Explosion-Proof Differential Pressure Transmitter

I. Product Definition

The Qidian QDFC70D Explosion-Proof Micro-Differential Pressure Transmitter is an intrinsically safe, high-precision micro-differential pressure measurement instrument developed by Anhui Qidian Automation Technology Co., Ltd. It is specifically designed for flammable and explosive industrial environments. Its core function is to accurately detect micro-differential pressure / air pressure (positive pressure, negative pressure, differential pressure), and linearly converting these minute pressure differentials into a standard 4–20 mA DC electrical signal output for acquisition, display, and closed-loop control by PLCs, DCS systems, or secondary instruments.

Comprehensive Core Functions:

1. Micro-differential Pressure Measurement: Measurement range covers **±25 Pa to ±100 kPa**, suitable for applications involving minute pressure differences such as furnace negative pressure, duct air pressure, and filter differential pressure.

2. Explosion-proof safety: Explosion-proof rating Ex ia II C T6 Ga, suitable for Zone 0 / Zone 1 flammable and explosive gas environments, compliant with the GB 3836.1-2010 standard.

3. Signal Transmission: High-precision 4–20 mA output (two-wire system), compatible with mainstream industrial control systems, featuring long signal transmission distances and strong anti-interference capabilities.

4. Wide-Temperature Stability: Built-in **-20°C to 70°C** precision temperature compensation ensures minimal zero-point and span drift in high- and low-temperature environments.

5. Overload Protection: Supports 300% FS overpressure overload, with shock and surge protection, suitable for complex industrial operating conditions.

6. Reverse Polarity Protection: Reverse polarity connection will not damage the circuit; automatic current limiting ≤35mA reduces installation risks.

7. Local Display (Optional): LCD/LED digital display allows on-site reading of pressure values and supports tool-free on-site calibration of zero point and span.

II. Working Principle

Core Logic: Pressure Differential → Diaphragm Deformation → Change in Resistance/Capacitance → Electrical Signal Conversion → Standard Signal Output. A simplified breakdown in 4 steps:

1. Pressure Sensing (Step 1)

The transmitter has two ports: a high-pressure port (H) and a low-pressure port (L), which are connected to the gas pressure at the two measurement points (e.g., upstream and downstream of an air duct, or the inlet and outlet of a filter). The pressure difference $\Delta P = P_H - P_L$ acts on the internal high-precision diffused silicon pressure-sensitive diaphragm.

2. Deformation Conversion (Step 2)

The minute pressure difference causes micrometer-level elastic deformation of the diaphragm. The piezoresistive chip on the diaphragm changes its resistance value due to this deformation (piezoresistive effect); the magnitude of the deformation is precisely proportional to the pressure difference—the greater the differential pressure, the more significant the change in resistance.

3. Signal Processing (Step 3)

The weak resistive signal is amplified by a dedicated amplifier circuit, then processed by a microprocessor (CPU) to perform temperature compensation, nonlinearity correction, and filtering. This eliminates the effects of ambient temperature and signal noise to ensure accuracy.

4. Standard Output (Step 4)

The processed signal is converted into a standard 4–20 mA DC current signal: 4 mA corresponds to 0 differential pressure, and 20 mA corresponds to full-scale differential pressure. The current signal is highly resistant to interference and supports long-distance transmission, allowing direct connection to a PLC/DCS for pressure value reading.

Summary: It functions like an “electronic pressure differential scale,” precisely converting invisible, minute pressure differentials into standard electrical signals that control systems can interpret. Its explosion-proof design ensures safe operation even in hazardous environments.

III. Core Value

3.1 Overview of Core Value

1. Safety Value: Intrinsically safe (Ex ia II C T6) design enables safe measurement in Zone 0 and Zone 1 hazardous environments, eliminating the risk of explosions caused by electrical sparks. It meets explosion-proof requirements for chemical plants, coal mines, and paint shops.

2. Accuracy: High accuracy of ±0.2% FS, with a minimum measurable differential pressure of **±25 Pa**, solving the challenge of accurately measuring minute air pressure or negative pressure that standard transmitters cannot handle.

3. Stability Value: Annual stability of ±0.04% FS, wide-temperature compensation, and long-term calibration-free operation reduce maintenance costs and are suitable for long-term continuous industrial operation.

4. Adaptability Value: Wide measurement range (±25 Pa to ±100 kPa), 4–20 mA standard output, and IP65 protection make it compatible with multiple scenarios, including fans, furnace chambers, air conditioning systems, and environmental dust removal.

5. Cost-Effectiveness: Solid-state design with no moving parts ensures a long service life and low failure rate; simple installation (M10 threaded / barbed connectors) and maintenance-free operation reduce total lifecycle costs.

3.2 Key Challenges + Solutions

Q: Chemical and painting workshops contain flammable and explosive gases. Standard transmitters are prone to sparking and cannot be used. What should be done?

A: Choose the QDFC70D explosion-proof model. With Ex ia II C T6 intrinsic safety certification, its internal circuitry is intrinsically safe, ensuring no electrical sparks occur in either normal or fault conditions. It can be used directly in Zone 0 and Zone 1 hazardous environments and complies with national explosion-proof standards for safety and regulatory compliance.

Q: The negative pressure in the furnace chamber and the air pressure in the duct range from only tens to hundreds of Pa. Standard transmitters cannot measure accurately, suffer from significant drift, and provide unreliable data. What should be done?

A: Use the QDFC70D micro-differential pressure sensor module, which features a minimum range of **±25 Pa** and an accuracy of **±0.2% FS**. It includes built-in precision temperature compensation, with zero-point drift of ≤±0.03% FS/°C over the range of **-20°C to 70°C**. It can accurately measure even minute pressure differentials, ensuring stable and reliable data.

Q: Industrial environments experience significant temperature fluctuations, causing transmitters to lose accuracy after just a few months. Frequent calibration is too cumbersome. What should be done?

A: The QDFC70D features a built-in digital temperature compensation algorithm that automatically corrects errors across a wide temperature range. With long-term stability of ±0.04% FS, it requires no calibration for 1–2 years under normal operating conditions, significantly reducing maintenance workload and downtime.

Q: Field conditions are complex, with voltage fluctuations and strong signal interference. What should be done if the transmitter is prone to damage or signal fluctuations?

A: The QDFC70D is designed with a wide voltage supply range (12–36 VDC), reverse polarity protection, current limiting protection, and lightning protection and anti-interference circuits. It remains operational even with reversed polarity connections, automatically limits current during overvoltage, and resists electromagnetic interference, ensuring stable operation and no signal fluctuations under harsh conditions.

Q: How can we address the need to measure small differential pressures while accommodating different ranges, given that replacing transmitters is cumbersome and costly?
A: The QDFC70D covers a range of ±25 Pa to ±100 kPa and supports on-site range migration and fine-tuning, allowing a single unit to adapt to multiple scenarios. Its standard 4–20 mA signal is compatible with all mainstream PLCs and DCS systems, eliminating the need for additional conversion modules and reducing procurement and installation costs.

Q: What if the field space is limited, installation locations are constrained, and the transmitter is bulky or difficult to install?
A: The QDFC70D features a compact aluminum alloy housing with M10 threads and Φ6/Φ8 barbed connectors. It can be mounted directly on walls or pipes, or connected via pressure tubing. Installation requires only two screws and takes just 10 minutes, making it ideal for tight spaces.

IV. Key Parameters & Specifications

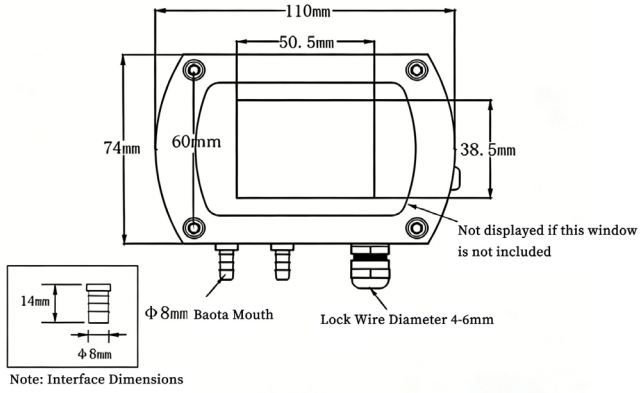
4.1 Basic Electrical Parameters
Measurement Range: ±25 Pa to ±100 kPa (designed specifically for micro-differential pressure, air pressure, furnace negative pressure, and filter differential pressure)
Accuracy Class: Two options available: ±0.2% FS and ±0.5% FS
Non-linearity: ≤±0.1% FS
Hysteresis & Repeatability: ≤±0.05% FS
Zero Drift: ≤±0.03% FS/°C
Long-term Stability: ±0.04% FS/year
Output Signal: 2-wire 4–20 mA DC standard current signal
Load Capacity: Maximum load resistance 500 Ω (24 VDC power supply)
Response time: ≤100 ms
Overload pressure: Overpressure overload protection up to 300% FS
Signal filtering: Multi-level software and hardware dual filtering, resistant to industrial electromagnetic interference
Wiring method: Two-wire non-polarity wiring, supports reverse polarity protection

4.2 Isolation Performance Parameters
Electrical isolation method: Fully isolated design between internal signal circuits and the housing
Insulation resistance: ≥100 MΩ (under 500 VDC conditions)
Isolation Withstand Voltage: Withstands 1000 V AC between input, output, and housing for 1 minute without breakdown
Common-Mode Interference Suppression: Supports suppression of common-mode interference from industrial inverters and motor start/stop operations
Surge Protection: Built-in surge absorption circuits for power and signal ports to protect against transient high-voltage spikes
Electromagnetic Compatibility: Complies with industrial-grade EMC interference resistance standards; suitable for factory environments with mixed high- and low-voltage wiring

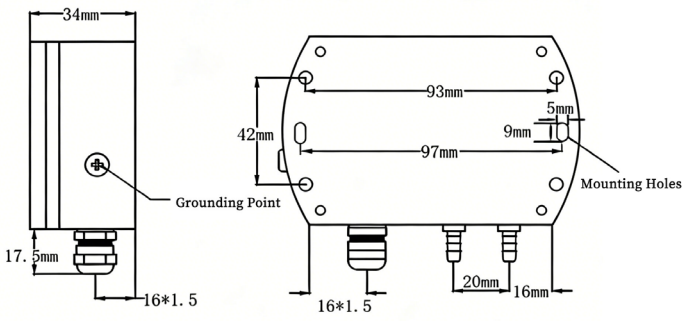
4.3 Power Supply & Power Consumption Parameters
Standard Supply Voltage: 24 V DC (typical)
Wide Supply Range: 12 V to 36 V DC
Operating Power Consumption: ≤15 mA under normal full-load conditions
Inrush Current: ≤20 mA
Power Distribution Characteristics: Two-wire passive output; no additional external power supply circuit required; compatible with direct power distribution to PLC/DCS analog modules
Reverse Polarity Protection: Internal circuitry remains undamaged even if power supply polarity is reversed; automatic current-limiting protection
Voltage Drop Characteristics: Low operating voltage drop; no signal attenuation during long-distance cable transmission

4.4 Environmental Adaptation Parameters
Operating Temperature Range: -20°C to +70°C
Storage Temperature Range: -40°C to +85°C
Operating Humidity: 10% RH to 90% RH (non-condensing)
Protection Rating: IP65 (dust- and water-resistant), suitable for long-term use in outdoor and damp workshop environments
Explosion-Proof Rating: Ex ia II C T6 Ga (Intrinsically Safe)
Suitable Explosion-Proof Zones: Zone 0 and Zone 1 hazardous environments with flammable and explosive gases
Compatible Safety Barrier Models: Standard configuration compatible with Zener-type safety barriers and isolating safety barriers (compatible with standard intrinsically safe safety barriers)
Vibration Resistance: Frequency 10 Hz to 1000 Hz, amplitude 0.1 mm; no parameter drift during long-term operation
Applicable Media: Dry air, non-corrosive neutral gases, flue gas, duct gas

4.5. Physical Parameters
Installation Methods
Wall-mounted fixed installation, pipe bracket installation, or threaded pressure tube installation; standard M10 pressure port, compatible with Φ6/Φ8 rubber tubing with barbed connectors.
Housing Material
High-strength die-cast aluminum alloy housing with sandblasted anodized surface and anti-corrosion powder coating; resistant to acids, alkalis, corrosion, and aging.
Protection Details
The housing is sealed with high- and low-temperature resistant silicone O-rings, providing protection against dust, water, and oil; terminal blocks are housed in a sealed, waterproof junction box, preventing water ingress and condensation even when exposed to outdoor rain.
Dimensions
Overall dimensions: Length 110 mm × Width 75 mm × Height 34 mm
Center-to-center distances of pressure ports and mounting holes are compatible with standard industrial mounting brackets; The high-low arrangement of the pressure ports facilitates the connection of pressure-sensing tubing for measuring pressure differentials between the front and rear.
Product Weight
Net weight of the entire unit: approx. 320g. The lightweight design ensures no load-bearing stress during wall-mounted or pipe installations.
Structural Details
Integrated sealed structure with no exposed loose parts; the terminal block features built-in anti-loosening clips to prevent wire disconnection in industrial vibration environments; includes a built-in on-site zero-point adjustment knob for calibration without disassembling the unit.



Note: Interface Dimensions



V. Application-Specific Selection Guide

5.1 Key Selection Criteria

1. Signal Type

Standard signals are preferred: The default selection is a 4–20 mA DC two-wire current signal, which is compatible with the vast majority of PLC/DCS systems and offers long transmission distances and strong interference resistance.

Special Signal Requirements: If integration with RS485/Modbus protocols or 0–10 V voltage signals is required, customization needs for the communication or voltage version must be specified in advance.

2. Number of Channels

Standard Scenarios: Single-channel differential pressure measurement. The default single differential pressure input meets the requirements for monitoring air pressure or differential pressure in most single-loop applications.

Multi-parameter scenarios: If multiple differential pressure groups need to be measured simultaneously, evaluate multi-channel expansion solutions; a single device can support customized multi-channel input and output.

3. Power Supply Options

Standard power supply: In industrial settings, 24V DC is the preferred choice, compatible with the vast majority of on-site power distribution systems.

Wide-Voltage Compatibility: For operating conditions with significant voltage fluctuations, select the 12–36 V DC wide-voltage version to prevent device reboots or damage caused by voltage instability.

4. Explosion-Proof Requirements

Non-Explosive Environments: For standard workshops and environments without flammable or explosive media, standard low-differential pressure transmitters may be used.

Explosion-Proof Environments: In flammable and explosive environments such as chemical plants, paint shops, and coal mines, the QDFC70D intrinsically safe model (Ex ia II C T6 Ga) must be selected and used in conjunction with a compliant safety barrier.

5. Installation Environment

Installation Space: For wall-mounted installations, prioritize standard mounting hole spacing; for installations in confined spaces, choose the compact housing to avoid installation issues due to dimensional constraints.

Environmental Temperature and Humidity: For standard environments, select the standard operating temperature range of -20°C to 70°C; for high-temperature, low-temperature, or high-humidity environments, evaluate temperature and humidity-extended versions to prevent condensation or low-temperature drift.

Protection Rating: IP54 is sufficient for standard indoor environments; for outdoor, humid, or dusty environments, the IP65 protection rating must be selected to prevent water and dust ingress from damaging the equipment.

6. Measurement Range and Accuracy Considerations

Range Matching: Select the appropriate measurement range based on the actual differential pressure range to be measured. Prioritize a range where the upper limit is 1.2 to 1.5 times the actual maximum differential pressure to avoid insufficient range or wasted accuracy.

Accuracy Grade: For standard monitoring applications, select ±0.5% FS accuracy; for metrology-grade or closed-loop control applications, select the high-accuracy version with ±0.2% FS.

5.2 Industry Application Selection Table

1. Chemical Industry Applications

Applicable Conditions: Air pressure monitoring in flammable and explosive gas pipelines, differential pressure monitoring in reactors, and explosion-proof air pressure control in ventilation systems.

Recommended Model: QDFC70D Explosion-Proof Version (Ex ia II C T6 Ga), 4–20 mA signal output, IP65 protection, ±0.2% FS accuracy, compatible with Zener-type / isolated safety barriers.

2. Power Industry Applications

Applicable Conditions: Negative pressure monitoring in boiler furnaces, air duct pressure monitoring, pressure differential monitoring before and after filters, and micro-differential pressure control in flue gas systems.

Recommended Model: QDFC70D Standard / Explosion-Proof Version, 4-20mA signal output, -20°C to 70°C wide-temperature compensation, ±0.2% FS accuracy, supports 300% FS overload protection.

3. Metallurgy Industry Applications

Applicable Conditions: Air pressure monitoring in blast furnace ventilation systems, differential pressure monitoring in dust collection ducts, and micro-differential pressure measurement in high-temperature flue gas systems.

Recommended Model: QDFC70D Wide Temperature Version, 4–20 mA signal output, IP65 protection, vibration-resistant design, ±0.5% FS accuracy (harsh environments) / ±0.2% FS accuracy (critical circuits).

4. Pharmaceutical Industry Applications

Suitable Conditions: Differential pressure monitoring in cleanrooms, air pressure control in ventilation systems, and real-time micro-differential pressure monitoring in dust-free workshops.

Recommended Model: QDFC70D High-Precision Version, 4-20mA signal output, ±0.2% FS accuracy, low-drift design, suitable for cleanroom installation requirements.

5. Smart Manufacturing Applications

Applicable Conditions: Ventilation pressure monitoring on automated production lines, differential pressure monitoring in equipment dust removal systems, and micro-differential pressure control in smart factory environments.

Recommended Model: QDFC70D Standard Version, 4-20mA signal output, optional field digital display version, supports direct integration with PLC/DCS systems, and is suitable for automated control loops.

5.3 Common Selection Misconceptions

Misconception 1: Ignoring Isolation Level and Focusing Only on Basic Parameters

Manifestation: Focusing solely on measurement range and accuracy while ignoring signal isolation level; using non-isolated transmitters in environments with strong electromagnetic interference (near variable frequency drives or motors), resulting in signal fluctuations and data distortion.

Solution: In industrial environments with strong interference, the QDFC70D transmitter with full isolation design must be selected to ensure electrical isolation between input, output, housing, providing protection against common-mode interference.

Misconception 2: Incorrect Signal Range Selection—Range Too Wide or Too Narrow

Manifestation: Selecting a wide-range transmitter for “general-purpose” use results in severely inadequate accuracy when measuring micro-differential pressures of tens of Pa; or selecting a range that is too narrow leads to equipment damage due to overpressure in actual operating conditions.

Corrective Action: Select the model precisely based on the actual measured differential pressure range. Prioritize a range upper limit of 1.2 to 1.5 times the actual maximum differential pressure; for low-differential-pressure applications, a dedicated low-differential-pressure sensor version must be used.

Misconception 3: Neglecting load matching, leading to abnormal signal transmission

Symptoms: Ignoring the input resistance of PLC/DCS modules and overloading the transmitter beyond its maximum allowable value results in the 4–20 mA signal failing to reach full scale, causing control loop malfunctions.

Corrective Action: When selecting a model, verify the transmitter’s maximum load capacity (e.g., QDFC70D has a maximum load of 500 Ω @ 24 VDC) and match it to the system’s input resistance. If necessary, adjust the supply voltage or replace the module with a low-load version.

Misconception 4: Incorrect Selection of General-Purpose Models in Explosion-Proof Environments, High Safety and Compliance Risks

Symptoms: Using standard non-explosion-proof transmitters in flammable and explosive environments poses a safety hazard of sparks triggering explosions and violates national explosion-proof regulations.

Corrective Action: In explosion-proof environments, the intrinsically safe QDFC70D model must be selected, along with compliant safety barriers, to ensure that the explosion-proof rating and certification match the

hazardous area classification at the site.

5.4 Customization Recommendations

1. Custom Solutions for Special Signals

For special requirements such as RS485/Modbus-RTU protocols and 0-10V/0-5V voltage signals, corresponding signal output versions can be customized. These support multi-protocol compatibility and multi-signal type switching to accommodate the integration needs of various control systems.

2. Custom Solutions for Non-Standard Operating Conditions

Extended Temperature Range: For extreme temperature and humidity environments ranging from -40°C to +85°C, we offer a wide-temperature-compensated version that optimizes zero-point and span drift control to ensure measurement stability in harsh conditions.

Media Adaptation: For corrosive gases and high-humidity, dust-laden media, we can customize corrosion-resistant material interfaces and filtration protection devices to extend
the equipment's service life.

Installation Customization: For confined spaces or specific mounting hole spacing requirements, non-standard housing dimensions and special mounting interfaces can be customized to adapt to on-site installation conditions.

4. Multi-Channel Integration Customization Solutions

For scenarios requiring simultaneous monitoring of multiple micro-differential pressure groups, multi-channel transmitters can be customized to enable multiple differential pressure inputs and multiple signal outputs from a single device, reducing on-site wiring costs and the number of devices required, and adapting to centralized monitoring systems.

5. Customized Functional Expansion Solutions

Digital Display Customization: Models without a local display can be upgraded to LCD/LED digital display versions, supporting on-site reading of pressure values and on-site calibration of zero point and range.

Alarm Customization: Relay alarm output functionality can be integrated to enable on-site overpressure/underpressure alarms, meeting the requirements of simple control loops.

VI. Installation and Commissioning Specifications

6.1. Pre-installation Preparation

1. Verification of Accessories

Verify the model of the main unit: Confirm that the model number on the nameplate is QDFC70D, and that the measurement range and explosion-proof rating (Ex ia II C T6 Ga) match the order.

Check the list of accessories: Φ8mm bell-mouth fittings ×2, mounting screws ×4, waterproof terminal block ×1, grounding screw ×1, product certificate of conformity / explosion-proof certification document ×1.

Inspect for physical integrity: Ensure the housing has no dents or deformation, the pressure ports are unobstructed, and the terminal box O-ring is intact and undamaged. For digital display models, verify that the screen has no scratches.

2. Environmental Inspection

Installation Location Requirements: Select an area free from strong electromagnetic interference (away from variable frequency drives and motors), strong vibrations, and corrosive gases. The installation height should be determined based on convenience for wiring, observation, and maintenance.

Explosion-Proof Environment Verification: When installing in hazardous areas, verify that the on-site hazardous area classification matches the equipment's explosion-proof rating, and ensure that the 配套 intrinsically safe barrier has been properly installed.

Ambient Temperature and Humidity Verification: The operating environment temperature must be between -20°C and 70°C, with relative humidity ≤90% RH (non-condensing). Avoid direct sunlight and exposure to rain.

3. Tool List

Basic Tools: Phillips screwdriver, flathead screwdriver, Allen wrench, wire strippers, crimping pliers.

Measuring Tools: Multimeter (DC/AC range, resistance range), signal generator (for 4–20 mA calibration), insulation resistance tester (≥500 VDC range).

Supplementary Consumables: Φ6/Φ8 mm silicone pressure tubing, cable ties, electrical tape, waterproof junction boxes (for humid environments).

4. Safety Precautions

Work in Explosion-Proof Zones: Personnel must hold valid explosion-proof work certification; work must be performed with the power disconnected; opening covers while the system is energized is strictly prohibited; explosion-proof tools and flammable gas detectors must be available on-site.

Electrical Safety: Verify that the on-site power supply is disconnected; do not perform wiring while the system is energized. The grounding system must be reliably grounded, with grounding resistance ≤4Ω.

Media Safety: When the measured medium is flammable or explosive gas, the pressure tubing must be sealed to prevent safety hazards caused by medium leakage.

6.2 Standard Installation Steps

1. Fixed Installation (Primarily Wall-Mounted)

Mark the installation position according to the mounting hole spacing (93 mm/97 mm) on the back of the device. Secure the mounting bracket or base using expansion bolts or self-tapping screws.

Align the transmitter with the mounting holes and fasten it with 4 screws. Ensure the device is installed horizontally and vertically, with no tilting or looseness. Anti-loosening washers must be installed in vibrating environments.

Pressure tubing installation: Screw the Φ8mm barbed fittings into the device's high-pressure (H) and low-pressure (L) ports. Connect the silicone pressure tubing to the two measurement points. The tubing must be free of kinks and blockages, with a length ≤10m, and must be protected from liquid and dust accumulation.

2. Wiring Specifications (General-Purpose Two-Wire Model)

Open the terminal box, verify the terminal labels inside, and wire according to the following specifications:

Power terminals: Connect the 24V DC positive terminal to the device's "+" terminal and the negative terminal to the "-" terminal. The two-wire system simultaneously supplies power to the transmitter and transmits the output signal.

Signal Terminals: No additional wiring is required. The two-wire circuit connects directly to the PLC/DCS analog input module (AI channel). The module provides 24V DC power, forming a complete circuit.

Shielding Wire Handling: Ground the signal line shield at a single end (grounded at the control cabinet side, left floating at the transmitter side) to prevent loop current interference caused by double-ended grounding.

Exclusive Wiring for Explosion-Proof Models:

The signal circuit must include an intrinsically safe barrier in series. Connect the transmitter to the input of the barrier and the control system to the output. Never connect a non-intrinsically safe power source directly to the transmitter.

Seal any unused wiring ports in the junction box with explosion-proof plugs to ensure the integrity of the explosion-proof enclosure.

3. Grounding Requirements

Equipment Grounding: Use a yellow-green grounding wire with a cross-sectional area of ≥1.5 mm² to securely connect the equipment's grounding terminal (marked as the grounding point) to the field grounding busbar. The grounding resistance must be ≤4 Ω.

Shield Grounding: The shield of the signal cable must be grounded at a single point on the control cabinet side only. The shield on the transmitter side must be wrapped with insulating tape and must not come into contact with the equipment housing or the grounding terminal.

Safety Barrier Grounding: The grounding terminal of the isolating safety barrier must be grounded separately, isolated from the transmitter's grounding circuit, to prevent ground-loop interference.

6.3, Wiring Diagram Notes

1. Standard Two-Wire (Non-Explosion-Proof) Wiring Specifications

Circuit Structure: PLC/DCS 24V DC power supply positive terminal → Transmitter "+" terminal → Transmitter "-" terminal → PLC/DCS AI channel negative terminal → Power supply negative terminal, forming a closed loop.

Key Notes:

Terminal numbers: "+" denotes the power/signal positive terminal, "-" denotes the power/signal negative terminal; there are no additional signal

terminals.
Shielding: The signal line shield is connected to the ground busbar on the control cabinet side and left floating and wrapped on the transmitter side.
Power Supply Requirements: The PLC module must provide a 12–36 V DC power supply, typically 24 V DC, with a loop load ≤500 Ω.

2. Dedicated Wiring Specifications for Explosion-Proof (Intrinsically Safe) Models
Circuit Structure: 24 V DC power supply on the PLC/DCS side → Input terminals of the isolated/Zener-type safety barrier → Output terminals of the safety barrier → Transmitter "+" terminal → Transmitter "-" terminal → Negative terminal of the safety barrier output → Negative terminal of the power supply.
Key Notes:
Safety barrier model: Select an intrinsically safe barrier compatible with Ex ia II C T6, with parameters matching the transmitter's explosion-proof certification.
Intrinsically Safe Circuit: Use intrinsically safe cable between the transmitter and the safety barrier. When laying the cable, route it separately from non-intrinsically safe cables, maintaining a minimum distance of 50 mm.
Grounding: Ground the safety barrier's grounding terminal separately. Connect the transmitter's grounding terminal to the field grounding busbar; the two grounding points must not share the same circuit.

3. Common Wiring: Correct vs. Incorrect Practices
Table
Wiring Scenario Incorrect Practice Correct Practice
Two-wire wiring Connecting an additional separate signal wire, creating a four-wire circuit, which causes signal abnormalities Strictly use two-wire wiring; power and signal share the same circuit
Shield grounding Grounding both ends (transmitter side and control cabinet side), creating loop current interference Ground only at a single point on the control cabinet side; leave the shield on the transmitter side floating and insulated
Wiring for Explosion-Proof Models Connecting the transmitter directly to the PLC power supply without using a safety barrier Install an intrinsically safe barrier in series, use intrinsically safe cable, and seal any unused ports with explosion-proof plugs
Power Supply Polarity Reversing positive and negative terminals, causing equipment damage or no output Verify terminal markings and connect positive and negative terminals correctly (the device has reverse connection protection; reverse connection will not cause damage but will result in no output)

6.4. Power-On and Commissioning Procedure
1. No-Load Test
After verifying that the wiring is correct, apply 24V DC power and use a multimeter to measure the loop current. Under no-load conditions (0 differential pressure), the current should be approximately 4mA (tolerance ≤ ±0.1mA).
For the digital display model, observe the screen to confirm normal display with no garbled characters or black screen; the default display shows the current differential pressure value (0 Pa under no-load conditions).
For the explosion-proof model, verify that the safety barrier indicator light is in the normal state (green indicates normal operation, red indicates a fault) and that there are no alarm signals.

2. Signal Verification
Zero Calibration: Connect both the high-pressure (H) and low-pressure (L) terminals of the transmitter to atmospheric pressure simultaneously. Measure the output current with a multimeter. If the reading deviates from 4 mA, adjust it using the zero adjustment knob on the device to stabilize the current at 4 mA ± 0.05 mA.
Full-scale Calibration: Apply full-scale differential pressure to the high-pressure terminal (e.g., 1000 Pa for a 1000 Pa range), connect the low-pressure terminal to atmospheric pressure, measure the output current, and adjust the range fine-tuning knob to stabilize the current at 20 mA ± 0.05 mA.
Midpoint Verification: Apply 50% FS differential pressure; the output current should be 12 mA ± 0.1 mA. Confirm that the linearity meets the ±0.2% FS accuracy requirement.

3. Indicator Light Status Assessment
Normal Status: The digital display shows a stable value, and the output current varies linearly with differential pressure within the 4–20 mA range without any fluctuations.
Abnormal conditions:
Output ≤ 3.8 mA: Insufficient power supply, poor wiring contact, or equipment failure.
Output ≥ 21 mA: Overpressure overload, signal circuit short circuit, or equipment failure.
No display on the digital display model: Power not connected, wiring error, or equipment damage.

4. Commissioning Under Load
Slowly open the valve for the medium being measured to gradually increase the differential pressure. Observe the transmitter's output current or display value to confirm a linear response to changes in differential pressure, with no delay or sudden jumps.
Check the pressure tubing for leaks. If the differential pressure display value fluctuates significantly, investigate whether the pressure tubing is blocked or leaking, or if there is airflow interference at the installation location.
Connect to the PLC/DCS system to confirm normal data acquisition. Compare the data with the on-site digital display value (if available); an error within ±0.2% FS is considered normal.

6.5 Installation Precautions
1. Never exceed the supply voltage: The supply voltage must not exceed 36 V DC; prolonged overvoltage will damage internal circuits. It must also not fall below 12 V DC, as this will prevent the device from functioning properly and cause abnormal output signals.

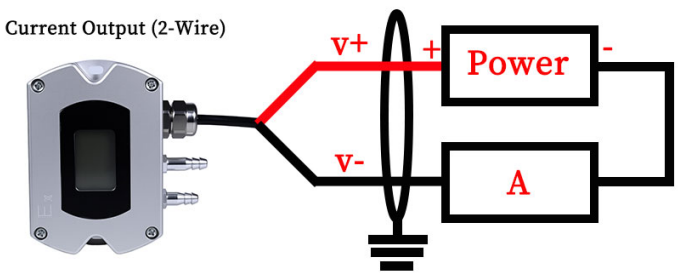
2. Never exceed the operating pressure: The measured differential pressure must not exceed 300% of the device's full scale. Overpressure will cause permanent deformation of the pressure-sensing diaphragm, rendering the device unusable.

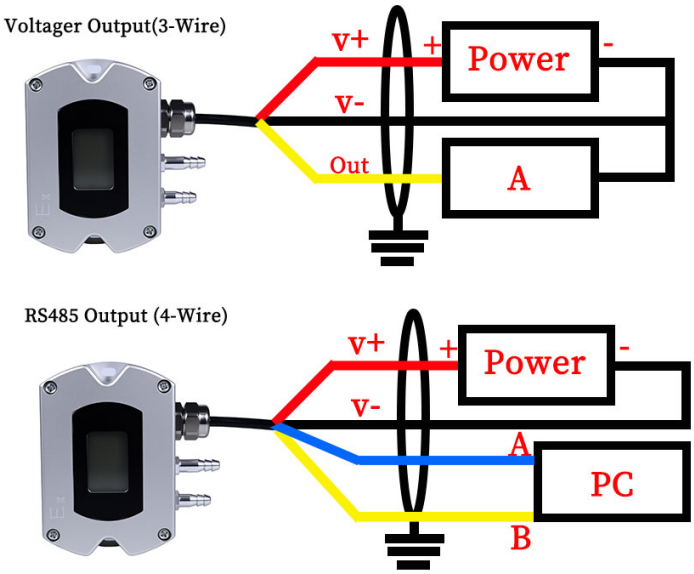
3. Avoid High-Voltage Interference: Signal cables must not be routed in the same conduit as power cables or variable frequency drive (VFD) cables; a minimum clearance of 300 mm must be maintained to prevent signal fluctuations caused by electromagnetic interference.

4. Protection in Humid Environments: When installing outdoors or in humid environments, ensure the sealing gasket of the junction box is intact and that no water or condensation enters the box. A waterproof junction box with an IP rating of at least IP65 may be installed as an additional precaution.

5. Prohibitions in Explosion-Proof Environments: It is strictly prohibited to open the explosion-proof enclosure while the equipment is energized. Non-explosion-proof tools must not be used to disassemble the equipment, and unauthorized modifications to the explosion-proof structure are strictly prohibited. Failure to comply will result in the loss of explosion-proof certification and pose a safety hazard.

6. Prohibitions Regarding Pressure Tubing Installation: Pressure tubing must not have kinks or blockages. Corrosive media must not be used in the pressure tubing. The length of the pressure tubing should not be excessive to avoid signal delays and liquid accumulation that could affect measurement accuracy.





VII. Recommendations for Daily Use & Operation and Maintenance

7.1 Key Points for Daily Inspections

1. Visual Inspection of Equipment

Daily, inspect the transmitter's housing for dents, deformation, corrosion, or discoloration; check that the terminal box cover is securely fastened; verify that the waterproof gasket is not aged, detached, or cracked; and ensure that the pressure connection ports show no signs of loosening, air leaks, or dust ingress.

2. Signal Stability Monitoring

Monitor the differential pressure/air pressure values collected by the PLC, DCS, or secondary instruments in real time. Observe whether the data is stable without sudden jumps, drift, or abrupt fluctuations. Under normal operating conditions, the values should follow linear changes in operating conditions and should not exhibit abnormalities such as unexplained stagnation or erratic fluctuations.

3. Temperature and Humidity Monitoring

Inspect the ambient temperature at the installation site to ensure it remains within the equipment's standard operating range of -20°C to 70°C. Monitor ambient humidity to prevent prolonged high humidity causing condensation or direct exposure to water mist, and ensure no condensation or water accumulation inside the junction box.

4. Explosion-Proof and Installation Status Inspection

In explosion-proof environments, focus on inspecting the explosion-proof enclosure for damage; ensure that the sealing of explosion-proof plugs for any extra cable entry holes is intact; verify that no unauthorized opening of covers or structural modifications has occurred; check that equipment mounting brackets are secure with no loosening or noticeable vibration-induced displacement; and ensure that pressure-sensing tubing is firmly secured with no swaying.

5. Operational Condition Inspection

Inspect the measured air ducts, furnace chambers, filters, and other components to ensure there is no instantaneous overpressure or high-pressure pulsation. Ensure that pressure-transmitting tubing is free of kinks, crushing, blockages, liquid accumulation, or dust buildup to maintain unobstructed airflow.

7.2. Regular Maintenance Plan

1. Cleaning Frequency Guidelines

Standard indoor conditions: Dust and clean the instrument surface once every 3 months;

High-dust, flue gas, or humid workshop conditions: Dust the exterior and connections once a month;

Chemical explosion-proof or corrosive environments: Clean every 2 months and inspect the integrity of the corrosion-resistant housing.

Cleaning Method: Wipe the housing and air nozzles with a dry, soft cloth. Do not rinse directly with water or wipe with corrosive solvents.

2. Wiring Tightness Inspection

Conduct a full wiring inspection every six months:

Check power and signal terminals for looseness, oxidation, or poor contact; ensure ground wires and shielding wires are securely crimped with no detachment; verify that wiring in explosion-proof intrinsically safe circuits has not shifted and that cable jackets show no damage or aging; retighten all wiring screws to prevent poor contact caused by vibration.

3. Recommendations for Accuracy Recalibration

Routine monitoring circuits: Perform zero-point and full-scale accuracy recalibration every 6 months;

Critical control and metering interlock circuits: Perform accuracy verification every 3 months;

Applications with harsh operating conditions or frequent temperature fluctuations: Shorten the interval to every 3 months;

Verification Method: Offline zero calibration against atmospheric pressure and full-scale calibration using a standard pressure source; perform fine-tuning and calibration immediately if errors exceed the allowable range.

4. Sealing and Component Inspection

Inspect the waterproof O-rings in the terminal box and the sealing gaskets of the pressure connection fittings once a year; replace them immediately if they show signs of hardening, cracking, or aging. Replace any loose or aged explosion-proof plugs and seals immediately to ensure explosion-proof, dustproof, and waterproof performance.

7.3 Long-Term Maintenance Tips

1. Dust and Moisture Protection

Keep the terminal box completely sealed at all times; seal all unused cable entry ports. In humid, open-air, or high-condensation environments, install an additional rain and dust shield. Avoid installation near air conditioning vents, steam outlets, or areas with direct water spray. During prolonged shutdowns, keep the device powered on in standby mode to use its low power consumption to dissipate internal condensation.

7.2 Anti-Interference Optimization Maintenance

Route signal cables separately throughout the entire run; do not install them in the same conduits or cable trays as variable frequency drives, motors, or high-voltage power lines. Strictly implement single-end grounding for shielded cables; do not ground both ends to prevent loop current interference. In strong on-site electromagnetic environments, wrap signal cables in metal shielding tubes to further suppress interference and ensure long-term signal stability without fluctuations.

7.3 Protection Techniques for Extreme Environments

High-temperature environments: Avoid direct sunlight and heat radiation; install heat-shielding panels if necessary to reduce the temperature of the housing;

Low-Temperature Environments: In extremely cold outdoor conditions, ensure wind protection and insulation to prevent long-term exposure to sub-zero temperatures from causing core drift;

Corrosive Chemical Environments: Regularly inspect the powder-coated anti-corrosion layer on the aluminum alloy housing; promptly touch up any damaged areas with anti-corrosion coating; use corrosion-resistant materials for pressure-sensing tubing;

High-Vibration Conditions: Install anti-vibration pads and secure piping with vibration-damping mounts to prevent long-term resonance from causing internal component aging or loose wiring.

7.4 Maintenance During Long-Term Storage

When the equipment is disassembled and stored, seal the high- and low-pressure ports to prevent dust ingress. Store it in a dry, well-ventilated room to avoid moisture, direct sunlight, and corrosive gases. Before reinstallation, perform a visual inspection, insulation test, and accuracy calibration; the equipment may only be put into service after passing these tests.

VIII. Troubleshooting & Emergency Response

8.1 List of Common Faults

Transmitter does not output a 4–20 mA signal; PLC does not receive measured values

Severe measurement signal drift, automatic zero-point shift, inaccurate readings

Digital display shows no display, black screen, or garbled characters
Measured values exhibit large fluctuations or jumps; interference and distortion
Actual pressure remains unchanged, but measured values are inexplicably high or low
Output locks up or range fails after transient overpressure
Alarm triggered by the explosion-proof safety barrier; abnormal indicator lights
Value lag and slow response after prolonged operation

8.2 Analysis of Failure Causes
Wiring-related causes
Reversed polarity of power supply, loose or faulty terminal connections, shielding wire grounded at both ends, intrinsic safety circuit not connected to safety barrier, signal and power lines routed together.
Power supply-related causes
Supply voltage below 12 VDC or above 36 VDC, high power supply ripple, insufficient load capacity of power distribution module, excessive circuit voltage drop.
Signal Overload Causes
Operating conditions exceeding 300% FS (Full Scale), overpressure surges, liquid accumulation and blockage in the pressure tubing, or selection of an insufficient measurement range leading to long-term overload drift.
Environmental Interference Causes
Installation near variable frequency drives, high-power motors, or power distribution cabinets; strong electromagnetic radiation at the site; moisture, condensation, or water ingress; or temperatures (high or low) exceeding the operating range.
Causes Related to Equipment Damage
Damage to the pressure-sensing element due to impact; aging of internal circuits; water ingress and corrosion due to seal failure; internal solder joint detachment caused by prolonged vibration.
Causes Related to Installation Conditions
Air leaks due to kinks in the pressure tubing; reversed connections of high- and low-pressure ports; pressure fluctuations caused by direct airflow at the installation location.

8.3 Step-by-Step Troubleshooting
Fault 1: No output from the device; no signal to the PLC
Troubleshooting Steps
Use a multimeter to measure the voltage at the power supply terminals and confirm it is within the normal range of 12–36 VDC.
Check for loose or disconnected wires, and verify that the two-wire system is wired according to specifications.
Confirm whether the positive and negative terminals are reversed; utilize the device's reverse connection protection feature by swapping the polarity and retrying.
For explosion-proof models, check whether the safety barrier is de-energized or damaged, and whether the intrinsically safe circuit is open.
Repair Measures
Tighten the terminal blocks, correct the polarity, and replace the DC power supply with a stable one; if the safety barrier is faulty, temporarily replace it with a safety barrier of the same model.
Emergency Workaround
If a spare transmitter of the same specification is available on-site, directly replace and install it to restore production first, and repair the faulty device later.

Fault 2: Signal Drift, Zero Point Shift, Inaccurate Measurement
Troubleshooting Steps
Expose both the high- and low-pressure ports to atmospheric pressure simultaneously and observe whether the zero point returns to 4 mA.
Check if the ambient temperature exceeds the range of -20°C to 70°C, and verify if there are any direct high-temperature heat sources on-site.
Inspect the pressure tubing for water accumulation, dust buildup, or blockages that may cause static pressure deviations.
Confirm whether the device has been operating under slight overpressure for an extended period.
Remedial Measures
Fine-tune the zero-point potentiometer on-site for calibration; clean the pressure tubing and clear the air ports; move the device away from heat sources and ensure proper ventilation and thermal insulation.
Emergency Workaround
Temporarily lock the PLC range parameters to apply offset compensation; recalibrate or replace the device during the next scheduled shutdown.

Fault 3: Digital Display Black Screen, Garbled Text, or Abnormal Indicator Lights
Troubleshooting Steps
First, check if the power supply is normal; low voltage may cause the screen to remain dark.
Check the junction box for water ingress, condensation, or water leakage due to aged seals.
Investigate whether strong electromagnetic interference is causing display driver malfunction.
Remedial Measures
Restore standard 24V power supply; wipe away internal moisture and replace waterproof seals; relocate the unit away from interference sources.
Emergency Workaround
Temporarily disregard the on-site display; rely on values collected by the PLC backend, which will not affect system control.

Fault 4: Value Jumps, Interference Distortion, or Irregular Fluctuations
Troubleshooting Steps
Check whether signal cables are routed in the same cable tray as power cables or VFD cables.
Check whether shielded cables are grounded at both ends, creating loop current interference.
Check whether the installation location is subject to excessive vibration or direct airflow from ventilation ducts blowing onto the pressure tap.
Remedial Measures
Route signal cables separately, maintaining a distance of at least 30 cm from power cables; ground the shielding wire to a single point within the control cabinet; adjust the pressure tap location and install vibration-damping pads.
Emergency Workaround
Add digital filtering parameters within the PLC to temporarily suppress value fluctuations and ensure production stability.

Fault 5: High and low pressure terminals reversed; positive and negative values inverted
Troubleshooting Steps
Verify whether the H (high pressure) and L (low pressure) terminals are connected to the wrong measurement points.
Remedial Measures
Swap the connections of the two pressure tubing ports and re-secure the tubing to restore normal operation.
Emergency Workaround
Configure positive/negative logic inversion within the PLC; no on-site tubing modifications are required.

Fault 6: Output Locked After Overpressure, Measurement Range Failed
Troubleshooting Steps
Confirm whether there was a momentary air pressure surge or pressure shock caused by the start/stop of the dust removal fan at the site.
Remedial Measures
After depressurizing, recalibrate the zero point and full-scale range; in environments with frequent pressure shocks, install an external buffer damper.
Emergency Workaround
Temporarily replace the unit with a spare gauge of a similar measurement range to prevent long-term overpressure damage to the sensor element.

8.4 After-Sales Repair Guidelines
1. Failure Criteria (Meet any one to request repair)
Normal power supply and correct wiring, yet the device remains without output or stuck at full scale for an extended period.
Accuracy cannot be restored after multiple zero-point/full-scale calibrations, with an error exceeding ±0.5% FS.
Water ingress and corrosion in the junction box, burn marks on the housing, or obvious signs of internal damage.
The device is completely inoperable due to overpressure, lightning strikes, or high-voltage interference.
The explosion-proof certified structure is damaged, or the device exhibits functional abnormalities that cannot be self-resolved following unauthorized modifications.

2. Repair Process

Record the complete model number: QDFC70D, measurement range, explosion-proof rating, and duration of installation and use.

Take on-site photos of the device nameplate, wiring configuration, and installation conditions, noting the fault symptoms and on-site environment.

Contact after-sales technical support and provide the model number, fault description, on-site photos, and operating conditions.

Technical staff will provide remote troubleshooting guidance; if on-site repair is not possible, the device will be processed for return repair or replacement.

3. Warranty Coverage

Under normal operating conditions, the warranty covers non-human-induced damage and devices that have not been disassembled or modified without authorization. The warranty period for the entire unit is in accordance with company standards.

During the warranty period, quality issues such as circuit failures, sensor drift, or seal failure will be repaired or replaced free of charge.

The following situations are not covered by the free warranty: unauthorized opening or modification of the housing, damage caused by accidental impact, burnout due to incorrect wiring, use under overpressure or overload conditions, or damage caused by the forced use of corrosive media.

4. Usage Instructions

For explosion-proof models, it is strictly prohibited to disassemble the explosion-proof housing without authorization; doing so will immediately void the explosion-proof safety certification and render the warranty invalid. Do not attempt to disassemble faulty equipment yourself; instead, submit it to the manufacturer’s professional after-sales service for inspection and repair.