
Insert an Electrostatic Dust Detection and Alarm Device and a Pipeline Dust Concentration Detector

Use Instructions



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1、 Safety Instruction

Strictly adhere to the assembly and installation specifications.

Before using this instrument, please read and thoroughly understand the contents of this manual, and strictly adhere to all its provisions. The static dust detection instrument is only applicable within the scope specified in the manual.

Product Maintenance

Electrostatic dust detection instruments must be inspected and maintained by trained professionals every three to six months, with maintenance records kept. Only spare parts approved by our company may be used during repairs.

Use in explosion-hazardous areas

According to China and international regulations concerning the use of electrical equipment in explosion-hazardous areas, equipment and components that have passed explosion-proof testing and certification may only be used in the applications specified in the certification. The use of faulty or incomplete components is strictly prohibited, and arbitrary modifications to the components used are not permitted. When maintenance is required for explosion-proof equipment or components, it is imperative to comply with relevant national regulations.

To mitigate explosion risks, when opening the cover or removing the safety barrier while the detector is powered on, a portable combustible gas monitor must be carried to ensure the surrounding environment contains no hazardous flammable or explosive gases.

Responsibility for Device Performance

If the electrostatic dust detection instrument is used in violation of the manual specifications, or if it has been repaired by personnel other than our company's technical staff, we shall not be held liable for any performance issues of the instrument. Any damages resulting from non-compliance with these recommendations shall be the user's sole responsibility. These recommendations also apply to the warranty and liability provisions outlined in the sales contract.

2、 Introduce

2.1 Scope of Application

This instrument is designed for continuous monitoring of dust and other contaminants in pipelines. It features a robust explosion-proof cast aluminum housing, making it suitable for various pipeline environments. The transmitter can be connected to our monitoring system or PLC controller via a sealed steel pipe to trigger system alarms. In highly corrosive environments where special sensor housings are required, customers should consult our technical experts. The product can be operated using an infrared remote control, enabling standalone calibration without opening the cover and eliminating safety verification requirements for the operating environment. An optional built-in alarm relay version is available, functioning as an independent monitoring unit to control peripheral devices.

2.2 Design Philosophy

The electrostatic dust detection and alarm instrument is connected to the main unit's current acquisition card and the online monitoring software, forming an online monitoring system.

The monitoring system supplies power to the transmitter and processes its output signals, connected via a 16AWG (1.5 mm²) three-core shielded cable with a maximum connection distance of 1,000 meters. The transmitter can also interface with any monitor capable of delivering 12–24 V DC voltage, handling RS485 bidirectional data communication, and receiving 4–20 mA analog signals. The transmitter is strictly compliant with explosion-proof specifications and is permanently installed in explosion-hazardous areas.

3、Move

3.1 Install

The selection of each transmitter installation site is crucial for ensuring the effective operation of the entire system. Therefore, every detail should be carefully considered during installation. Special attention should be paid to the following points:

- . The installation and use of transmitters must comply with national and local safety regulations governing the use of gas monitoring equipment in explosion-hazardous environments.
- . The relevant electrical regulations concerning the connection and installation of power supplies and signal cables for gas monitoring equipment must be strictly complied with.
- . Changes in the environmental conditions of the transmitter
- . Physical parameters of the monitored dust or vapor
- . Application features (e.g., potential leaks, air flow direction, etc.)
- . The installation point should facilitate maintenance.
- . The types of optional components or attachments to be used in the system (e.g., remote alarm and recording devices)
- . Other factors or specifications that may affect system performance or installation

3.1.1 Installation Provision

The transmitter operates on a 12–24 V DC power supply, which determines the distance between the monitoring system power source and the transmitter. The connecting cable is a 16–22 AWG (0.5–1.5 mm²) three-core shielded cable.

.The transmitter installation site must be free from thermal radiation sources to prevent the internal temperature from exceeding 149 °F (65 °C). It is recommended to install a radiation shielding enclosure.

.The transmitter must be installed vertically (with the sensor facing downward).

.The transmitter housing features a sealed explosion-proof design, making it suitable for outdoor environments. When paired with the splash guard produced by our company, the sensor becomes waterproof, dustproof, and windproof.

3.1.2 Way to Install

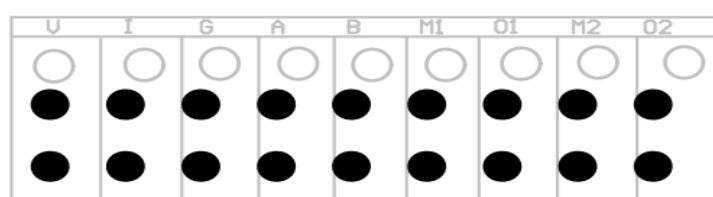
This instrument is very easy to install:

- 1) The opening on the pipeline is secured using a flange.

3.2 Electrical Connection

3.2.1 Transmitter Electrical Connection

Only trained professionals may perform the electrical connections of the equipment, and all relevant regulations must be strictly adhered to during the connection process.



3.2.2 Connection for the 4~20mA Circuit

V	24VDC+ (positive power input)	Redline
I	4~20 mA positive input terminal	Yellow line
G	24VDC (-power input), 4~20 mA negative input	Black line

3.2.3 RS485 Circuit Connection

A	RS485 positive input	Green line
B	RS485 negative input	Blue line

Note: Do not connect power to the RS485 signal input to avoid damaging the RS485 communication circuit and compromising warranty coverage.

3.2.4 Built-in Relay-Type Transmitter

M1	A1 Underreported relay common terminal	Brown Line
01	The A1 underreporting relay typically starts in this state.	Orange Line
M2	A2 High-Report Relay Common Terminal	Gray line
02	A2 High-Report Relay Normally On	White line

3.2.5 Display Screen, LED Backlight/in Indicator Light

Display backlight:

White light: emits bright white backlight during normal operation;

Orange light: The A1 model features a low-level bright orange backlight.

Red light: A2 features a bright red backlight;

LED pilot lamp :

Power status: Green light (常亮 indicates normal operation; flashes when connected to the host computer);

Fault: Yellow light (does not illuminate under normal operation; lights up when a fault occurs);

Alarming indicator: Red light (does not illuminate under normal operation; turns on during alarms);

Reception: Position the infrared remote control receiver. Align the remote control with this position to operate the instrument.

4、 System Operation and Maintenance

4.1 Prepare

When powered on (12–24 V DC), the instrument enters a self-test mode: the full-screen display remains active for 1 second, followed by a 1-minute preheating period. The LCD displays a 1-minute countdown in seconds; during the preheating phase, the 4–20 mA output is limited to 3 mA, and the relay function is disabled. After the 1-minute preheating, the instrument switches to normal operation. If the self-test fails during the preheating phase, the fault indicator light will illuminate. Upon completion of the preheating, the power supply, fault, and alarm indicator lights will all light up, confirming normal operation of the corresponding indicators.

4.2 Normal Operating Mode

In normal operation, the instrument displays the concentration of the detected dust (as shown in Figure 1) and transmits a 4–20 mA analog signal and an RS485 digital signal externally.

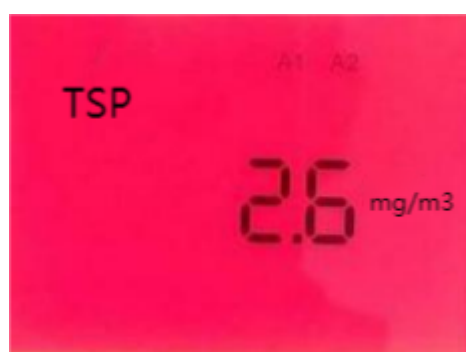


Graph 1

As the dust concentration increases, an A1 character alarm will be displayed when the A1 threshold is reached (Figure 2). When the A2 threshold is exceeded, both A1 and A2 character alarms will be displayed (Figure 3), triggering corresponding relay actions. The external audio-visual alarm system will also activate to issue an alert.



Graph 2



Graph 3

4.3 System Alarm

When the instrument detects that the current dust concentration has reached the alarm threshold, it immediately triggers an alarm, and the backlight color changes accordingly.

State	Alarm indicator	Display screen backlight	Relay 1	Relay 2	Audible and visual alarm
Normal	Go out	White light	OFF	OFF	Failure to actuate
A1	Twinkle	Orange Light	ON	OFF	Movement
A2		Glow	ON	ON	Movement

4.4 Menu Operation Mode

Under normal display conditions, there are two methods to enter programming mode: one involves modifications via the host computer software (refer to the host computer software documentation for usage), and the other utilizes the card-type remote control provided with the instrument.



Graph 4

4.5 Remote Control Introduction

The remote control, as shown in Figure 4, has five buttons: the middle one is the menu (shift) key, the left one is the OK key, the right one is the return key, the top one is the increase key, and the bottom one is the decrease key.

Press the menu key to access SET (Parameter Settings), CALI (Calibration Settings), or ALAR (Alarm Settings). Once selected, you can perform the corresponding configurations; customers only need to modify CALI and ALAR.

SET option: Factory default parameters configured by our company before shipment.

CALI options: Zero calibration (ZERO), gain calibration (SPAN), and 4mA and 20mA output current calibration.

alarma options: parameter settings for A1 low alarm value and A2 high alarm value.

4.6 Programming Method

Enter programming mode: When configuring the instrument with the remote control, pressing the function key activates programming mode. Use the ∇ and $\wedge$ keys to navigate through the primary menu—available options include SET, ALAR, and CALI. To access the secondary menu, simply press the confirm key. In the secondary menu, select functions using the ∇ and $\wedge$ keys.

After entering the primary menu, press the ∇ key once to access the next primary ALAR menu option.

1、 On the interface, display the SET menu. Press the OK key to select ADDR, DOT, RANG, UNIT, TYPE, DOT, and ADC, then use the ∇ and $\wedge$ keys.

Switch to view.

2、 Enter alarm value setting: In the test environment, press the function key to access the SET menu, then press the $\vee$ key once to enter the ALAR mode.

1) Modify A1: When entering the ALAR menu, a short press of the OK key activates the A1 modification option. Here, the $\vee$ and $\wedge$ keys serve as data subtraction and addition keys, respectively; the function key functions as a data bit selection key. A single press of the "Function" key selects a data bit, which then flashes at a 0.5-second interval. After completing the settings, press OK to save and exit this sub-menu, or press Return to exit without saving.

2) Modify A2: When entering the ALAR menu, pressing the OK key will allow modification of option A1; pressing the $\vee$ key once will enable modification of option A2. Here, the $\vee$ and $\wedge$ keys function as data subtraction and addition keys, respectively, while the function keys serve as data bit selection keys. Long-pressing a function key once selects a data bit, which then flashes at a 0.5-second interval. After completing the settings, press OK to save and exit, or press Return to exit without saving.

3) Modifying TWA: When entering the ALAR menu, pressing the OK key opens the A1 modification option; pressing the $\vee$ key once opens the A2 modification option; pressing the $\vee$ key again opens the TWA modification option. Here, the $\vee$ and $\wedge$ keys function as data subtraction and addition keys, respectively, while the function keys serve as data bit selection keys. Holding a function key once selects a data bit, which then flashes at a 0.5-second interval. After completing the settings, press OK to save and exit, or press Return to exit without saving.

4) Modifying STEL: When entering the ALAR menu, pressing the OK button will allow you to modify the A1 option; pressing the $\vee$ key once will enable modification of A2; pressing the $\vee$ key again will proceed to modify TWA; pressing the $\vee$ key once will open the STEL modification options. Here, the $\vee$ and $\wedge$ keys function as data subtraction and addition keys, respectively, while the function keys serve as data bit selection keys. Holding a function key once selects a data bit, which then flashes at a 0.5-second interval. After completing the settings, press OK to save and exit, or press Return to exit without saving.

4、 Access the CALI primary menu: In the test environment, press the function key to enter the SET primary menu, then press the $\vee$ key once to switch to ALAR mode, and press the $\vee$ key again to access the CALI primary menu.

1) Zero Calibration: When entering the CTLI menu, press the OK button to input a 4-digit password. If the password is correct, you will proceed to the ZERO option; if incorrect, the ERR message will display for 2 seconds before returning to the CTLI interface to access the Zero Gas Zero Point Calibration section of the function settings. The LCD will display the current gas concentration and the "Zero" symbol. If the displayed concentration is not 0, press the OK button to save the zero calibration and confirm with OK. To set additional parameters, press the $\vee$ key to proceed to the next level of settings; otherwise, press the Return key to return to the detection mode.

2) Calibration: When entering the CTLI option, pressing and holding the OK key will prompt you to enter the password; entering the correct password will activate the ZERO option. Pressing the $\vee$ key once will open the calibration menu, allowing you to access the Span gas gain correction setting in the function configuration mode. If the displayed concentration does not match the calibration standard gas, use the $\vee$ or $\wedge$ keys to readjust to the target concentration. After adjustment, press the OK key to save the settings (the saving method is the same as above). Once saved, press the Function key to proceed to the next level of parameter configuration; otherwise, press the Return key to return to the detection mode.

3) Modify calibration password: When entering the CTLI options, press the OK key to access the ZERO options; press the $\vee$ key once to enter the calibration menu; press the $\vee$ key again to access the password modification option. Enter the new password (4 digits) and confirm to save, or press the Return key to exit without saving.

4) 4MA Calibration:

Upon entering the CTLI, continuously press the "^" key to access the 4MA calibration menu. The LCD screen will display the current DA reading; then press the OK button to proceed with calibration. During this process, use a multimeter to measure the output current. If the reading is below 4MA, increase the AD input value appropriately. Re-test the output current; if it remains below 4MA, repeat the previous steps. If the reading exceeds 4MA, adjust the AD input value accordingly. Re-test the output current; if it still exceeds 4 MA, continue with the same procedure.

5) 20MA Calibration:

Upon entering the CTLI, continuously press the "^" key to access the 20MA calibration menu. The LCD screen will display the current DA reading; press the OK button to proceed with calibration. Use a multimeter to measure the output current: if it is below 20MA, increase the AD input value accordingly. Re-test the output current; if it remains below 20MA, repeat the previous steps. If the current exceeds 20MA, adjust the AD input value appropriately and re-test. Continue with the same procedure if the current remains above 20MA.

6) Restore factory default calibration: After entering CTLI, press the "^" key repeatedly to access the DEF restore factory calibration menu.

7) CFC coefficient setting: After entering the CTLI, continuously press the "^" key to access the CFC coefficient setting interface (this setting is only applicable when the gas type is TVOC).

After setting the coefficients, press the "^" or "v" key to select them. Once selected, press the OK key to save and exit, or press the Return key to exit without saving.

5、 Technical Parameter Description

5.1 Product Certification

Explosion-proof certification: Explosion-proof rating Exd IIC T6; Protection rating: IP65

Test Report: CMA

CE – Electromagnetic Compatibility (Standard 89/336/EEC)

5.2 Signal Output (to the Central Controller, Transmitted Via a Three-Core Shielded Cable)

Measurement of electrical signal overflow	4~20Ma
Signal overf-low	3.8~4mA
	20~20.5mA

Transmitter failure <3.2mA

Maintenance signal: 4±1 mA, 1 Hz modulation

Optional signal (controllable switch)

The warning outputs a 1-second fault signal digital signal every 10 seconds.

HART is transmitted via a three-core shielded cable, while RS485 is transmitted via a shielded twisted pair cable.

5.3 Working Power Supply

Working voltage: 12 V DC

Peak current: 750 mA for 10 microseconds

Working current: 50–110 mA

The instrument is equipped with a reverse electrode protection.

The cable terminal is designed to accommodate cables with a diameter of 16 AWG.

5.4 Physical Parameter

External protection: IP65

Threaded interface: M20*1.5 internal thread

Dimensions: 568×250×94 mm

Weight: 2.0 kg

temperature : -20~60°C

Humidity: 0–90% RH (no condensation)

Pressure: 700–1300 mbar

Calibrated flow rate = 0.6 L/min

Measurement range: 0–1–10–100–1000 mg/m³

Reading error $\leq \pm 10\%$ FS

6、 Communication Protocol(Please Request the Electronic Version from Our Company)

7、 Maintenance Overhaul

The lifespan of sensors varies depending on their environmental conditions. Dust sensors typically have a lifespan of 1–2 years, and their zero point and sensitivity may drift over time; therefore, the instruments require regular calibration.

Furthermore, our company hereby solemnly reminds you: After the instrument fails to trigger an alarm, it should be calibrated or subjected to functional testing, and all data obtained from these procedures must be properly documented. Under normal operating conditions, the instrument requires no additional maintenance beyond zero adjustment and calibration.

pay attention to :

Special care must be taken when storing and using sensors. Exposure to environments exceeding normal operating temperatures can damage the sensors. Sensors are highly sensitive to atmospheric pressure; they will fail to function properly when atmospheric pressure fluctuates significantly or deviates by more than $\pm 10\%$ from normal levels.

After a sensor exceeds its measurement range under any circumstances, it must be regularly recalibrated to ensure measurement accuracy.

7.1 Display Fault

To enable users to clearly and intuitively understand a product's operational status and the specific causes of failures, thereby facilitating rapid troubleshooting, the RS485 communication protocol incorporates a dedicated fault detection function.

7.2 Fault Code Description

When a fault occurs, the fault code will be displayed in the upper-left corner of the instrument. For code definitions, refer to Table 3 in the aforementioned communication protocol.

7.3 Replace the Sensor

Sensor replacement must be performed by qualified engineering technicians exclusively using sensors of the same model configured by our company. Any instrument damage caused by users installing unauthorized sensors will not be covered under warranty.

The method for replacing the sensor is as follows:

- ◆ Turn off the transmitter power.
- ◆ Open the sensor housing.
- ◆ Remove the old sensor from the circuit board and replace it with a new sensor of the same model.
- ◆ Tighten the sensor housing.
- ◆ Connect to the power supply and turn on the device.
- ◆ After replacing the sensor, some instrument settings may change. Check that the instrument settings meet the requirements before reuse.
- ◆ After startup, the instrument reading may not be zero; adjust it to zero after the instrument has operated stably for a period of time.

7.4 Zero Adjustment and Calibration

During routine maintenance, the instrument requires frequent zeroing and calibration. To facilitate users' daily maintenance tasks, the instrument offers two operation methods for this purpose. One method allows maintenance on-site using a remote control without opening the instrument's casing; refer to the operating instructions for details. The other method requires opening the casing for zeroing adjustments.

7.5 Common Faults and Troubleshooting

Hitch	Cause	Processing method
The instrument has no display.	Poor contact at the power socket; circuit fault.	Reconnect Return to the original manufacturer for repair.
The reading is too low	Zero point and gain correction are too low; the sensor is malfunctioning.	Calibrate and replace the sensor
The reading is too high	Zero point and gain correction are too high; the sensor has failed.	Calibrate and replace the sensor
The reading is unstable.	Insufficient polarization time; sensor failure; circuit malfunction. The circuit generates self-stimulation AC interference	Continue polarization; replace the sensor and return it to the original manufacturer for repair. Adjust the Span potentiometer to reduce the gain. Connect the instrument power supply to the instrument's power circuit and ensure proper grounding.
Response time has slowed down	Dust clogging has caused the probe sensor to fail; there is also a circuit malfunction.	Clean the dust from the protective cover Replace the sensor Return to the original manufacturer for repair.

7.6 Instrument Calibration Record

product model :

meter number :

Using unit:

date of manufacture :

Date	Standard gas concentration	Before calibration indication value	Calibrated indication value	Remarks

8、 Selection Guide: For Details, Please Consult Our Sales Representatives.

9、 Explosion-Proof Features and Usage Instructions

9.1 Content of the Explosion-Proof Marking

This instrument is an explosion-proof device, designed in accordance with GB3836.1-2010 "Electrical Equipment for Explosive Gas Environments – Part 1: General Requirements" and GB3836.2-2010 "Electrical Equipment for Explosive Gas Environments – Part 2: Explosion-Proof Type'd' ". The enclosure bears the explosion-proof marking Exd II CT6.

EX: Explosion-proof marking; d: Explosion-proof type;

II: This instrument is intended for use in Zone 1 and Zone 2 hazardous areas (Zone 1: Areas where explosive gas mixtures may normally occur; Zone 2: Areas where explosive gas mixtures are unlikely under normal conditions but may occasionally or briefly occur under abnormal circumstances).

C: The relationship between the classification of explosive gas mixtures and the ratio of the maximum test safety clearance to the minimum ignition current.

Maximum experimental safety margin (MESG, mm): ≥ 0.5 ; Minimum ignition current ratio (MICR): > 0.45 .

T6: The maximum surface temperature T of the device is 85°C ; the ignition temperature of combustible materials is 100°C , with $T > 85^{\circ}\text{C}$.

9.2 Matters Need Attention

◆ Do not operate the instrument in environments with explosive gases or when power is not disconnected; read and understand the user manual before operating or maintaining the instrument.

◆ This device should be used in environments free from corrosive gases, cooking fumes, and dust, and protected from rain. Avoid dropping it from heights or subjecting it to severe vibrations.

◆ Avoid frequent exposure of this device to high-concentration gas samples exceeding the detection range, as this may shorten the sensor's operational lifespan.

life 。

- ◆ Due to variations in dust sample calibration and environmental conditions, the test results obtained by this device may exhibit a certain discrepancy from the actual dust concentration.

◆ All equipment prior to installation undergoes rigorous inspection and testing. To ensure measurement accuracy, regular calibration should be performed—typically every six months—or as per the relevant on-site regulations.

9.3 Ambient Condition

This instrument is suitable for operation under the following environmental conditions; please note these precautions when using it.

Environmental temperature for explosive gases: -20°C to 60°C

Operating temperature and humidity of the instrument: -20°C to 40°C, 0% to 95% relative humidity (no condensation).

This instrument is designed as an explosion-proof model without employing additional explosion prevention measures. It achieves an IP65 protection rating, completely preventing dust ingress, and can be safely flushed with water without any risk.