

Rotary Potentiometer

A knob on a divider, with a light on the wiper.

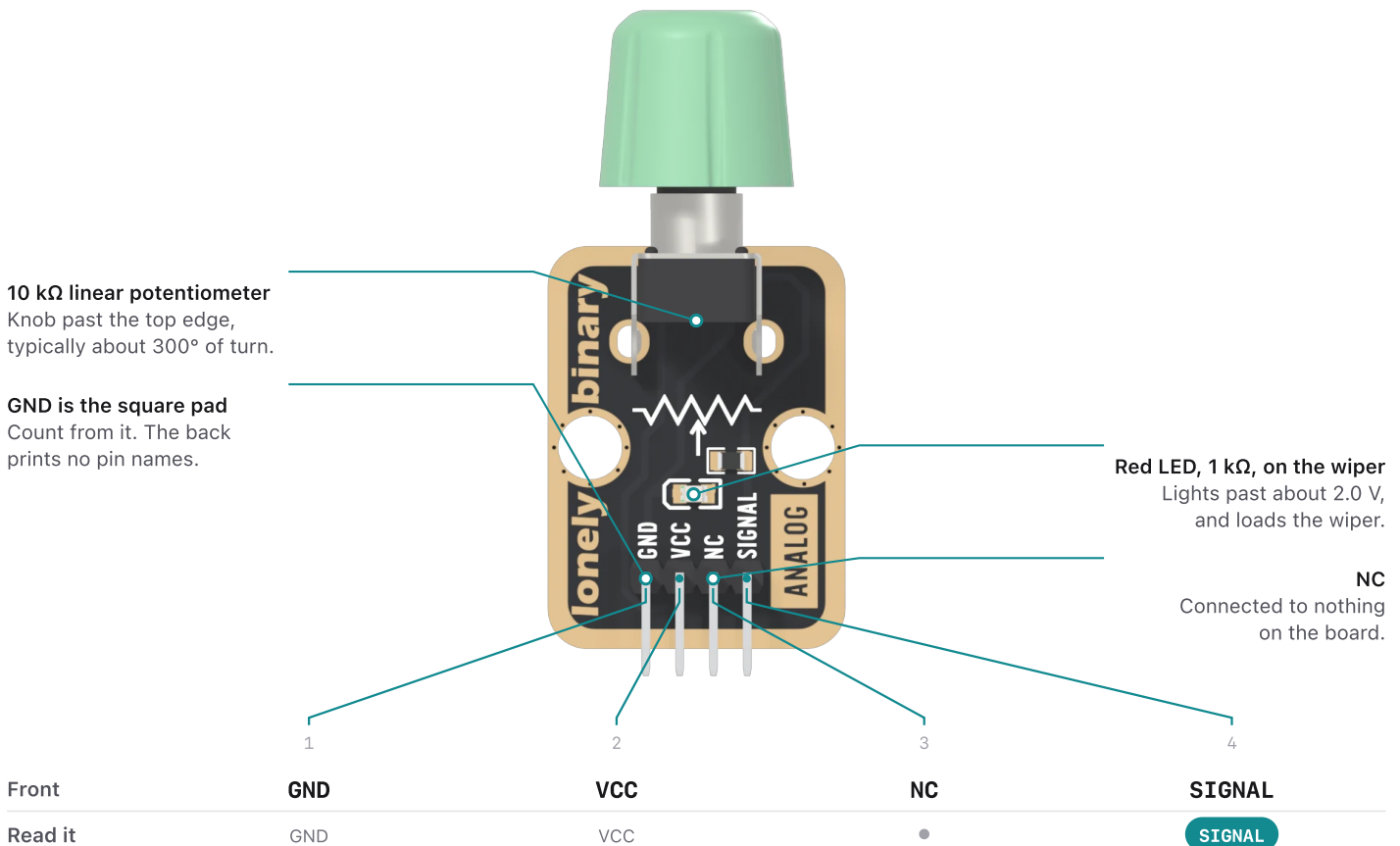


VCC is the top of the range

Turned to the end, SIGNAL is VCC. On an ESP32, ESP32-S3 or Pico, feed VCC from 3V3, never 5V: 5 V would reach a 3.3 V analog pin.

Pins, and which to wire

Knob up, header at the bottom. Wire GND, VCC and SIGNAL; NC is connected to nothing on the board.



The light bends the reading

Once the LED conducts it pulls current through the top of the track, so SIGNAL reads low over the upper part of the turn.

How much it bends

VCC 5 V (Uno)

1.26 V low at worst

The LED starts at about 40 % of the turn. The worst point is near 84 %; the far stop still reads full scale.

VCC 3.3 V

0.46 V low at worst

The LED starts near 61 % of the turn, a little dimmer than on 5 V. The bend is smaller, not gone.

For a knob that sets a brightness, the bend does not matter. For a number you rely on, calibrate a few marks, or use only the turn below where the LED lights. On an Uno, running VCC from 3V3 also shrinks the bend.

Worked out from a model: the LED, red on the boards, as about 2.0 V plus its 1 kΩ. Real LEDs turn on gradually, so the real curve is smoother. The track draws 0.5 mA at 5 V.

Read it, as volts

Arduino IDE · Board: your board · ESP32-S3: USB CDC On Boot: Enabled

```
// SIGNAL's pin. Uno: A0. ESP32: 34. ESP32-S3: 4. Pico: 26.
const int POT_PIN = A0;
// Uno: 1023 and 5.0. ESP32, ESP32-S3: 4095 and 3.3.
const int ADC_MAX = 1023;
const float VREF = 5.0;

void setup() {
  Serial.begin(115200);
}

void loop() {
  int raw = analogRead(POT_PIN);
  Serial.print(raw);
  Serial.print("  ");
  Serial.print(raw * VREF / ADC_MAX, 2);
  Serial.println(" V");
  delay(200);
}
```

0 0.00 V
438 2.14 V
534 2.61 V

Serial Monitor at 115200 on an Uno at the start, the middle and three-quarters of the turn, from the model. From about 40 % of the turn the volts climb more slowly than the knob: that is the LED.

Calibrate the turn

Read the value at five marks on the knob, 0, 1/4, 1/2, 3/4 and the far stop, and interpolate between them. That straightens the bend far better than mapping from the two ends alone.

When it does not work

It reads 0 whatever I do

VCC is not connected, or SIGNAL is on a different pin from the sketch. Count from the square pad.

The LED never lights

Normal below about 61 % of the turn on 3.3 V: the red LED needs about 2.0 V. Dark at the far end means no VCC or GND.

The number flickers

ADC noise. Average a few readings, or ignore changes of one or two counts.

Specifications

Potentiometer	10 kΩ linear (B10K), RV09 type	Turn	Typically about 300°
Indicator	Red LED, 1 kΩ, from the wiper	Output	0 V to VCC on SIGNAL, bent over the upper part
Supply	3.3 V or 5 V, the same as your board	Header	4 pins, right-angle, 2.54 mm
Size	22.4 × 30.4 mm, knob past the top edge	Height	15.4 mm to the top of the knob

Wiring

	FRONT	UNO	ESP32	S3	PICO
1	GND	GND	GND	GND	GND
2	VCC	5V	3V3	3V3	3V3
3	NC				
4	SIGNAL	A0	GPIO 34	GPIO 4	GP26

Hole 1 is the square pad. On an ESP32 or ESP32-S3 use an ADC1 pin: ADC2 stops working while Wi-Fi is on.