RIGOL
Calibration Guide

DP800 Series Programmable
Linear DC Power Supply

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RIGOL Technologies, Inc.

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Document Overview

This manual gives a detailed introduction of the calibration notices and calibration process of DP800.

Subjects in this Manual

Chapter 1 Calibration Notices
This chapter gives a detailed introduction of the recommended calibration interval, calibration safety, the method to stop the calibration and the related information, the method to acquire the calibration service, the recommended test devices and the notices during the test.

Chapter 2 Calibration Process
This chapter gives a detailed introduction of the calibration interface and the calibration process of each calibration item of DP800.

Format Conventions in this Manual

1. **Button:**
   The button at the front panel is denoted by the format of "Button Name (Bold) + Text Box" in the manual, for example, **Utility** represents the "Utility" button.

2. **Menu:**
   - The menu item can be denoted by the format of "Menu Word (Bold) + Character Shading", for example, **I/O Config** denotes the "I/O Config" item under **Utility**.
   - The menu item can be denoted by the screenshot of the menu key, for example, ⬅┘.

3. **Operation Step:**
   The next step of the operation is denoted by an arrow "→" in the manual. For example, **Utility** → **I/O Config** represents pressing **Utility** at the front panel and then pressing the menu item **I/O Config**.

Content Conventions in this Manual

DP800 series programmable linear DC power supply includes the following models. Unless specified otherwise in this manual, DP831A is taken as an example to illustrate the calibration notices and calibration process of DP800 series.

Model	Channel	Channel Output Voltage/Current
DP831A	3	8V/5A, 30V/2A, -30V/2A
DP832A/DP832	3	30V/3A, 30V/3A, 5V/3A
DP821A	2	60V/1A, 8V/10A
DP811A	1	20V/10A (Range 1), 40V/5A (Range 2)

Contents

Chapter 1   Calibration Notices

Calibration Interval

Regular calibration can ensure the performance specifications of DP800. You are recommended to calibrate the instrument at a one-year calibration interval. Please perform regular calibration if higher accuracy is required.

You are recommended to perform a complete calibration at the calibration interval to ensure that the instrument will remain within specifications before the next calibration.

Calibration Safety

You need to input the correct password before calibration each time you want to calibrate the instrument. The password is used to prevent accidental or unauthorized calibration of the instrument.

Press **Utility** → **⇨1/2** → **Test/Cal** → **ManualCal**, input the correct password using the numeric keyboard. Then, press **OK** to enter the calibration interface.

The calibration password is "2012". The password is stored in the non-volatile memory and will not change at power-off or remote interface reset.

You are allowed to modify the calibration password. Press **Utility** → **⇨1/2** → **Test/Cal** → **Password**, and then press **Old**, **New** and **Confirm** in turn and input the corresponding password before pressing **OK** to finish the password modification.

To Stop the Calibration

You can power off the instrument to stop the calibration at any time during the calibration. The calibration data stored will not be cleared when the calibration is stopped and you do not need to calibrate the items already calibrated again in the next calibration.

⚠️ **CAUTION**

    If the calibration is stopped when the instrument is writing the new calibration constants into the Flash, you may lose all the calibration constants and you need to perform the calibration again.

To Acquire the Calibration Service

RIGOL does not recommend manual calibration by users. If calibration is required, please contact **RIGOL** customer service department or the local distributor.

Recommended Test Devices

It is recommended that you use the test devices listed in the table below or other test devices whose performance specifications satisfy the "Performance Requirement" listed in the table below for calibration.

Table 1-1 Recommended Test Devices

Device	Performance Requirement	Recommended
Digital Multimeter	$6^1/_2$	**RIGOL** DM3068
Test Lead	Connect the output terminals of DP800 and the input terminals of the multimeter	—
Short Circuitor	Short-circuit the positive terminal (+) of the channel output terminals and positive terminal (S+) of the Sense terminals; short-circuit the negative terminal (-) of the channel output terminals and negative terminal (S-) of the Sense terminals	—

Test Notices

For optimum performance, all procedures should comply with the following recommendations.

1) Make sure the environment temperature is stable and between 18℃ and 28℃. Ideally, the calibration should be performed at 23℃±1℃.
2) Make sure the environment relative humidity is less than 80%.
3) Make sure that the instrument has been warmed up for at least 30 minutes before the calibration.
4) Keep the test cables as short as possible and make sure that the impedance of the cable is consistent with the requirement.

Chapter 2   Calibration Process

Warm the DP800 up for at least 30 minutes. Press **Utility** → ⇨1/2 → **Test/Cal** → **ManualCal**, input the correct password using the numeric keyboard. Then, press **OK** to enter the calibration interface as shown in the figure below (take DP831A as an example).
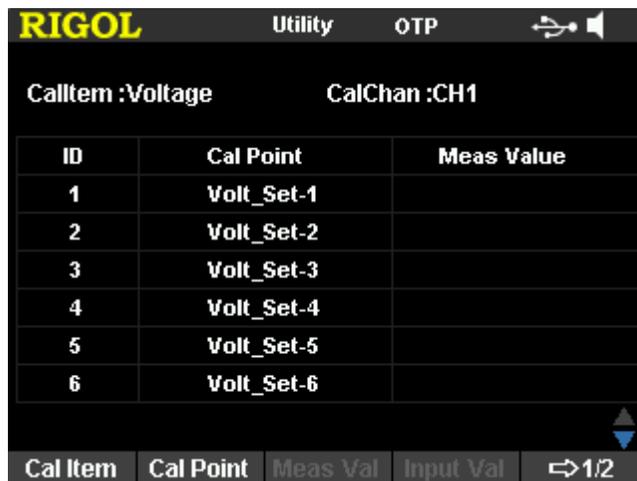

Figure 2-1 Calibration Interface

1. **Cal Item**
    Press this softkey to select the desired calibration item. The calibration items of DP800 manual calibration are listed in the table below. You can select one or more calibration items, but it is recommended to perform a complete calibration.

    Table 2-1 Calibration Items

No.	Item
1	V DAC (calibrate the accuracy of the output voltage, the default calibration item)
2	I DAC (calibrate the accuracy of the output current)
3	V ADC (calibrate the accuracy of the readback voltage)
4	I ADC (calibrate the accuracy of the readback current)

    Note: the calibration methods of the 3 channels are the same and CH1 is taken as the example in this manual. Please reboot the instrument after finishing all channels' calibration.

2. **Cal Point**
    Press this softkey, the specified calibration point in the ID column is highlighted and **Meas Val** becomes available. At this point, you can rotate the knob to select the current calibration point.

3. **Meas Val**
    Press this softkey after selecting a calibration point. The Meas Value column of the corresponding point becomes editable (the reference voltage or current of the corresponding point is displayed on the interface) and **Input Val** becomes available. At this point, use the numeric keyboard or the knob and direction keys to input the measurement value.

4. **Input Val**
    After selecting a calibration point and inputting the measurement value, press this softkey to write the measurement value into the system and finish the calibration of the point selected.

5. **Save**
    Press this softkey to save the current calibration values and exit the calibration interface.

6. **Sign**
    This softkey is used to control the sign of the data input using the numeric keyboard. The data input is a positive value when the sign is set to "+" and will be converted to a negative value automatically when the sign is set to "-".

The calibration method of each calibration item is introduced in detail in the following part of this chapter.

⚠ **CAUTION**
You are recommended to calibrate each item following the sequence below.

V DAC Calibration

1. Make sure that DP800 has been warmed up for at least 30 minutes. Connect the channel output terminals (take CH1 as an example; the calibration method is also applicable to CH2 and CH3) of DP800 with the voltage input terminals of the digital multimeter using the test leads as shown in the figure below.
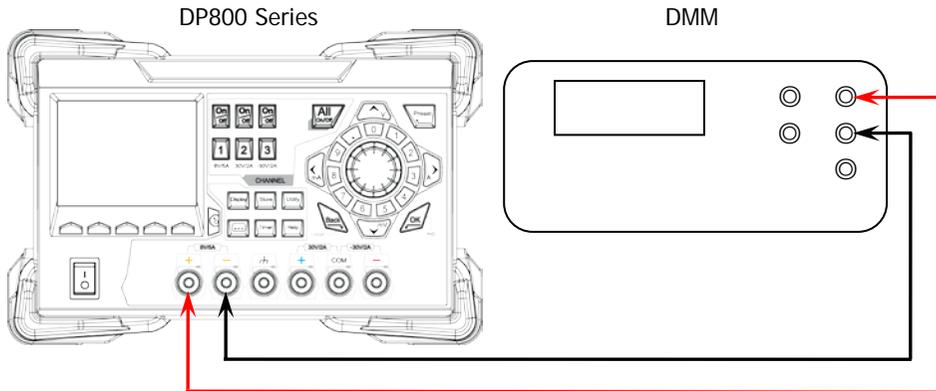

Figure 2-2 Connect DP800 and the Digital Multimeter (Voltage)

2. Press the **On/Off** softkey corresponding to CH1 at the front panel of DP800 to enable the channel output.

3. Turn on the digital multimeter. Select the DC voltage (DCV) measurement function and set the range to "Auto".

4. Enter the DP800 calibration interface. Press **Cal Point** directly (the V DAC calibration is the default calibration item) or press **Cal Item** → **V DAC** → and the cursor switches to the first point in the ID column.

5. Press **Meas Val** and the Meas Value column of the point selected becomes editable. At this point, use the numeric keyboard or the knob and direction keys to input the current measurement value of the digital multimeter (please set the "Sign" to "+" or "-" according to the sign of the measurement value).

6. Press **Input Val** to write the measurement value into the system and finish the calibration of the point currently selected. The cursor switches to the ID column.

7. Select the next calibration point using the knob. Repeat steps 5 and 6 until all the calibration points are calibrated.

8. Press **Save** and the V DAC calibration is finished.

Note: The differences between the V DAC calibration steps of the channels which support the Sense function (CH2 of DP821A and DP811A) and the above calibration steps are as shown below.

1) The following operations should be performed before the first step (connect the channel output terminals of DP800 with the voltage input terminals of the digital multimeter).
   ● Short-circuit the positive terminal (+) of the channel output terminals with the positive terminal (S+) of the Sense terminals of the corresponding channel using the short circuitor.
   ● Short-circuit the negative terminal (-) of the channel output terminals with the negative terminal (S-) of the Sense terminals of the corresponding channel using the short circuitor.

2) Turn on the Sense function of the corresponding channel before the second step (enable the channel output).

V ADC Calibration

1. Make sure that DP800 has been warmed up for at least 30 minutes. Connect the channel output terminals (take CH1 as an example; the calibration method is also applicable to CH2 and CH3) of DP800 with the voltage input terminals of the digital multimeter using the test leads as shown in Figure 2-2.

2. Press the **On/Off** softkey corresponding to CH1 at the front panel of DP800 to enable the channel output.

3. Turn on the digital multimeter. Select the DC voltage (DCV) measurement function and set the range to "Auto".

4. Enter the DP800 calibration interface. Press **Cal Item** → **V ADC** → ◄─⌐ and the cursor switches to the first point in the ID column.

5. Press **Meas Val** and the Meas Value column of the point selected becomes editable. At this point, use the numeric keyboard or the knob and direction keys to input the current measurement value of the digital multimeter (please set the "Sign" to be "+" or "-" according to the sign of the measurement value).

6. Press **Input Val** to write the measurement value into the system and finish the calibration of the point currently selected. The cursor switches to the ID column.

    Note: Please wait for at least 3 seconds before pressing **Input Val** after inputting the current measurement value of the digital multimeter. Otherwise the calibration may not be successful.

7. Select the next calibration point using the knob. Repeat steps 5 and 6 until all the calibration points are calibrated.

8. Press **Save** and the V ADC calibration is finished.

Note: The differences between the V ADC calibration steps of the channels which support the Sense function (CH2 of DP821A and DP811A) and the above calibration steps are as shown below.

1) The following operations should be performed before the first step (connect the channel output terminals of DP800 with the voltage input terminals of the digital multimeter).

    ●   Short-circuit the (+) terminal of the output terminals with the (S+) terminal of the Sense terminals of the corresponding channel using the short circuitor.

- Short-circuit the (-) terminal of the output terminals with the (S-) terminal of the Sense terminals of the corresponding channel using the short circuitor.

2) Turn on the Sense function of the corresponding channel before the second step (enable the channel output).

I DAC Calibration

1. Make sure that DP800 has been warmed up for at least 30 minutes. Connect the channel output terminals (take CH1 as an example; the calibration method is also applicable to CH2 and CH3) of DP800 with the current input terminals of the digital multimeter using the test leads as shown in the figure below.
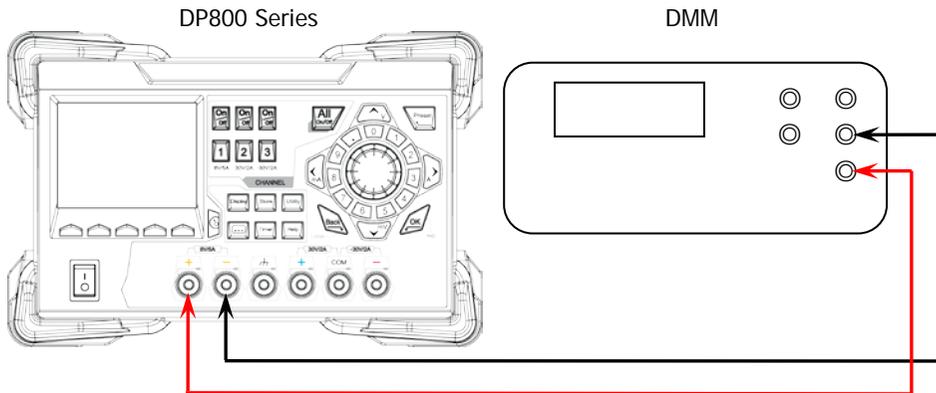

Figure 2-3 Connect DP800 and the Digital Multimeter (Current)

2. Press the **On/Off** softkey corresponding to CH1 at the front panel of DP800 to enable the channel output.

3. Turn on the digital multimeter. Select the DC current (DCI) measurement function; set the range to "Auto" and the scale to "**A**".

4. Enter the DP800 calibration interface. Press **Cal Item** → **I DAC** → ⬅—▯ and the cursor switches to the first point in the ID column.

5. Press **Meas Val** and the Meas Value column of the point selected becomes editable. At this point, use the numeric keyboard or the knob and direction keys to input the current measurement value of the digital multimeter (please set the "Sign" to be "+" or "-" according to the sign of the measurement value).

6. Press **Input Val** to write the measurement value into the system and finish the calibration of the point currently selected. The cursor switches to the ID column.

7. Select the next calibration point using the knob. Repeat steps 5 and 6 until all the calibration points are calibrated.

8. Press **Save** and the I DAC calibration is finished.

I ADC Calibration

1. Make sure that DP800 has been warmed up for at least 30 minutes. Connect the channel output terminals (take CH1 as an example; the calibration method is also applicable to CH2 and CH3) of DP800 with the current input terminals of the digital multimeter using the test leads as shown in Figure 2-3.

2. Press the **On/Off** softkey corresponding to CH1 at the front panel of DP800 to enable the channel output.

3. Turn on the digital multimeter. Select the DC current (DCI) measurement function; set the range to "Auto" and the scale to "**A**".

4. Enter the DP800 calibration interface. Press **Cal Item** → **I ADC** → [←] and the cursor switches to the first point in the ID column.

5. Press **Meas Val** and the Meas Value column of the point selected becomes editable. At this point, use the numeric keyboard or the knob and direction keys to input the current measurement value of the digital multimeter (please set the "Sign" to be "+" or "-" according to the sign of the measurement value).

6. Press **Input Val** to write the measurement value into the system and finish the calibration of the point currently selected. The cursor switches to the ID column.

    Note: Please wait for at least 3 seconds before pressing **Input Val** after inputting the current measurement value of the digital multimeter. Otherwise the calibration may not be successful.

7. Select the next calibration point using the knob. Repeat steps 5 and 6 until all the calibration points are calibrated.

8. Press **Save** and the I ADC calibration is finished.