Manufacturer's Specification of WG Series Wiegand Sensors and Wiegand Modules

General of Product

Wiegand Sensor is one kind of passive magnetic sensitivity device made by using Wiegand Effect. It can convert magnetic signal to electrical signal without applied operational power supply, so it is also called zero power consumption magnetic sensitivity sensor.

WG Series Wiegand Sensors developed by our company is composed of a stick of dual-stable state alloy wire with magnetic sensitivity function and induction coil wound around it. Its working principle is: in alternating magnetic field, when one polarity (for example: N polarity) magnetic field parallel to sense wire reaches the intensity activating magnetic induction, magnetic domain inside sense wire will move when inspired and the magnetization direction and the instant turning are in the same direction. Meanwhile, the magnetic field around sense wire will also vary instantly; hence an electric pulse is induced from induction coil. Hereafter, if this magnetic field weakens, the magnetization direction of sense wire will keep stable and induction coil will also have no electric pulse output. However, when the opposite polarity (S polarity) intensifies to activate magnetic induction intensity, the magnetization direction of sense wire will also turn over instantly and induce an electric pulse in opposite direction in induction coil. Repeated like this, WG Series Wiegand Sensors convert magnetic signal to alternating electric signal in alternating magnetic field.

WG514 Wiegand Sensor Module integrates signal shaping circuit together base on Wiegand Sensors to compose a new module with active function. Its working principle is the same as that of Wiegand sensors. Although Wiegand Modules increase power supply consumption, its power consumption is extremely small; furthermore, for its signals are shaped, the output is a pair of reverse standard square pulses and the counting and sampling is more convenient and more reliable.

Product Characters

- Wiegand Sensor is a kind of passive device and it can work without applied operational power supply; Wiegand Sensor Module is a kind of active device but extremely small power consumption, and its average power consumption current is no more than 0.2μA.
- Dual-magnetic polarity activation working mode: the polarity of activation magnetic field varies one circle, Wiegand sensor will synchronically output a pair of positive & negative electric pulse signals with more than 1.5V amplitude; and Wiegand module will output a pair of reverse square waves and the amplitude equals to supply voltage.
- Output signal amplitude is irrelevant with variation speed of magnetic field, able to reach "zero speed" sensing.
- No contact point, anticorrosion, dampproof, and more than 2 billion times of service life.
- Output signal of Wiegand Module can sense far by using phone line, coaxial line, applicable for local network management.

Main Purposes

- As numeration sensor, it's applicable for micro power consumption intelligent type flow instruments, such as: electronic water meter, electronic calorimeter, electronic gas meter, electronic oil gage, etc.
- As electronic switch, it's applicable for intelligent toys, entrance guard, etc., automatic control.

● Performance Characters

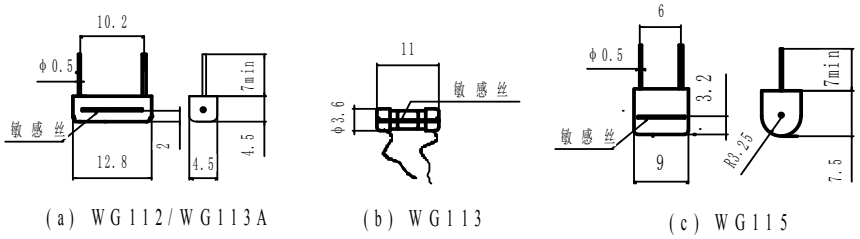
Model	Working Voltage V_{CC} (V)	Ave. Power Consumption Current I_{CC} (μA)	Activation Magnetic Induction Intensity B (mT)			Output Amplitude V_O (V)	Pulse Width τ (μS)	Working Temp. Scope T (℃)
			Min. Value	Best Value	Max. Value			
WG112	—	—	2.5	7～8	12	≥2.0	10～50	-20～+125
WG113	—	—	2.5	7～8	12	≥2.0	10～50	-20～+85
WG113A	—	—	2.5	7～8	12	≥2.0	10～50	-20～+85
AH/WG115	—	—	2.5	7～8	12	≥1.5	10～50	-20～+125
WG214	—	—	2.5	7～8	12	≥1.5	10～50	-20～+125
WG311	—	—	2.5	7～8	12	≥1.5	10～50	-20～+125
WG312	—	—	2.5	7～8	12	≥1.5	10～50	-20～+125
WG514	3.6～5	＜0.2	2.5	7～8	12	V_{CC}	～30	-20～+125
AH909	—	—	2.5	7～8	12	≥1.5	10～50	-20～+55
Note: 1mT=10Gs。								

● Structure & Dimension

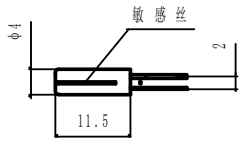
• Structural Sketch Drawing

Dimensional unit：mm

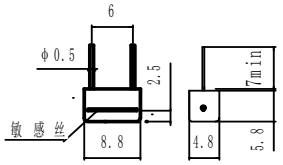
Model	Overall Dimension (mm)	Location of Sense Wire	Appearance	External Lead Wire
WG112	12.8×4.5×4.5	2mm to Underside	Plastic Shell	Tinning Copper Rigid Lead Wire
WG113	Φ3.6×11	Central Axis	With Beads on Two Sides	Plastic FlexibleLead Wire
WG113A	12.8×4.5×4.5	2mm to Underside	Plastic Shell with Beads on Two Sides	Tinning Copper Rigid Lead Wire
WG115	9×6.5×7.5	3.2mm to Underside	Plastic Shell	Tinning Copper Rigid Lead Wire
WG214	13×7.4×8	2.7mm to Underside	Plastic Shell with Fixing Holes on Two Sides	Dual-color Plastic FlexibleLead Wire
WG311	Φ4×11.5	Central Axis	Aluminum Shell	Tinning Copper Rigid Lead Wire
WG312	8.8×4.8×5.8	2.5mm to Underside	Aluminum Shell	Tinning Copper Rigid Lead Wire
WG514	Φ16.3×9	2.7mm to Underside	Plastic Shell	Four-color plastic cable yarn /drop-out line
AH909	Φ4×11.5	Central Axis	Aluminum Shell	Tinning Copper Rigid Lead Wire



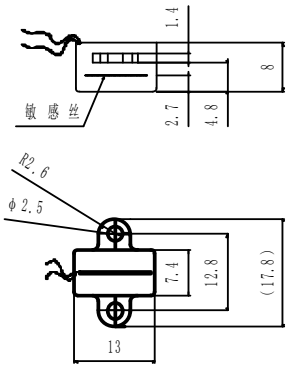
(a) WG112/WG113A　　(b) WG113　　(c) WG115



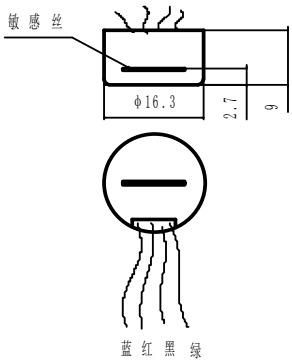
(d) WG311/WG909



(e) WG312



(f) WG214



(g) WG514

● Connection of Lead Wire

- ➢ Two lead wires of Wiegand Sensor can be directly connected to rear level signal processing circuit without distinguishing positive or negative polarity.
- ➢ Connection of four lead wires of WG504 Wiegand Module

1. Cable yarn: blue is OUTPUT 1; red is POWER SUPPLY +; black is POWER SUPPLY -; green is OUTPUT 2.
2. Drop-out Line: facing to top of module (refer to Sturtcural Sketch Drawing), lead wires are accordingly from left to right: ① OUTPUT 1; ② POWER SUPPLY +; ③ POWER SUPPLY -; ④ OUTPUT 2.

WG Series Wiegand Product Application Notice

✧ Magnetic Circuit Design

The key whether Wiegand Sensor and Wiegand Module can work normally or not lies in magnetic circuit design:

1. N, S dual-magnetic polarity alternating activation shall be applied and the distance between two magnetic polarities shall be close to or larger than length of sensor. For example: water meter can use φ9.5 mm ferrite magnet ring. Also a pair of magnet steel can be applied and the distance between two magnetic polarities shall be no less than 9mm.
2. The installation location of magnet shall make magnetic line parallel to sense wire of sensor (refer to activation mode and installation method).
3. The activation magnetic induction intensity located by sense wire of sensor shall be guaranteed no less than the minimum value but no more than the maximum value. It's noted that the magnetic field intensity of magnet at some application occasion (for example: calorimeter) may attenuate with the increase of ambient temperature and the rotating parts may make the distance between magnet and sensor farther for mechanical wear. Therefore, when first design, the activation magnetic induction intensity shall be set around a bit larger than the best value. .
4. Pay attention to magnetic shielding and prevent interference of ambient stray magnetic fields

   For example: as for the application of electronic water meter and electronic calorimeter, presently many vendors adoptφ9.5mm matching ferrite magnet ring (magnet ring is a pair of N, S magnetic polarities and the surface max. magnetic induction intensity is more than 90 mT). In order to reduce mechanical wear and influence to magnetic field by temperature and ensure the reliable operation of instrument for long term, it's recommended that the initial working point of activation magnetic field is set around 8～9 mT when design. It's measured that the optimal distance from magnet ring surface to underside of sensor (module) is 2.0mm and the max. distance shall not exceed 2.5mm.

✧ Circuit Design

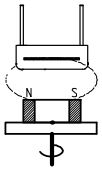
When used as numeration sensors of flow metering instruments, in order to prevent various possible interferences and ensure correct numeration, it's recommended to adopt measures as follows:

1. Signals of Wiegand Sensor shall be connected to single-chip microcomputer after being shaped by shaping circuit. This shaping circuit can effectively eliminate signal noises and make sensor work more reliably. After shaping, two output ends of circuit output a pair of opposite square waves of high & low power level accordingly. The amplitude of square wave is supply voltage of circuit, the width is about 30μS, and the frequency of square wave is the same as alternating frequency of activation magnetic field. WG514 Wiegand Module developed by our company is to integrate Wiegand sensor and shaping circuit together and more convenient when using.
2. Two input ends of single-chip microcomputer shall collect signals of two output ends of shaping circuit respectively. And whenever a pair of high, low power level is collected, the rear level counter will add "1".

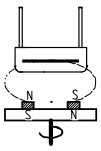
   Caution: if only half wave signal of Wiegand sensor or one output end signal of shaping circuit is collected, wrong numeration may be resulted.
3. Within 5mS after one square wave signal is collected, single-chip microcomputer shall not collect signals immediately and the software will arrange single-chip microcomputer to do other work.

✧ Activation Mode and Installation Method

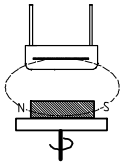
Several typical activation modes and installation methods are as follows and one of them can be adopted as required.



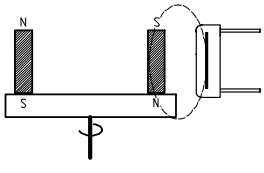
(a) Magnet Ring Activation Mode



(b) Magnet Granule Activation Mode

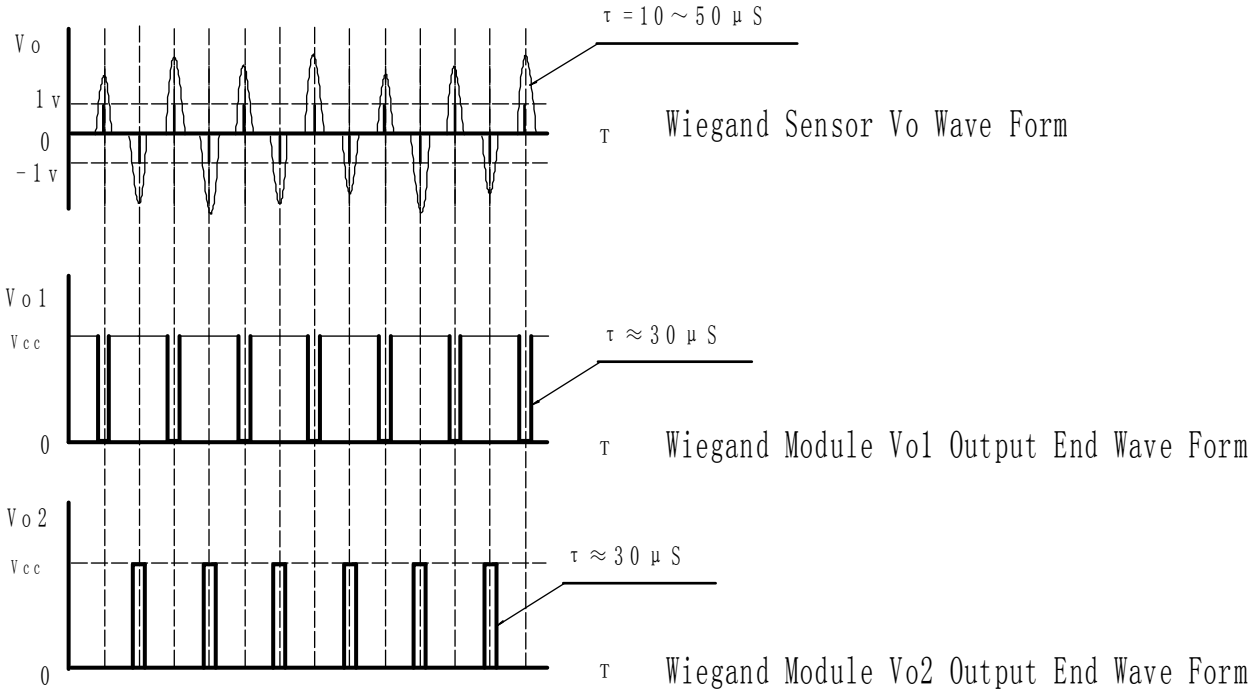


(c) Magnet Strip Activation Mode



(d) Magnet Strip Activation Mode

✧ Output Wave Form of Sensor and Module



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