Dust sensor or Laser sensor for air purifier？#dust sensor#Laser sensor #air purifier

Air purifier products are different from air conditioners. As far as ordinary consumers are concerned, it is difficult to establish a very intuitive feeling for the effectiveness of the air purifier products they purchase. It is necessary to have relevant monitoring data to give a fair evaluation. Therefore, the dust sensor gradually attracts industry attention. The evaluation of indoor air quality is only a dust sensor. It can sense the concentration of hazardous components in the air and is the most important bridge for establishing direct contact between air purifier products and users.

In the high-end air purifier market at home and abroad, the application of dust sensors has been extensive, and it is one of the necessary sensors for smart air purifiers. With the rapid growth of the domestic air purifier market, the dust sensor technology is also developing rapidly, especially the laser dust sensor has been rapidly developed, and domestic manufacturers have also launched their own laser dust sensors. From 2014 to 2015, it is the fastest growing period of domestic laser dust sensors, and the products are gradually maturing, stable and mass production.

The domestic dust sensor market is indeed brilliant, new products are doubled, which manufacturer does not want to stand out in this great environment? However, the squandering of flowers is becoming more and more fascinating. From the perspective of the propaganda of each manufacturer’s products, they all focus on the advantages of rendering their own products. This is understandable; but sometimes it is not biased and lacks objectivity. This article starts with how to choose the right dust sensor to help the high-end air purifier products enhance the user experience and create value. Let’s talk about which dust sensor should be used in the air purifier.

Correct understanding of laser dust sensor and infrared dust sensor

When it comes to lasers, many people will first think of a variety of powerful and powerful laser weapons in science fiction movies. In fact, in addition to the military field, laser technology is widely used in medical, lighting, ranging, cutting and IT. For example, the popularity of VCD, DVD and Blu-ray products in these years has benefited from the gradual development of laser technology.

The laser word LASER is derived from the acronym for the English phrase “light amplification of stimulated radiation.” Initially, LASER was simply transliterated into a laser in China. In 1964, it was renamed “Laser” by the famous Chinese scientist Qian Xuesen. So, what exactly is a laser? Laser actually refers to the light produced by the special physical phenomenon of “magnification by stimulated radiation.” Aside from ignorant physics terms, lasers have the characteristics of high coherence, strong directivity, good monochromaticity, and high power density compared to ordinary visible light. For example, the light produced by the laser source is like a chorus. Everyone’s voice is a tone and the rhythm is neat. The light produced by the ordinary visible light source is like the noise in the teahouse, the slag, the mess. sequence. Therefore, the laser can be concentrated into a very concentrated parallel beam and can maintain a small diffusion angle and a high power density over a long distance. Common lasers are generally divided into three categories: solid-state lasers, gas lasers, and semiconductor lasers (commonly known as laser LEDs). In the field of instrument-level laser particle counters, a gas laser is generally used as a light source. In the field of dust sensors, laser LEDs are generally used as light sources due to cost constraints. Infrared LED is a light-emitting diode with an emission wavelength in the infrared range. The common wavelength is generally around 850 nm to 940 nm. It is widely used in medical, security, communication, remote control and sensing fields. Since the infrared LED emits light outside the visible spectrum, the receiver with a specific spectrum can greatly reduce the influence of ambient light on the received signal. Thanks to the continuous maturity of infrared LED technology in recent years, infrared LEDs have the characteristics of long life, high emission efficiency, good monochromaticity and good directionality. This makes infrared LEDs widely used in the field of sensors, especially in the dust sensor industry.

In the field of current dust particle PM2.5 detection, two kinds of dust sensors are mainly used: an infrared dust sensor and a laser dust sensor. Some friends have doubts about the difference between the two. Here, I will give you a brief introduction from five aspects.

First, structure and principle

The structure and circuit of the infrared sensor dust sensor are relatively simple. The light source is an infrared LED light source, and the air inlet and outlet air outlets mainly rely on resistance heat to obtain a flow of hot air, and the particles pass through and output a high level. The output signal is only the PWM model.

The structure and circuitry of the laser sensor are relatively complex. The light source is a laser diode. The sampled air is propelled by a fan or blower and tested through a complexly designed air duct. When the fine particles in the air enter the area where the laser beam is located, the laser will be scattered; the scattered light will radiate in the space 360°, we place the photodetector in place so that it only receives the scattered light, and then passes through the photodetector. The photoelectric effect produces a current signal, which is amplified and processed by the circuit to obtain a fine particle concentration value. The output signal is generally a serial output.

Second, price and cost

Infrared dust sensors have been used in the industry for many years, the market price is about 35-50 yuan, and the price of laser dust sensors is 90-180 yuan.

The cost gap between the two is mainly due to the addition of laser generators and fans in the material cost of the latter and the need for complex circuit structures and high technical thresholds.

Third, measurement accuracy

The infrared principle dust sensor can only detect particles above 1um, and the measurement accuracy is insufficient. Because the infrared LED light scattering particle signal is weak, it only responds to large particles larger than 1um, and only uses the heating resistor to push the sampled airflow. The number of samples is small, and the data calculation is completely carried out by the upper computer. The laser dust sensor can detect particles above 0.3um. Because it comes with a high-performance CPU, it uses a fan or blower to collect a large amount of data and analyzes it through a professional particle counting algorithm. In summary, it has advantages over infrared dust sensors in terms of sampling number, data source and algorithm.

Fourth, the application

Due to the lack of precision, the infrared principle sensor is mainly used for industrial and mining dust. The detection object is large particle size and high concentration dust. The detection level is mg/m3, and the concentration of PM2.5 cannot be accurately measured.

The laser principle sensor is mainly used in the field of PM2.5 detection to quantify PM2.5 quality with accuracy. Can be embedded in household (vehicle, handheld) air detectors, air purifiers. In addition, laser principle sensors are also used in areas such as IoT data acquisition and environmental quality testing.

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