

## User manual

Radio remote control (RF remote control) is a remote control device that uses radio signals to control various remote mechanisms. After these signals are received by the remote receiving equipment, they can command or drive other corresponding mechanical or electronic equipment to complete various operations, such as closing the circuit, moving the handle and starting the motor, and then these machines can carry out the required operations. As a kind of remote controller complementary to infrared remote controller, it has been widely used in the field of garage door, electric door, road gate remote control, anti-theft alarm, industrial control and wireless smart home.

The commonly used radio remote control system is generally divided into two parts: transmitting and receiving. The transmitting part is generally divided into two types, namely, the remote controller and the transmitting module. The remote controller and the remote control module are for the use mode. The remote controller can be used independently as a whole machine, and the external outgoing line has a wiring pile head; The remote control module is used as an element in the circuit and is applied according to its pin definition. The advantage of using the remote control module is that it can be seamlessly connected with the application circuit, small volume, low price and make the best use of everything. However, the user must really understand the circuit principle. Otherwise, it is convenient to use the remote control.

Generally speaking, the receiving part is also divided into two types, namely super heterodyne and super regenerative receiving mode. The super regenerative demodulation circuit is also called super regenerative detection circuit, which is actually a regenerative detection circuit working in the intermittent oscillation state. Superheterodyne demodulation circuit is the same as superheterodyne radio. It is equipped with a local oscillation circuit to generate oscillation signal. After mixing with the received carrier frequency signal, the intermediate frequency (generally 465kHz) signal is obtained. After intermediate frequency amplification and detection, the data signal is demodulated. Because the carrier frequency is fixed, its circuit is simpler than that of a radio. The superheterodyne receiver has the advantages of stability, high sensitivity and relatively good anti-interference ability; Super regenerative receiver is small and cheap.

The common carrier frequency of radio remote control is 433.92MHz. The remote control uses the open frequency band specified by the state. In this frequency band, if the transmission power is less than 10mW, the coverage is less than 100m or does not exceed the scope of the unit, it can be used freely without the approval of the "Radio Regulatory Commission", while Europe and the United States and other countries stipulate 433MHz. Therefore, 433MHz remote controller shall be used for products exported to the above countries.

There are two types of coding methods commonly used in radio remote control, namely fixed code and rolling code. Rolling code is an upgraded product of fixed code. At present, rolling coding method is used in all occasions with confidentiality requirements.

The rolling code coding method has the following advantages:

1. Strong confidentiality, automatically change the code after each launch, and others cannot use the "code detector" to obtain the address code;
2. The coding capacity is large, the number of address codes is more than 100000 groups, and the probability of "duplicate code" in use is very small;
3. It is easy to check the code. The rolling code has the function of learning and storage. It can check the code on the user's site without using a soldering iron. Moreover, a receiver can learn up to 14 different transmitters, which has a high degree of flexibility in use;

4. Due to the small code error received by the receiver, there is almost no code error on the receiver.

The coding capacity of fixed codes is only 6561, and the probability of repeated codes is great. Its coding value can be seen through solder joint connection or obtained by "code detector" on the use site. Therefore, it does not have confidentiality. It is mainly used in occasions with low confidentiality requirements. Because of its low price, it has also been widely used.

The difference between radio remote control and infrared remote control (the difference between IR and RF remote control). Infrared remote control and wireless remote control are for different carriers. Infrared remote control uses infrared to transmit control signals. Its characteristics are directional, non blocking, generally no more than 7 meters away and free from electromagnetic interference. TV remote control is infrared remote control; Radio remote control uses radio waves to transmit control signals. It is characterized by non directionality, no "face-to-face" control, long distance (up to tens of meters or even kilometers) and easy to be disturbed by electromagnetic interference. In the field of long-distance penetration or non directional control, such as industrial control, it is easier to use radio remote control. Edit the influencing factors of wireless remote control distance in this section

The main factors affecting the remote distance of RF remote control are as follows:

1. Transmitting power: large transmitting power leads to long distance, but it consumes a lot of power and is prone to interference;
2. Receiving sensitivity: the receiving sensitivity of the receiver is improved, and the remote control distance is increased, but it is easy to be disturbed, resulting in misoperation or out of control;
3. Antenna: linear antennas are used, which are parallel to each other and have a long remote control distance, but occupy a large space. Lengthening and straightening the antenna in use can increase the remote control distance;
4. Height: the higher the antenna, the farther the remote control distance, but limited by objective conditions;
5. Blocking: the current wireless remote controller uses the UHF frequency band specified by the state. Its propagation characteristics are similar to that of light, with linear propagation and small diffraction. If there is a wall blocking between the transmitter and the receiver, the remote control distance will be greatly reduced. If it is a reinforced concrete wall, due to the absorption of electric waves by the conductor.

#### FCC Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is

connected.

—Consult the dealer or an experienced radio/ TV technician for help.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Caution

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC Radiation Exposure Statement

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The device has been evaluated to meet general RF exposure requirement.

The device can be used in portable exposure condition without restriction.