

## Protection Device of Control Switch Sensor Base on Intelligent MCU

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**Abstract.** (Objective) Sensors need to work in a harsh environment. In order to maintain accuracy, it is necessary to protect the sensor of intelligent control switch. (Methods) Protection device include shell, cover and dust control device. Circuit board is installed in the shell. Micro controller and various ancillary electronic components are designed under the circuit board surface, and encapsulation cap included the special optical blocks or magneto electric blocks are been on the circuit board surface. Receiving signal sensor, transmitting signal sensor, light emission, microcontroller and instrumentation were inserted between two faces of circuit board. (Results) The upper surface of the shell is bolted around the cap as a protective cover, and the top center of the protective cover is connected with a dustproof device. The transmitting signal sensor and the receiving signal sensor are surrounded by a protective cover to prevent dust and other adhesion from the surface of the signal sensor. Two kinds of signal sensor are isolated to ensure the performance and to avoid interference. (Conclusion) In the coordination of the embedded chip, the control switch can keep up the accurate operation.

### Introduction

In public places such as schools, government agencies and enterprises, even in areas such as warehouses, classrooms and garages, the phenomenon of ever-bright lamps occurs from time to time so that result in the waste of energy. Because of frequent switching or human factors, the damage rate of wall switch is very high that increases the maintenance. Exposure in space at long time, the surface of the photoelectric switch is easy to adhere to dust. In the transmitting signal sensor or receiving signal sensor surface the dust accumulation to a certain amount will cause the send and receive signal instability. It will affect the normal use of the switch or even control error.

It is also troublesome to disassemble the existing photoelectric switch after installation, so it is impossible to clean the photoelectric switch quickly. For example, common residential public staircases, especially emergency staircases, when the elevator cannot be used normally, the residents can only climb the staircases up and down. Because the light inside the staircases is darker, in order to ensure the safety of the residents of staircases, it is necessary to install floodlights inside the staircases. To the multistory building that did not install elevator, the illumine of fluctuation stair is cannot be short of more. Only in the case of dark light, personnel or emergency, lighting can be controlled by photoelectric switch. In order to make the illuminator work.

China's current common panel switch socket, appearance size can be divided into three types, type 86, 120, 118. Relative to the seesaw switch which is simple, photoelectric switch can achieve more self-control. Photoelectric switch which utilize the detected block objects or reflection of the light beam, through processing circuit of synchronous circuit, can detect the presence of object. [1] The object is not limited to metal, all that can reflect light objects can be tested. Photoelectric switch converts input current on the transmitter to optical signal injection according to the strength of received light or corrosive objects. Similar intelligent control switch can use more sensors, higher accuracy, such as the use of infrared, ultrasonic, radio frequency, magnetic sensing elements. Intelligent control switches may also use wireless communication means, such as ZigBee, Wifi or bluetooth technology, including the necessary antenna or signal transceiver amplification device.

With the promotion of intelligent life, the constantly innovation of control switch, signal transceiver components have always been an important link in the relationship between switch performance. Our sensor protection device of intelligent control switch is provided to solve the problems raised in the above background.

### **Design of Intelligent Protection Device**

The protection device is designed based on sensor structure of intelligent control switch. Circuit board is installed in the shell. Micro controller and various ancillary electronic component is installed under the circuit board surface .circuit board surface encapsulation shell through the special optical design of acrylic blocks, such as blocks can be installed in a variety of light transmitting magnetic sensor and receive signal sensor, microcontroller and emission signal of sensors and instrumentation in the received signal sensor circuit board, circuit of uniform design, intelligent control switch, mentioned on the shell surface to install shield around the block is fixed by bolt. [2] The center on the top of the protective cover is clamped with a dustproof device.

The surface of the circuit board is encapsulated with acrylic caps with special optical design through the shell. The upper surface of the shell is bolted around the acrylic caps and installed with a protective cover. If the dust is accumulated or the accuracy needs to be corrected, the bolts can be unscrewed to clean the cover surface.

The top of the outer wall of dustproof device is butted with limit ring and positioning ring. The outer wall of the dustproof ring is butted with limited position ring on one side close to the positioning ring. The center on the top of the protective cover is provided with a through hole matching the dustproof ring, and the top of the through hole is provided with a limit slot to match the limit ring. The top of the inner wall of the dustproof ring is fixed and installed with a dustproof plate through a bolt, and the surface of the dustproof plate is evenly provided with a through hole. The edge of the lower surface of the positioning ring is fixed and installed with a ring clamp block through bolts. [3]The top of the protective cover is arranged with a ring clamp block around the limit groove. The dust prevention device is connected with the ring clamp block at the center of the top of the protective cover through the ring clamp block and ring clamp groove. The dustproof ring is located inside the piercing jack, and the limit ring and the limit slot are used to limit the position of the dustproof ring.

### **Implementation Modalities**

According to Fig. 1, the technical scheme of the implement is clearly and completely described including shell10, cover 20and dust control device 30. The dust shield shell device as described in the center of the shell wall is installed with bolt of circuit board. By bolt installation on the surface of the circuit board and under the center controller, encapsulation shell through the surface of the circuit board has special optical design of acrylic blocks, such as blocks can be installed in a variety of light transmitting magnetic sensor and receive signal sensor. [4] The surface on the shell is installed shield around the acrylic block that is fixed by bolts. The top of the card with the dustproof device which is center of the guard , microcontroller , emission signal of sensors, the received signal sensor and instrumentation the circuit board, circuit is uniform designed with intelligent control switch.

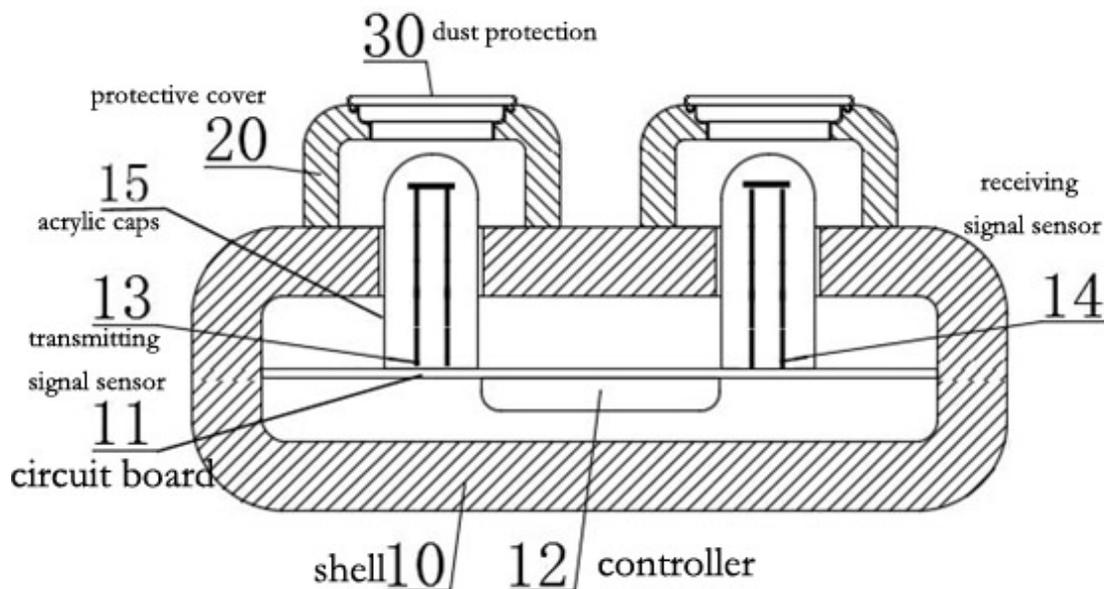


Figure. 1 Technical scheme of the implement

By shield, blocks encirclement of emission and receiving signal sensor signal sensor, then dust control device in the top of the shield, prevent the dust adhesion in transmitting signal transducer and receiving signal sensor surface, if necessary will launch from the received signal sensor signal sensor, guarantee the stable components such as sensors, antenna performance.

Dust device including dust ring, spacing ring and locating ring, dust ring described at the top of the outer wall socket has the locating ring, dust ring described the outer wall near the locating ring on one side of the socket finite ring, described in the shield at the top of the center runs with dust ring wear insert, 31 described wear jack opened with spacing ring spacing groove at the top.

The dustproof device is set at the center of the top of the protective cover through the cooperation of the dustproof ring and the piercing jack, and then the position of the dustproof ring is limited through the cooperation of the limit ring and the limit slot to avoid the deviation of the dustproof ring in the piercing jack.

The top of the inner wall of the dustproof ring is bolted and fixed with a dustproof board, and the surface of the dustproof board is evenly provided with a through-hole.

When used by ring card with ring card slot, clamping dustproof device in the center of the top cover, produce light emission signal sensor, magnetic signal, and spread through the hole. [5] When light, magnetic signal reflection configuration, light, magnetic signal is reflected back, and then through the hole is the receive signal sensor, the photo sensor, infrared human sensors and other components, can only receive signal device to form a control switch response. When dust device surface adhesion with ash, through ring card with ring card slot, can remove dust device directly, People can carry out preliminary cleaning of the dustproof device. After further treatment, the protective cover bolts can be unscrewed and the cover surface can be cleaned to ensure the precise operation of the intelligent control switch.

In the process of using the switch, the transmitting signal sensor and the receiving signal sensor are separated from the outside world through the dustproof plate to prevent dust from adhering to the surface of the transmitting signal sensor and the receiving signal sensor, and the signals of the transmitting signal sensor and the receiving signal sensor can be transmitted through the through-hole.

The edge of the lower surface of the positioning ring is fixed and installed with a ring clamp block through bolts. The top of the protective cover is arranged with a ring clamp block around the limit groove. The dust prevention device is connected with the ring clamp block at the center of the top of the protective cover through the ring clamp block and ring clamp groove.

The dustproof ring is located inside the piercing jack, and the limit ring and the limit slot are used to limit the position of the dustproof ring.

### **The Test Results**

Compared with the prior art, the result is better. Our transmitting signal transducer and receiving sensor signal has performed through the shield and block encirclements. Then dust device clamping on the top of the shield can prevent the dust from adhesion in transmitting signal transducer and receiving signal sensor surface. If necessary it will launch from the received signal sensor or transmitting signal sensor to guarantee the stable components and antenna performance. When dust is adhered to the surface of the dustproof device, the dustproof device can be directly removed through the cooperation of ring card block and ring card groove, and then people can clean the dustproof device. Further processing can unscrew the protective cover bolt and clean the acrylic cover surface to ensure the accurate operation of the intelligent control switch.

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