

2.5.8. Calibrating the Sensors

1. Calibration options

DaqPRO ships fully calibrated. However, DaqLab enables you to calibrate any of the DaqPRO sensors except for the internal temperature sensor, which doesn't need calibration. The calibration parameters are sent to DaqPRO and stored in its memory.

Tips:

- Prior to any calibration procedure you must restore factory defaults
- Calibrating a sensor type applies to all inputs
- Calibrating the PT 100 2 wires sensor applies also to PT 100 3 wires except for fine offset calibration
- Prior to calibrating any of the thermocouple sensor types, calibrate the Voltage 50mV sensor as this will set the gain (slope) of all thermocouple sensor types
- The internal temperature sensor needs no calibration

DaqLab employs three different calibration methods **Two-point calibration**, **Offset calibration** and **Zero calibration**. When selecting a sensor type to calibrate, DaqLab prompts you to the appropriate calibration procedure:

Sensor	Type	Calibration method
Current	0 – 24mA	Two-point calibration
Temperature	NTC 10K	Zero calibration
Temperature	NTC 100K	Zero calibration
Temperature	PT-100 2 wire	Two-point calibration
Temperature	PT-100 3 wire	Two-point calibration*
Temperature	Thermocouple J	Offset calibration
Temperature	Thermocouple K	Offset calibration
Temperature	Thermocouple T	Offset calibration
Voltage	0 – 10V	Two-point calibration
Voltage	0 - 50mV	Two-point calibration

Two-point calibration

The two-point calibration sets the gain (slope) and offset (intercept) of the sensor's conversion function.

Use the two point calibration to calibrate the voltage and current sensors and the PT100 temperature sensors.

* To calibrate the PT100 3 wire, first calibrate the PT100 2 wire as the slopes of their conversion functions are identical. Then proceed to adjust the PT100 3 wire offset.

In some cases you may need to refine your calibration using the fine offset tuning tool.

Offset calibration

To calibrate the thermocouple temperature sensors: TC-J, TC-K and TC-T first calibrate the 50mV sensor type. That will set the slope for all thermocouple temperature sensors. Then proceed to adjust the offset using the Offset calibration technique.

Zero calibration

The zero calibration sets only the offset (intercept) of the sensor's conversion function.

Use the zero calibration to calibrate the NTC 10k and NTC 100k temperature sensors.

2. Calibration password

To prevent accidental change of the calibration, the calibration procedure is protected by a password. The default password is: 1234. To change the password:

1. Click **Logger** on the menu toolbar, and then click **Calibration**
2. Click **Change Password** to open the Change Password dialog box
3. Enter the current password in the **Current Password** edit box
4. Enter the new password in the **New Password** edit box
5. Enter the new password a second time in the **Confirm New Password** edit box to confirm your new password
6. Click **OK**

Note: The password must include at least 4 characters and is case sensitive .
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3. Calibration procedure

Two point calibration:

Measure two reference values

1. Connect DaqPRO to the PC

2. Click **Logger** on the menu bar, then click **Calibrate sensors**
3. Enter the calibration password, then click **OK**
4. Choose a sensor from the **Select sensor** drop list and click **OK** to open the **Sensor calibration** dialog:

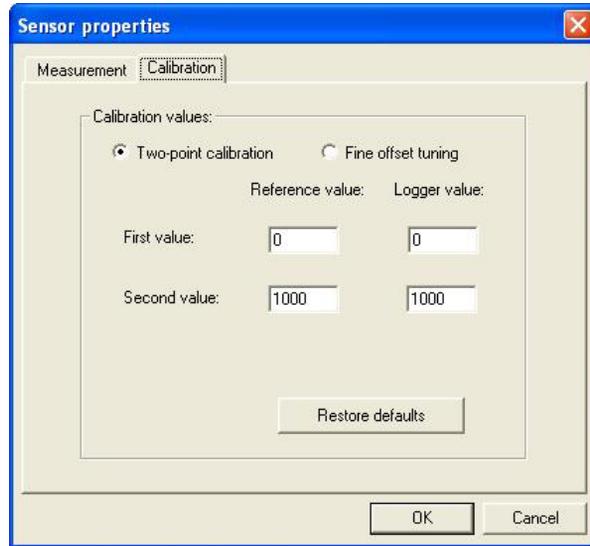


Figure 16: Two-point calibration dialog

Note: we strongly recommend calibrating using the values that appear in the two **Reference value** edit boxes

5. Click **Restore defaults**, then click **OK**
6. Measure two known reference values and record both the reference values and the values displayed by DaqLab

Enter calibration values

1. Repeat steps 1 to 4 above
2. Select the **Two-point calibration** option
3. Enter a distinct reference value in each of the **Reference Value** edit boxes and the corresponding logger values in each of the **Logger Value** edit boxes (The logger values are the values displayed by DaqLab when measuring the two reference values)
4. Click **OK**

Fine offset calibration

If, after the calibration procedure, DaqPRO still exhibits some offset value use the Fine offset tuning tool to correct it.

The offset value is the difference between the value displayed by DaqPRO and the reference value. For example if the calibrator is set to 0°C and DaqPRO reads 1°C the offset value is +1, but if DaqPRO reads -1°C then the offset value is -1.

1. Connect DaqPRO to the PC
2. Click **Logger** on the menu bar, then click **Calibrate sensors**
3. Enter the calibration password, then click **OK**
4. Choose a sensor from the **Select sensor** drop list and click **OK** to open the **Sensor calibration** dialog
5. Select the **Fine offset calibration** option
6. Enter the offset value
7. Click **OK**

The calibrated sensor parameters will be saved both in DaqPRO and DaqLab memories, so there is no need to calibrate DaqPRO every time you run the DaqLab program.

Offset calibration:

Calibrating any of the thermocouple sensors comprises of two steps. First calibrate the 50mV voltage sensor to set the slope of the sensor's conversion function. Then use the calibration procedure described below to calibrate the sensor's offset.

Measure two reference values

Before taking measurements you need to disable the temperature compensation both in DaqPRO and in the calibrator.

To disable the temperature compensation in DaqPRO:

Click **Logger** on the menu bar, point to **Thermocouple compensation**, and then click **Disable**.

Note: don't forget to enable the temperature compensation prior to normal operation of DaqPRO. One way to enable the temperature compensation is to turn DaqPRO off and on again. Another way is via DaqLab: Click **Logger** on the menu bar, point to **Thermocouple compensation**, then click **Enable**

To take two reference measurements:

1. Connect DaqPRO to the PC
2. Click **Logger** on the menu bar, then click **Calibrate sensors**
3. Enter the calibration password, then click **OK**
4. Choose a sensor from the **Select sensor** drop list and click **OK** to open the **Sensor calibration** dialog:

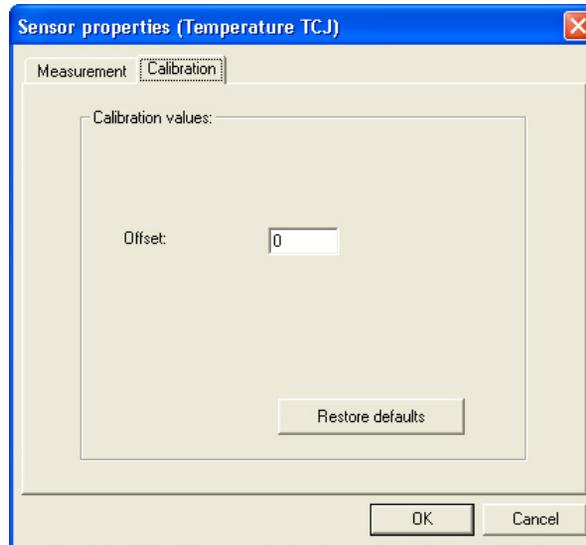


Figure 17: Offset calibration dialog

5. Click **Restore defaults**, then click **OK**
6. Measure two known reference values and record both the reference values and the values displayed by DaqLab. Calculate the offset values

The offset value is the difference between the value displayed by DaqPRO and the reference value. For example if the calibrator is set to 0°C and DaqPRO reads 1°C the offset value is +1, but if DaqPRO reads -1°C then the offset value is -1.

Enter calibration values

1. Repeat steps 1 to 4 above
2. Enter the offset value in the **Offset** edit box (in case the two offset values are not identical enter the average of the two values)
3. Click **OK**

Zero calibration:

1. Connect DaqPRO to the PC
2. Click **Logger** on the menu bar, then click **Calibrate sensors**
3. Enter the calibration password, then click **OK**
4. Choose a sensor from the **Select sensor** drop list and click **OK** to open the **Sensor calibration** dialog:

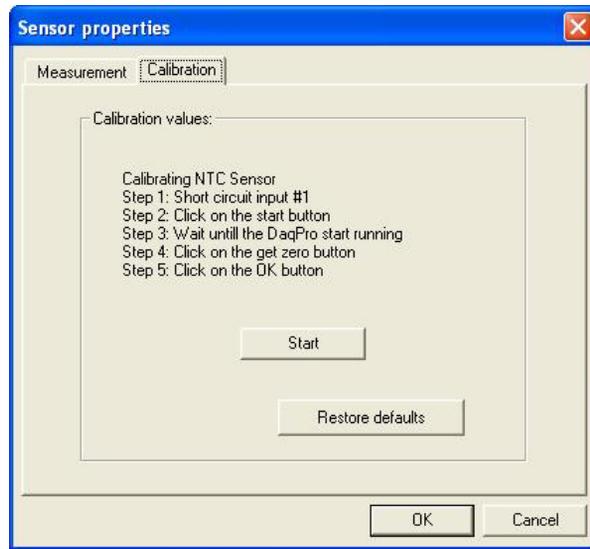


Figure 18: Zero calibration dialog

5. Click **Restore defaults**, then click **OK**
6. Repeat steps 1 to 4 above
7. Short circuit input 1
8. Click **Start**
9. Wait until DaqPRO begins recording
10. Click **Get zero**
11. Click **OK**

The calibrated sensor parameters will be saved both in DaqPRO and DaqLab memories, so there is no need to calibrate DaqPRO every time you run the DaqLab program.