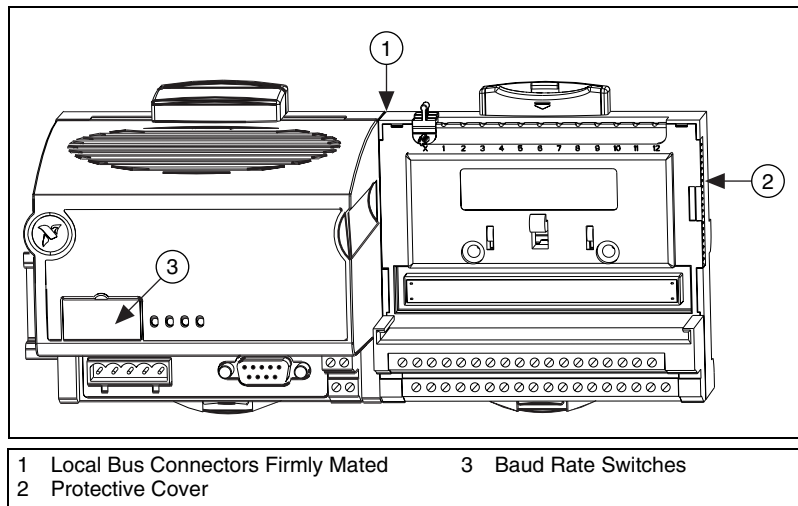


Figure 1. Connecting FieldPoint Terminal Bases

2. Install the FP-AO-200 module on the calibration terminal base as described in the module operating instructions.

3. Connect the bank to the host computer using an RS-232 cable.

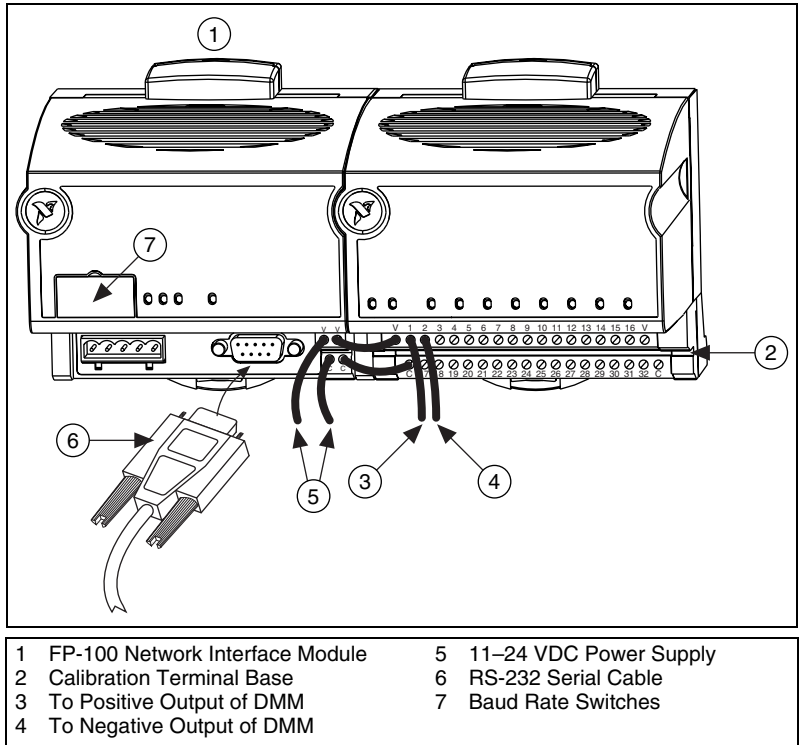

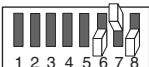




Figure 2. FP-AO-200 on Calibration Terminal Base

4. Use the DIP switches on the network interface module to select a baud rate that your computer supports. Table 2 shows the available baud rates. The default baud rate for the FP-1000 is 115,200, which provides the fastest performance. You do not need to change this setting unless you experience communication problems.

Table 2. Baud Rate Switch Settings for the FP-1000/1001

| Switch Positions 6–8 | Network Module Baud Rate |
|---|--------------------------|
|  | 300 |
|  | 1,200 |
|  | 2,400 |
|  | 9,600 |
|  | 19,200 |
|  | 38,400 |
|  | 57,600 |
|  | 115,200 |

5. Connect the positive wire of the power supply to the first V terminal of the FP-1000 and the negative wire of the power supply to the first C terminal of the FP-1000, as shown in Figure 3.

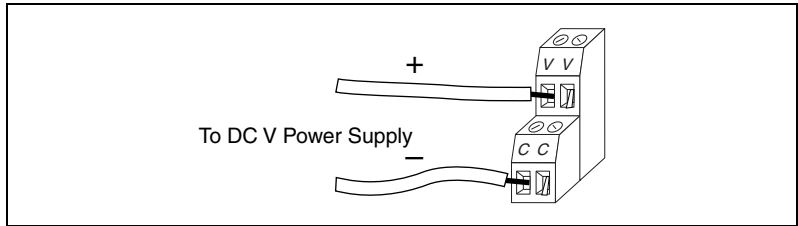
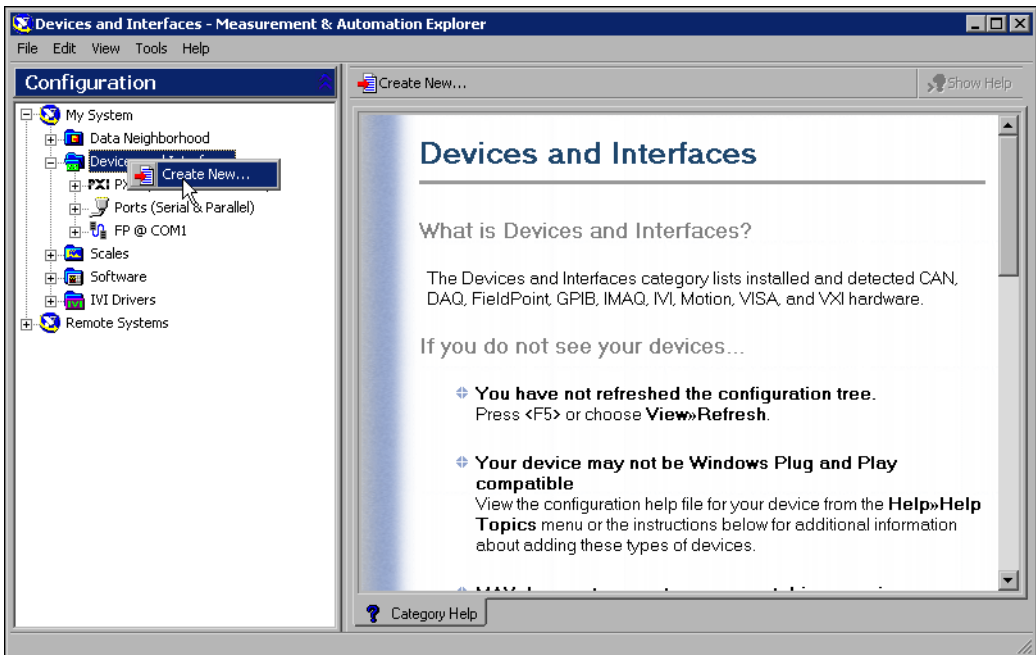
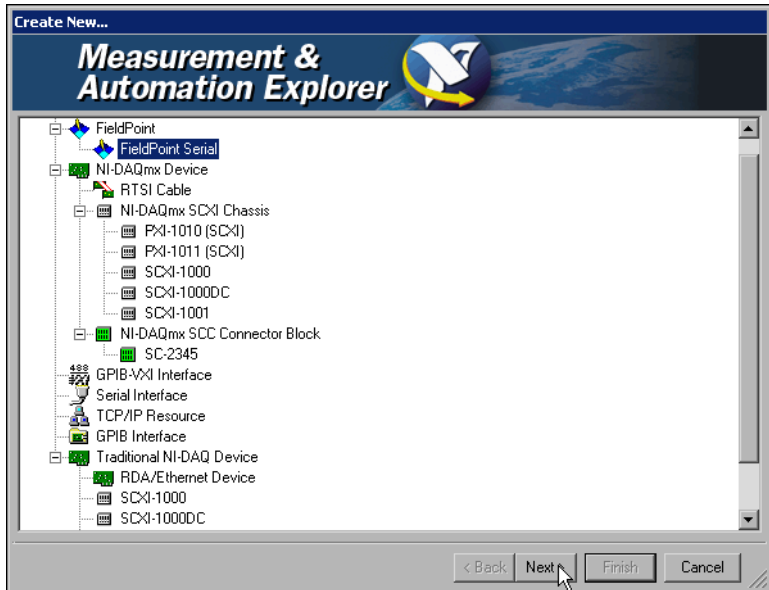


Figure 3. FP-1000/1001 Power Connector Pinout

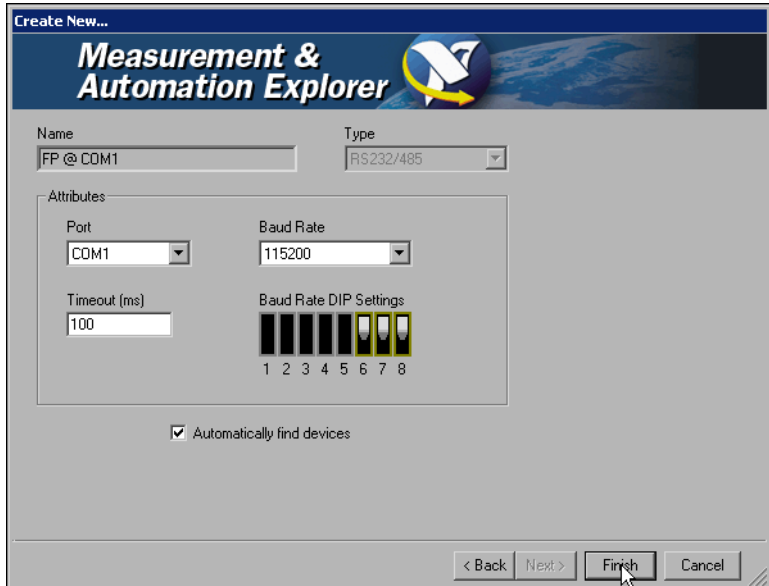
6. Power the FP-AO-200 module by completing the following steps:
 - a. Connect the second V terminal on the network module to either V terminal on the FP-AO-200 module.
 - b. Connect the second C terminal on the network module to either C terminal on the FP-AO-200 module.
7. Launch Measurement & Automation Explorer (MAX).
8. In the MAX configuration tree, right-click **Devices and Interfaces** and select **Create New**.



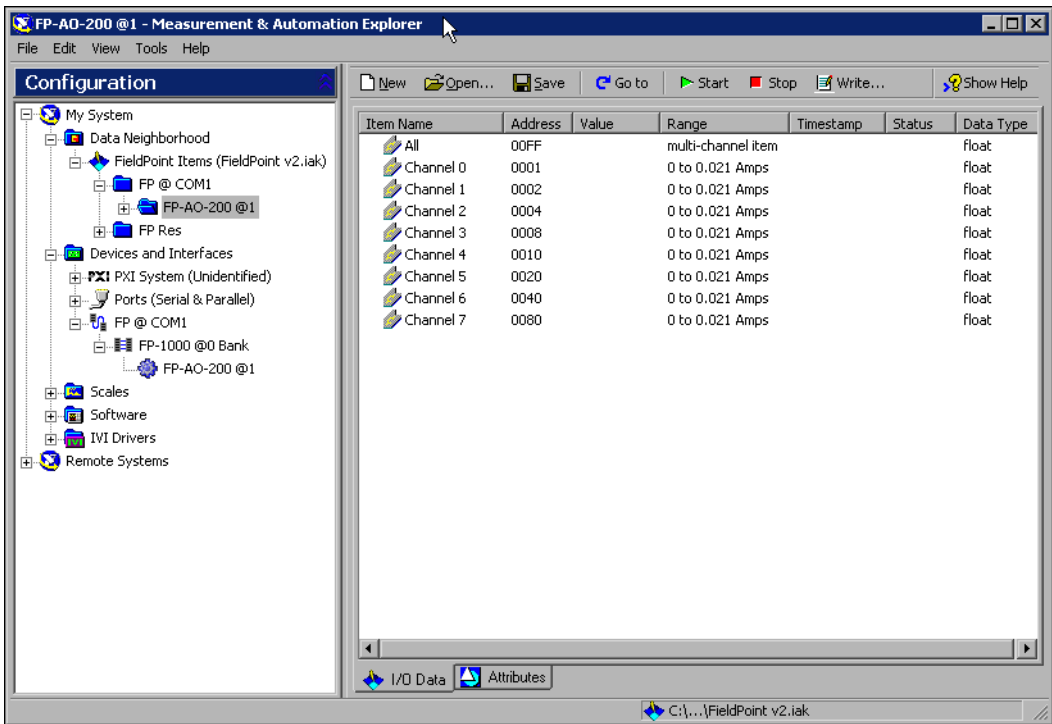
9. Select **FieldPoint Serial**, then click **Next**.



10. Change the serial configuration if you need to, then click **Finish**.



- Under **My System»Data Neighborhood**, expand the configuration tree until the I/O module you want to calibrate appears. If you do not see the module, the network module is not communicating properly with either the host or the I/O module. Check the connections and try again.



- Close MAX before you go on to the next section. You do not need to save the .iak file.



Caution You *must* close MAX and keep it closed during the remainder of this procedure to prevent a system crash.

Connecting the DMM to the FP-AO-200 Module

To connect the DMM to the FieldPoint module, complete the following steps:

- Connect the positive current lead of the DMM to the I_{OUT} terminal of channel 0 (terminal 1). Refer to Table 3 for signal connections. When you run the Calibration Executive procedure, you are prompted to connect the positive current lead of the DMM to the I_{OUT} terminals of the remaining channels.

Table 3. FP-AO-200 Terminal Pin Assignments

| Channel | Terminal I _{OUT} |
|---------|---------------------------|
| CH0 | 1 |
| CH1 | 3 |
| CH2 | 5 |
| CH3 | 7 |
| CH4 | 9 |
| CH5 | 11 |
| CH6 | 13 |
| CH7 | 15 |

2. Connect the negative current lead of the DMM to the COM terminal of channel 0 (terminal 2) on the FP-AO-200. You can leave this connected for the remainder of the procedure.
3. Configure the DMM to measure DC current.
4. Make sure all other terminals on the terminal base are open.

Running the Calibration Executive Procedure

To run the Calibration Executive calibration procedure, complete the following steps:

1. Launch Calibration Executive and follow the instructions in the Calibration Configuration Wizard to load the FP-AO-200 calibration procedure. Refer to the *Calibration Executive Software User Manual* if you need more information on configuring and loading a calibration procedure.
2. Enter the following information about the installed hardware when prompted by Calibration Executive:
 - **Digital Multimeter Information**—The DMM you are using for this calibration procedure (for example, the HP 34401A).
 - **Available Address**—Select `None` if you are using the manual mode; otherwise, select the GPIB address of the DMM.
3. When the procedure is loaded, click **Run Procedure** to begin.
4. Follow any instructions you receive from Calibration Executive, such as to connect the DMM to each module channel.

5. Enter the following information in the first dialog box.
 - **Password**—The default password, `NATI`.
 - **Baud Rate**—The correct rate from Table 2 to communicate with the network module.
 - **Port Number**—The serial port used to connect to the FP-1000 network module, for example, COM1, COM2, and so on.
 - **Device Number**—The address of the IO module you want to verify or calibrate. The first module to the right of a network module has an address of 1.

If you enter a parameter incorrectly, Calibration Executive prompts you to re-enter the information.

6. Follow the prompts from the Calibration Executive procedure to change the positive current lead of the DMM to the positive terminal of the respective channel. Refer to Table 3 for more information on channels and their terminals.

After the procedure finishes, complete the following steps to see the calibration report:

1. Click **View»Reports**.
2. Select **View** to launch your browser and view the report.
The calibration report appears as a printable HTML file.

You have completed calibrating your FP-AO-200 module with Calibration Executive.



Note If the FP-AO-200 module fails after calibration, return it to NI for repair or replacement.

Troubleshooting and Common Questions

When I change the baud rate of the FP-1000 and run the Calibration Executive procedure, a Communication Error dialog box prompts me to re-enter the correct baud rate. How do I do this?

Power down the FP-1000, then power it up again to enable the new settings that you entered.

Some test points fail even after I run the Calibration Executive procedure. What can I do to correct this problem?

Before running the Calibration Executive procedure, allow the FieldPoint bank to warm up at least 15 minutes to ensure accurate readings. Also, make sure you are using shielded copper wire for all cable connections to the module.

Communication with the FP-AO-200 module times out. What causes this to happen?

The watchdog timer on the FP-1000 might be enabled. Refer to the *FP-1000/1001 User Manual* to find out how to disable the watchdog timer.

Technical Support Resources

NI Web Support

National Instruments Web support is your first stop for help in solving installation, configuration, and application problems and questions. Online problem-solving and diagnostic resources include frequently asked questions, knowledge bases, product-specific troubleshooting wizards, manuals, drivers, software updates, and more. Web support is available through the Technical Support section of ni.com.

Worldwide Support

National Instruments has offices located around the world to help address your support needs. You can access our branch office Web sites from the Worldwide Offices section of ni.com. Branch office Web sites provide up-to-date contact information, support phone numbers, email addresses, and current events.

If you have searched the technical support resources on our Web site and still cannot find the answers you need, contact your local office or National Instruments corporate. For telephone support in the United States, dial 512 795 8248. For telephone support outside the United States, contact your local branch office:

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Germany 49 0 89 741 31 30, Greece 30 2 10 42 96 427, India 91 80 51190000,
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Korea 82 02 3451 3400, Malaysia 603 9131 0918, Mexico 001 800 010 0793,
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Russia 7 095 783 68 51, Singapore 65 6226 5886, Slovenia 386 3 425 4200,
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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