

# PRODUCT SPECIFICATION



**PRODUCT TYPE: G800-B**

**PRODUCT DESCRIPTION: CURRENT OUTPUT ANGLE SENSOR (ABSOLUTE VALUE ENCODER, ANGULAR DISPLACEMENT SENSOR)**



## Contact Us

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## 1. Product characteristics

The G800-B series angle sensor adopts MEMS technology and magnetoelectric induction technology. It uses differential array magnetic sensitive elements and non-contact measurement of the rotating shaft. It senses the parallel magnetic field intensity of the permanent magnet installed at one end of the rotating shaft and performs linearity correction through MCU processing, temperature compensation, output signal standardized digital filtering, zero point setting, programmable intelligent control of multiple different slope settings, to achieve the absolute angular position of the output sensor within the range of 0 ~ 360°. Accuracy 0.2°, output RS232, RS485, CAN, 0-5V, 0.5-4.5V, 0-10V, 4-20mA, 0-20mA optional.

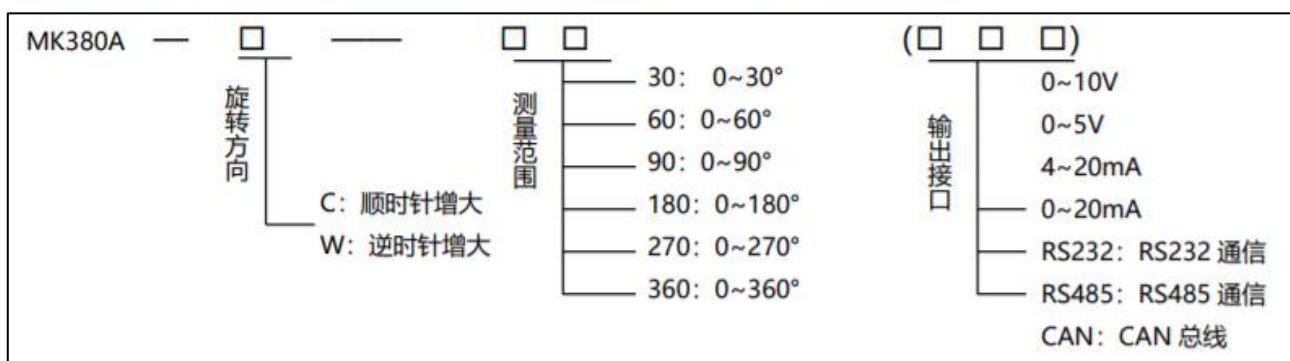
Before leaving the factory, all products undergo calibration, reverse and anti-pulse peak voltage protection, and long-term aging stability testing. Each process is precise and rigorous, ensuring reliability under different working conditions and long-term use cycles; Featuring non-contact, long lifespan, high resolution, low-temperature drift, excellent linearity, precise reset, high-frequency response, multiple protections, anti-interference, vibration and shock resistance, suitable for various harsh industrial environments such as water, oil, and gas, it is a high cost-effective angle sensor. It is also an ideal product for updating and upgrading contact angle sensors (such as conductive plastic potentiometers, encoders, and angular displacement sensors).

## 2. Product performance

- Sampling frequency: 1KHZ
- Measuring range:  $\pm 0 \sim \pm 360^\circ$  (optional)
- Resistant to vibration and impact
- Output: RS232, RS485, CAN, 4-20mA, 0-20mA, 0~5V, 0~10V optional
- Wide voltage input: DC 9 ~ 36V
- Accuracy: 0.2°; High resolution: 0.02°
- Full temperature drift: 0.15%FS
- Wide operating temperature -40 ~ +85°C
- Protection level: IP66 (IP67 can be customized)

## 3. Product application

- Motor control: servo system, corner position
- Valve: angle actuator
- Ship industry: ship rudder position and hatch door position
- Car safety control: steering wheel
- Coal mining machinery: coal washing machine, mineral concentrator, shield machine
- Textile machinery: tension control, shuttle wire diameter
- Medical equipment: CT, motor rotation
- Robot: attitude control, boom rotation
- Satellite antenna plane and pitch angle
- Engineering equipment such as cranes, cranes, and excavators



#### 4. Product specification

Parameter	Conditions	G800-B-90	G800-B-180	G800-B-270	G800-B-360	Unit
Measuring range <sup>(1)</sup>		0~90	0~180	0~270	0~360	°
Measuring axis		X, Y	X, Y	X, Y	X, Y	
Zero temperature drift <sup>(2)</sup>	-40 ~ 85°	±0.003	±0.003	±0.003	±0.003	°/°C
Resolution <sup>(3)</sup>		0.02	0.02	0.02	0.02	°
Accuracy <sup>(4)</sup>	-40 ~ 85°C	0.2	0.3	0.4	0.6	°
Linearity		0.15	0.15	0.15	0.15	%FS
Power-on start time		0.2				s
Response time	Slow/Fast	500/200μs				
Output signal <sup>(5)(6)</sup>	R <sub>load</sub> =240 Ω	0~20mA, 4~20mA optional				
Noise		3mV				
Midpoint offset	midpoint output (Approach left and right)	4-20mA output 12mA 0-20mA output 10mA				
Average working hours		≥ 55000 hours/time				
Impact resistance		2500g, 0.5ms, 3 times/axis				
Anti-Vibration		10grms、2 ~ 2000Hz				
Operating temperature		-40 ~ 85°C				
Waterproof level		IP66 (can be customized IP67)				
Cable		Standard 1.5 meter length, wear-resistant, oil-proof, wide temperature, shielded cable 3*0.3mm <sup>2</sup>				
Weight		120g (excluding packaging box)				

\* This performance parameter only lists the 0~90°, 180°, 270°, and 360° series for reference. For other measurement ranges, please refer to the nearest adjacent parameters.

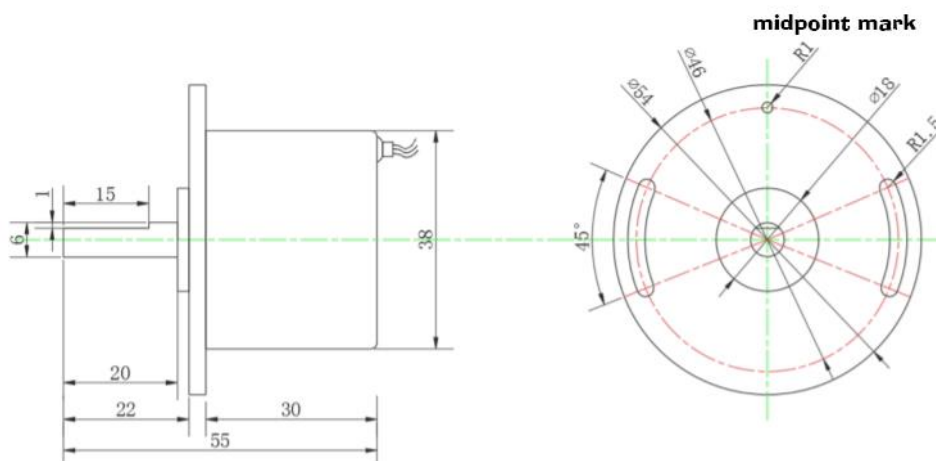
### 5. Electrical indicators

Parameter	Condition	Minimum value	Typical value	Maximum value	Unit
Supply voltage		9	12	36	V
Working current <sup>(7)</sup>		15	25	35	mA
Power reverse protection <sup>(8)</sup>			40		V
Signal reverse protection <sup>(8)</sup>			40		V
Output load	resistive	0	240	1000	Ω
Operating temperature		-40		+85	°C
Storage temperature		-55		+125	°C

**Remark:**

- (1) Measuring range: can be set according to needs.
- (3) Temperature drift: refers to the difference between the maximum value and the minimum value of the output voltage signal within the operating temperature range when the angle remains unchanged.
- (4) Resolution: refers to the minimum change value of the measured value that the sensor can detect and distinguish within the measurement range.
- (2) Accuracy: The root mean square error between the actual angle and the sensor measurement angle measured multiple times (≥24 times).
- (5) Output current signal: no filtering.
- (6) Output current signal: For details of the acquisition circuit diagram, see the "Electrical Indicators" section.
- (7) Operating current: refers to the supply current when the signal output is open circuit.
- (8) If the reverse voltage exceeds the limit, the reverse protection diode will breakdown.

### 6. Product size chart



## 7. Mechanical properties

<b>Connector</b>	Lead wire (1.5m) or waterproof aviation socket (customized)	<b>Rotational moment</b>	< 10mN.m
<b>Protection level</b>	IP67	<b>Mechanical corner</b>	0~360° unlimited rotation, forward and reverse rotation without stopping position
<b>Shell material</b>	Aluminum alloy frosted and oxidized	<b>Mechanical life</b>	> 120 million transfers
<b>Installation</b>	Three M4 screws		

## 8. Shaft rotation direction



Figure 1.1 The direction of the arrow is the clockwise rotation direction of the sensor.

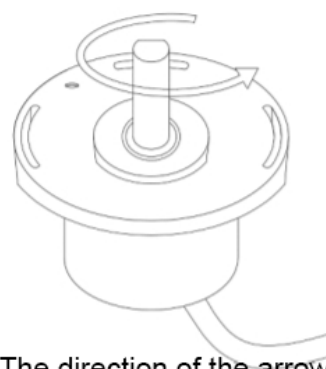
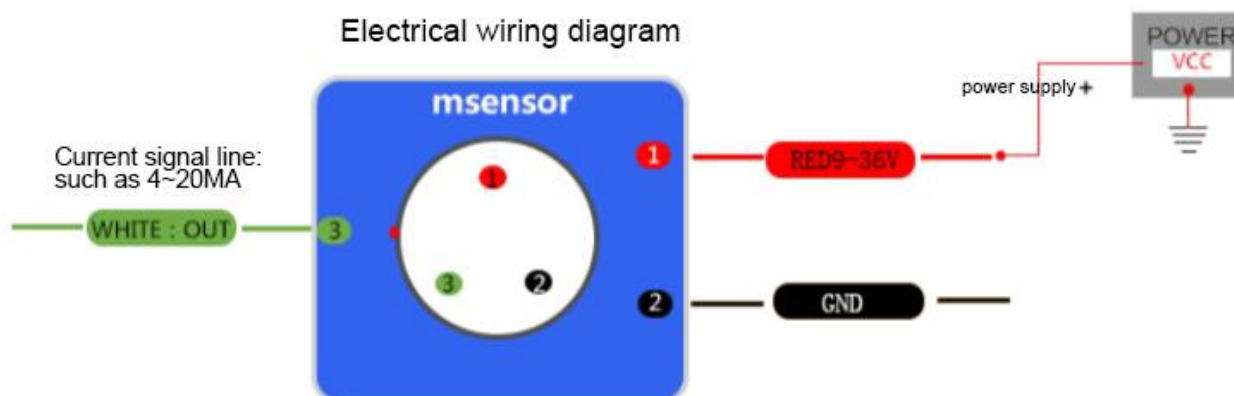


Figure 1.2 The direction of the arrow is the counterclockwise rotation direction of the sensor.

## 9. Electrical connections

Thread Color	RED	BLACK	GREEN
Function	1	2	3
	VCC Positive pole of power supply	GND Negative pole of power supply	Out Signal line



● **Special note:** The power supply cannot be connected to the signal output line (green line), otherwise

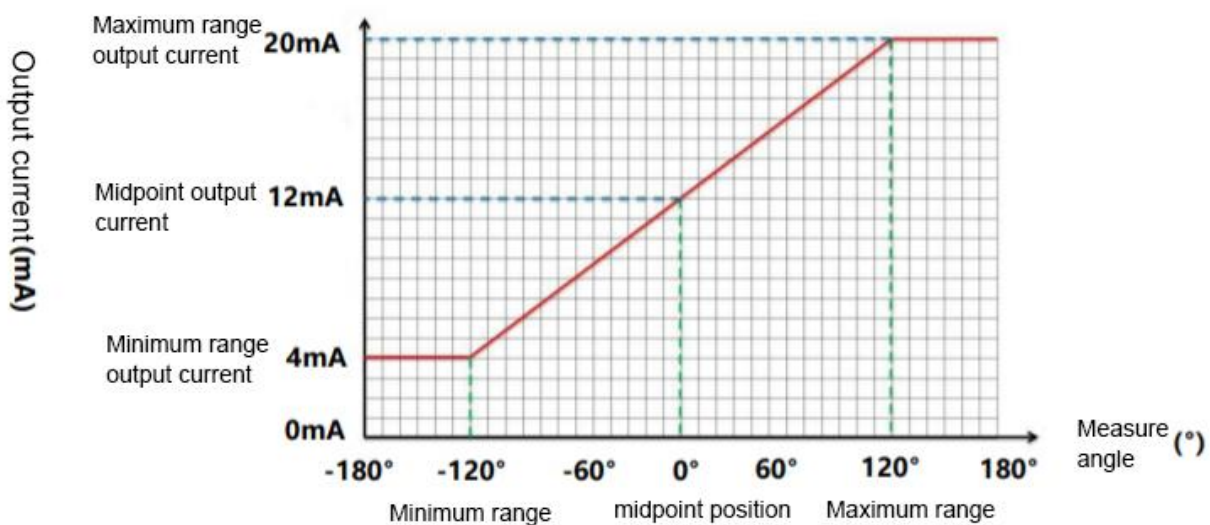


the sensor will be damaged; if the sensor is disassembled and installed while the power is on, the common end of the sensor (black line) should be connected first.

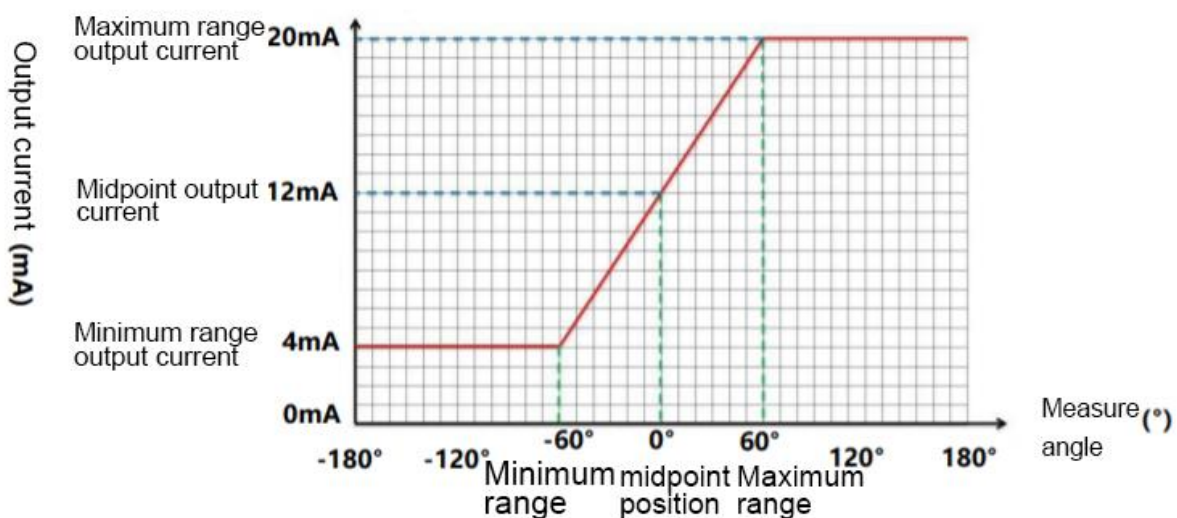
●If there is a problem with the sensor during use, first remove the angle sensor, provide Vcc power, rotate the shaft and observe whether there is a voltage signal output to confirm whether there is a problem with the sensor.

G800-B series current output 0~20mA, 4-20mA, corresponding to the minimum range and maximum range of angle measurement; when calculating the angle, just follow the ratio to get the corresponding angle value:

**For example:** G800-B-C-240 (4~20mA): indicates 0~240° (±120°) measurement range, 4~20mA output current



**For example:** G800-B-C-120 (4~20mA): indicates 0~120° (±60°) measurement range, 4~20mA output current



## 10. Current output and angle calculation formula

$$\text{angle} = \text{Sensitivity} * (I_{\text{out}} - I_{\text{offset}})$$

Current angle

$I_{\text{out}}$ : current value output by the sensor, unit mA

$I_{\text{offset}}$ : sensor zero position output current value (usually 4mA)

**Sensitivity:** Sensor sensitivity is the proportion of the corresponding current change when the sensor angle changes. For example, if the sensor range is 0~90° and the corresponding current change is 4-20mA, then the sensor sensitivity is 5.625.

$$(90 - 0) = \text{Sensitivity} * (20 - 4)$$

If the current output current is 12mA, the corresponding angle is 45 degrees:

$$45 = 5.625 * (12 - 4)$$

For example: the measuring range of the sensor is 0 ~ 120°, and the corresponding current change is 4-20mA, then the sensor sensitivity is 7.5.

$$(120-0) = \text{Sensitivity} * (20-4)$$

If the current output current is 16mA, the corresponding angle is 90 degrees:

$$90 = 7.5 * (16 - 4)$$

Therefore, the sensitivity of the sensor corresponds to the measuring range.

## 11. Product installation method

### Installation Notes:

- 1) Within the nominal angle range, the signal changes linearly. Rotate the axis clockwise, and the angle value increases. Rotate it counterclockwise, and the angle value decreases.
- 2) When the flat platform on the sensor shaft is aligned with the marked hole on the end face, it is the midpoint of the angle range. For example, when the measuring range is 360°, the output is 4-20mA. At this time, the angle value is about 180°, and the output signal is 12mA.
- 3) During installation, the sensor rotation axis and the measured rotation axis should be kept as concentric as possible. If concentricity cannot be guaranteed, it is best to use a flexible coupling to connect the sensor. The housing flange should be fixed with screws. The angle change is linearly proportional to the output voltage.

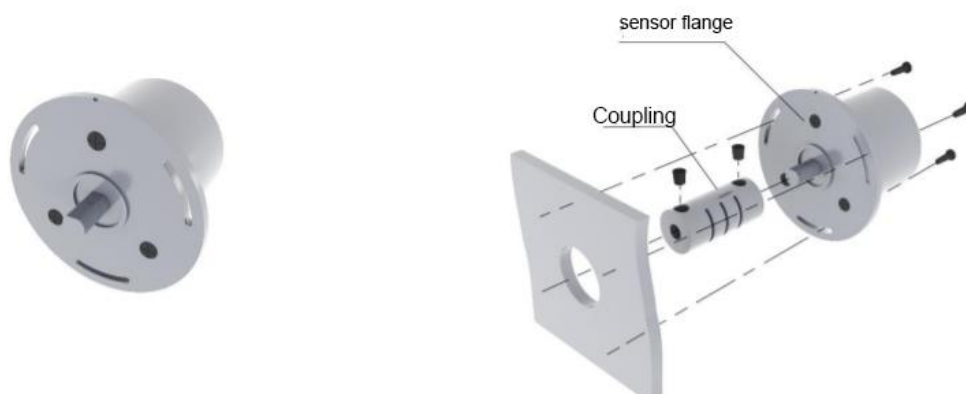


Figure 3.1 Coupling installation

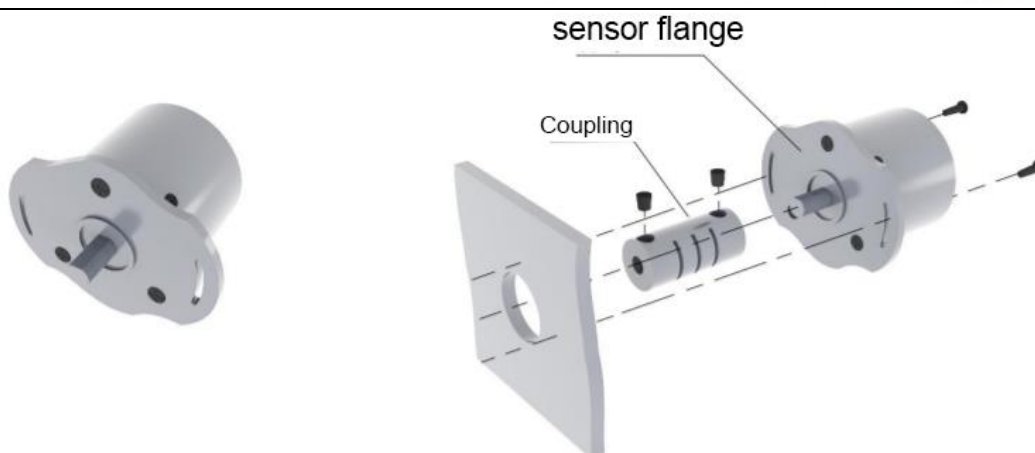


Figure 3.2 Coupling installation

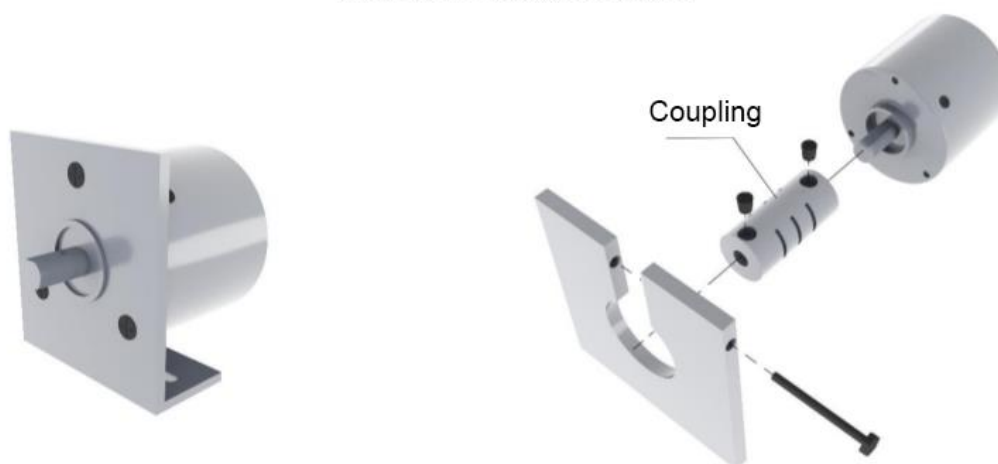


Figure 3.3 Bracket and coupling installation

## 12. Product installation precautions

- 1) The angle sensor and the device under test must be connected concentrically, which can greatly improve the measurement accuracy and service life of the sensor.
- 2) During installation, the connecting hole with the sensor shaft should have a sliding fit tolerance. Hard knocking or installation with increased force is strictly prohibited.
- 3) It is recommended to use a flexible coupling to connect the sensor shaft and user-side output.
- 4) The sensor shaft is concentric with the user's rotor. For installation, first fix the rotating shaft, and then tighten the screws of the sensor flange or end cover.
- 5) In order to find or align the mechanical midpoint and electrical midpoint during the transfer process, first tighten the rotating shaft and place it at the marked point at the position that needs to be detected. Slightly tighten the screws of the flange or end cover, rotate the sensor housing, align the multi-meter with the measurement midpoint (recommended) (or starting point) corresponding to the output current value, and then tighten the tightening screws. The recheck is correct and the installation is completed.
- 6) It is recommended to use a hollow shaft angle sensor, which can better ensure the concentricity of the installation

## 13. Angle measurement range

The G800-B series current output angle sensor measures the angle with a full-scale range of 360°. According to customer needs, the normal use range of measurement range is:



$0 \sim 40^\circ (\pm 20^\circ)$ ;  $0 \sim 90^\circ (\pm 45^\circ)$ ;  
 $0 \sim 180^\circ (\pm 90^\circ)$ ;  $0 \sim 360^\circ (\pm 180^\circ)$

Other angle ranges can be set according to customer specific needs. Different angle measurement ranges have the same corresponding current output signal, that is, 4~20mA. The correct selection of the measuring range can maximize the sensitivity of the sensor detection signal, that is, the output signal value corresponding to the unit angle of rotation is the largest. The relationship between angle measurement range and measurement accuracy is detailed in the "Product Performance Indicators" section.

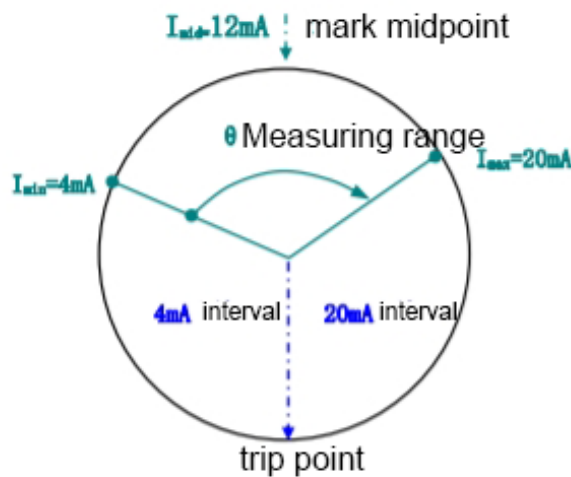


Figure 1 Angle measurement area

The angle measurement interval is shown in Figure 2, and its description is as follows:

- 1)  $\theta$  corresponds to the measurement angle interval;
- 2)  $I_{min}=4mA$ , starting point of measurement;  $I_{max}=20mA$ , end point of measurement;
- 3)  $I_{mid}=12mA$  is the midpoint of the measurement interval. It is recommended to use this point as the benchmark when assembling the sensor to minimize the edge cumulative error.
- 4) If the measurement interval is  $360^\circ$ , when the analog value jumps from 4mA to 20mA, there is a measurement dead zone of  $0.3^\circ$ .
- 5) As shown by the arrow in Figure 1, the output signal increases clockwise;

If it is necessary to increase counterclockwise, the G800-B series current output angle sensor can be programmed

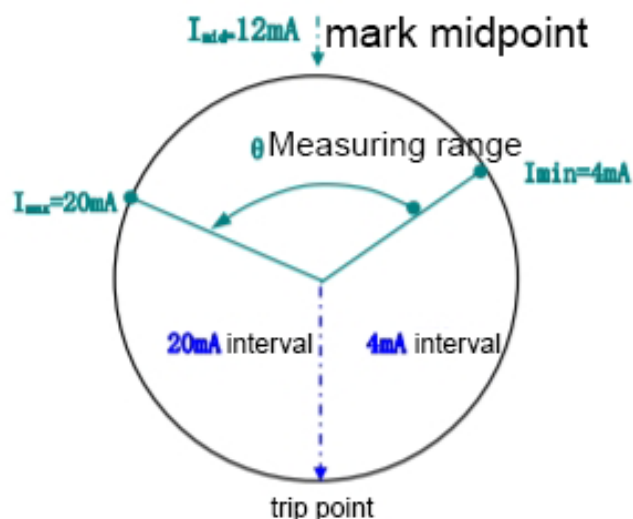
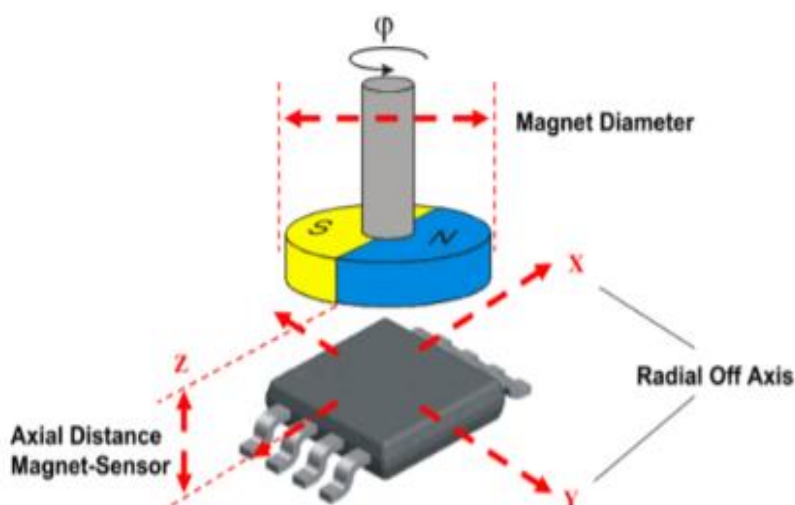


Figure 2 Angle measurement area

#### 14. Working principle

The angle sensor uses the Hall principle and adopts a core control unit imported from Europe. It mainly detects angle changes by installing a grating on the shaft internally and cutting the magnetic field through the rotation of the shaft. A programmable angle sensor designed with an independent sensor chip using Triaxis™ (three-axis Hall) technology as the core. By amplifying, filtering, and converting the capacitance, the angle is obtained.



#### 15. Signal output

- 1) The G800-B series angle sensor is programmed by MCU and adopts an integrated design with voltage transmitter. The measurement angle range can be set within the range of 0~360° according to user needs. Outputs industry-standardized 4-20mA, 0-20mA current signals. Especially suitable for angle position detection and connection with programmable controller (PLC).
- 2) The signal output stage of the G800-B series angle sensor has a reverse protection diode with a reverse breakdown voltage of 40V (default), which can reach 100V depending on customer requirements. Effectively prevent damage to the signal output stage due to incorrect connection of the signal line to the positive pole of the power supply (VCC). Industrial use environments may cause the sensor signal output stage to suffer higher transient voltages. In order to better protect

the sensor, protection measures such as transient voltage suppression (TVS) can be added. During use, due to careless wiring by the user or leakage of wires, etc., the internal current of the sensor may occasionally be excessive and burn out. Installing a self-restoring fuse inside the sensor can ensure to the greatest extent the damage to the sensor caused by large instantaneous current.

- 3) The load resistance  $V_{cc}=12V$  is  $250\Omega$ , and the peak-to-peak noise reaches  $20mV$  without filtering. Using the filter circuit and parameters as shown in the figure, the signal noise peak-to-peak value is reduced to a maximum of  $2mV$ . The larger the value of the filter resistor and capacitor, the better the filtering effect, but the signal response speed will decrease. According to the actual application situation, select the appropriate filter circuit parameters.

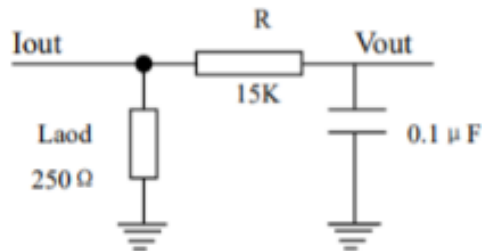


Figure 1 Filter circuit

## 16. Power protection

- 1) The G800-B series angle sensor has a wide power supply voltage range of  $9V \sim 36V$ . In industrial environments, there are often inductive or capacitive loads. When the power line is connected or disconnected, a spike voltage of 25 to 60V can be generated, which can easily cause damage to the sensor circuit system. The G800-B series angle sensor power supply system has a reverse protection diode with a reverse protection voltage of 40V.
- 2) For specific use environments, the G800-B series angle sensor can optionally adopt protection measures such as power input transient voltage suppression (TVS) to effectively suppress the interference of such spike pulses and make the sensor circuit system work safely and reliably.
- 3) In an industrial environment where strong and weak currents are mixed, if the current of the strong current load is too large, the common ground loop may affect the sensor detection circuit and even affect the service life of the sensor. The G800-B series angle sensor has specially developed a four-wire system. Angle sensor. That is, the working system ground wire (GND) and the negative electrode of the angle sensor are separated and floating, which greatly improves the service life and anti-interference ability of the sensor.