

# Principle and Usage of HX711 Weighing Sensor Module

## 1. Structure of weighing sensor with parallel beam:

Experimental electronic scales, postal electronic scales and kitchen scales, etc generally adopt dual-hole strain weighing sensor with cantilever parallel beam, which features with high precision, easy processing, simple and compact structure, strong anti-unbalancing-load capacity and high natural frequency, whose typical structure is shown in Figure 1.

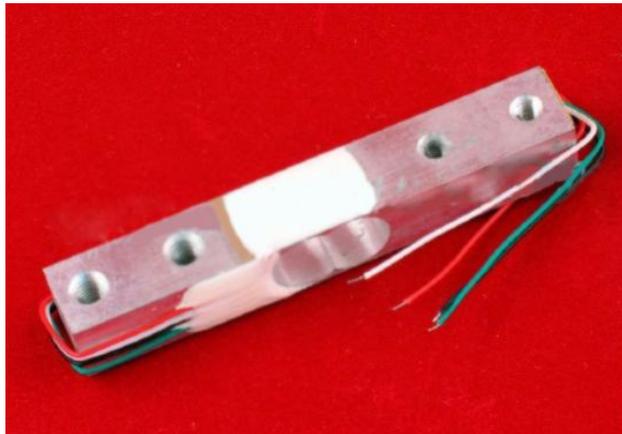


Figure 1 Dual-hole strain weighing sensor with cantilever parallel beam

## 2. Operation principle of weighing sensor:

Stressing operation principle of strain sensor is shown in Figure 2.

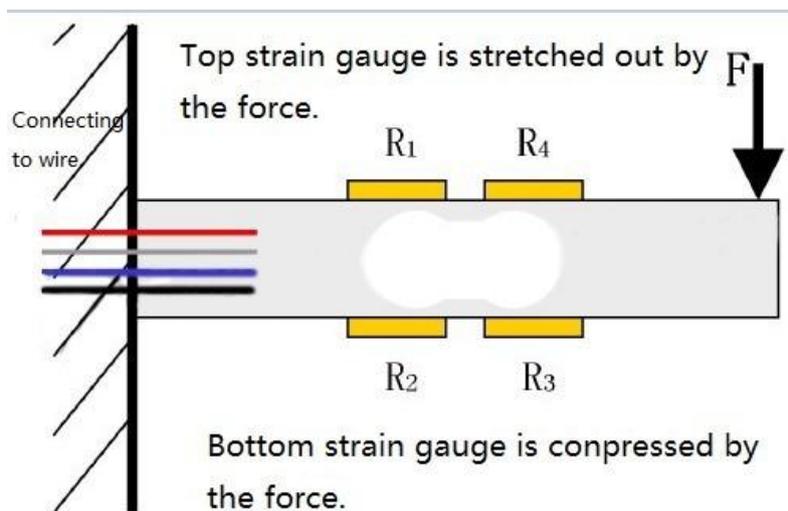


Figure 2 Stressing operation principle of strain sensor

Attach the strain gauge to the stressed pressure-sensitive element, when the elastic element is deformed by the force, the corresponding strain generated by the strain gauge will be transformed into resistance changes. Connect the strain gauges as a bridge shown in Figure 3, the resistance changes caused by force is converted to voltage changes of measurement circuit, and the weight of

the measured object can be obtained by converting the output voltage value.

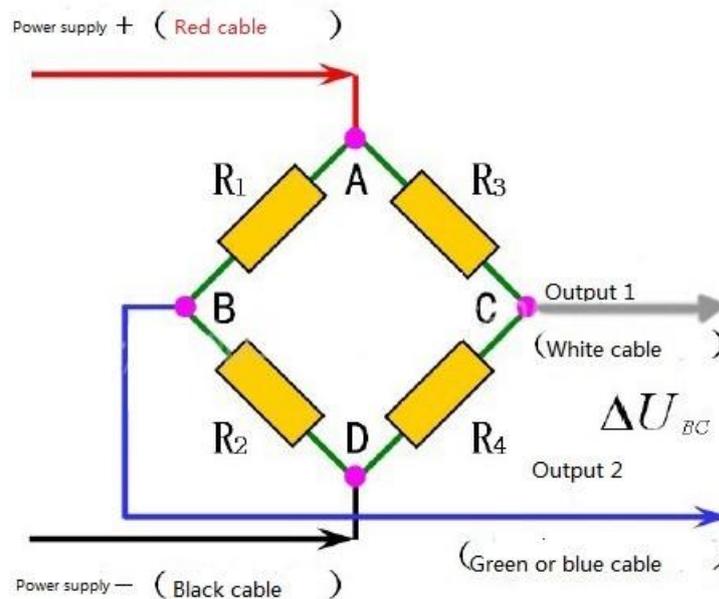


Figure 3 Circuit operation principle of strain sensor

The four arms of the bridge are connected with working strain gauges and are involved in the mechanical deformation in the same temperature field, the temperature influences will be mutually offset and the voltage output with high sensitivity. When the four strain gauges are of same material and resistance value, the following equation can be derived :

$$\Delta U_{BC} = \frac{EK}{4} (\varepsilon_1 - \varepsilon_2 + \varepsilon_3 - \varepsilon_4) = \frac{EK}{4} 4\varepsilon_1$$

### 3. How to use weighing sensor

Weighing sensor of parallel beam can be mounted as cantilever beam, and we can find details in Figure 4. The deformation of the sensor is quite small, pay special attention that it cannot be overloaded during installation and use. If the plastic deforms and the original shape is not recovered after the force is removed, the sensor is damaged. There are four cables on the sensor connecting to external circuit, red for positive input of power supply, black for negative input of power supply, white for signal output 1, blue (or green) for signal output 2. To ensure accuracy, do not adjust the cable length arbitrarily.

