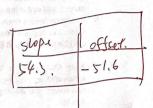
Table 1: Recorded potentiometer measurements

Angle (deg)	Output (V)
0°	0.990
30°	1,53
60°	2.05
90°	2.63
120°	3,2
150°	3,64
180°	423



## 1.1.2 Calibrate the Potentiometer

- 校正传晓器 14. Click on the <u>Calibrate Sensor</u> tab to calibrate the output of the potentiometer in terms of angular position (in degrees).
- 15. Use the Slope (deg/V) and Offset (deg) numeric controls to enter the slope and offset values you obtained during the data collection step.
- 16. Test the accuracy of your calibration. To do this, set the potentiometer knob to different angles and verify that the correct angular position is displayed in the Calibrated Output waveform chart as well as the Pot Angle (deg) meter Screenshot. indicator.

17. Press the Stop button.

1.2 Measuring Angular Displacement using an Encoder

The Virtual Instrument (VI) used to collect data from and calibrate the encoder is shown in Figure 2.

- 5. Wait for the Initialized? LED indicator to turn on.
- 6. In non-quadrature decoding only signal A is used. Rotate the encoder knob in the clockwise direction. How does the Edge (count) numeric display change?
- 7. Rotate the knob in the counter-clockwise directions. How does the Edge (count) numeric display change?

Note: At any time you can press the Reset button to reset the counter. This will rest the Edge (count) and Angle (deg) numeric displays to zero.

8. Using the Edge (count) numeric display, determine the number of pulses the encoder generates per each full revolution (PPR).

Note: PPR is determined in non-quadrature mode. It refers to the total number of pulses generated by Signal A when the encoder makes one full revolution. The value of PPR will be used to calibrate the encoder pulses in terms of angular displacement in degrees.

9. Continue to the next section.

## 1.2.2 Calibrate the Encoder

- 10. Calibrate the pulses of the encoder in terms of angular displacement. To do this, enter the PPR value which was calculated in the previous section in the PPR numeric control and press the Enter key.
- 11. Verify the accuracy of your calibration. To do this, first press the Reset button then rotate the encoder knob and verify that the correct angular position is displayed in the Angle (deg) numeric indicator.
- 12. Continue to the next section.

pro- quad. [15]

## 1.2.3 X2 Decoding

- 13. From the Decoder drop-down menu, select X2.
- 14. Press the Reset button.
- 15. In X2 decoding both signals A and B are used. Rotate the encoder knob in the clockwise direction. How do the Edge (count) and Angle (deg) numeric displays change?

Note: An encoder will have a fixed PPR value regardless of the decoding algorithm that is used.

- 16. Rotate the knob in the counter-clockwise direction. How do the Edge (count) and Angle (deg) numeric displays change?
- 17. Examine the behavior of signal A and signal B.
- 18. What is the resolution of the measured angular displacement?
- 19. Continue to the next section.

## 1.2.4 X4 Decoding

resulution 750

- 20. From the Decoder drop-down menu, select X4.
- 21. Press the Reset button.
- 22 Rotate the knob in the clockwise and counter-clockwise directions. How do the Edge (counts) and Angle (deg) numeric displays change?
- 23. What is the resolution of the measured angular displacement?
- 24. Examine the behavior of signal A and signal B as you slowly rotate the encoder knob in the clockwise direction. In particular, compare the behavior of signals A and B and you rotate the encoder in the clockwise direction with the state machine diagram shown in Figure 2-4. Take a screenshot of your results.
- 25. Press the Stop button.

resolution 3.75