QDX50A Differential Pressure Transmitter

I. Product Definition

The QDX50A/QDX50A-2088 integrated differential pressure transmitter is an industrial-grade differential pressure measurement device independently developed by Anhui Qidian Automation Technology Co., Ltd. Designed specifically for monitoring industrial parameters such as differential pressure, level, and flow in fluid media, it is an intelligent industrial measurement instrument that integrates sensing, signal processing, and transmission output into a single unit. The full series includes non-display models, LED/LCD digital display models, and explosion-proof models, suitable for complex operating conditions across multiple industries such as petroleum, chemical, water treatment, and HVAC.

Its core functions comprehensively cover the following scenarios:
1. Precise Differential Pressure Measurement: Directly captures the pressure difference between two points within a pipeline or vessel. The measurement range covers the entire spectrum from low to medium and high differential pressures, and is compatible with various media such as gases, liquids, and steam, addressing the limitation of traditional single-pressure measurement that cannot directly obtain differential pressure.

2. Standardized Signal Transmission: Converts differential pressure signals into industry-standard electrical signals (4-20mA, RS485 Modbus, etc.), enabling direct integration with industrial control systems such as PLCs, DCS, and digital displays to achieve long-distance signal transmission and compatibility.
Measurement Adaptability for Diverse Operating Conditions: Featuring an integrated stainless steel measurement chamber, optional heat dissipation structures, and wide-temperature circuit design, it adapts to complex operating conditions such as high- and low-temperature media, corrosive fluids, and environments with vibration and shock. It also supports high-temperature models with heat sinks (e.g., for steam applications).

3. Multiple Display and Output Configurations:
No-display model: Direct signal output via HART connector; compact design suitable for space-constrained applications where local readings are not required;
Digital display model (LED/LCD): Supports real-time local display of differential pressure values; the LCD model features a backlight for clear readability in both bright and dim lighting conditions, while retaining standard signal output functionality;
Explosion-proof models: Utilize flameproof or intrinsically safe designs, comply with industrial explosion-proof standards, and are suitable for flammable and explosive hazardous environments such as the petroleum and chemical industries.

4. Auxiliary Industrial Process Control: Through differential pressure signals, it can indirectly enable extended functions such as liquid level measurement (differential pressure level in sealed vessels), flow monitoring (differential pressure flow in orifice devices), filter clogging alarms, and pipeline pressure drop monitoring, making it a core foundational device for multi-parameter monitoring in industrial process control.

5. High Stability and Interference Resistance: Utilizes a highly stable piezoresistive sensor core and anti-interference circuit design to effectively suppress electromagnetic interference, temperature drift, and zero-point drift in industrial environments, ensuring long-term measurement accuracy and stability.

II. Working Principle

The operating process of the QDX50A/QDX50A-2088 differential pressure transmitter can be broken down into four core steps: pressure acquisition → signal conversion → signal processing → transmission output (+ local display). A simplified explanation is provided below:

1. Pressure Acquisition Stage
The high-pressure side (H) and low-pressure side (L) of the measured fluid are connected to the two threaded ports on either side of the transmitter, respectively. The medium pressure is transmitted through a stainless steel measuring chamber to the internal high-sensitivity piezoresistive sensing element. The Wheatstone bridge on the sensing element detects the deformation caused by the pressure difference between the two sides.

2. Physical-to-Electrical Signal Conversion Stage
When a pressure differential acts on the sensor element, the silicon diaphragm inside the element undergoes a slight deformation, causing a change in the resistance of the bridge arms of the Wheatstone bridge. The originally balanced bridge generates a weak voltage signal (in the millivolt range) proportional to the differential pressure value, thereby completing the conversion from “differential pressure (physical quantity) to weak electrical signal.”

3. Signal Processing Stage
The amplifier circuit, filter circuit, and temperature compensation circuit inside the transmitter process the weak electrical signal: first amplifying the signal strength, then filtering out electromagnetic interference from the industrial environment, and simultaneously using temperature compensation algorithms to eliminate zero-point drift and sensitivity drift caused by changes in medium or ambient temperature, thereby calibrating the signal into a stable standard signal source.

4. Transmitter Output and Local Display Stage
Non-display models: The processed signal is converted into an industrial-standard 4–20 mA current signal (or RS485 digital signal) and output to the control system via an HART connector;
Digital display models (LED/LCD): While outputting the standard signal, the processed differential pressure value is transmitted to the local display module, where it is displayed in real time in digital form;
Explosion-proof model: Based on the above circuitry and structure, an explosion-proof housing and isolation circuit design are added to limit electrical sparks within safe limits, preventing the ignition of flammable and explosive media, while ensuring normal signal acquisition and output remain unaffected.

5. Simply put, the entire process acts like a “differential pressure translator”: it converts the invisible pressure difference in the pipeline into a standard electrical signal that the control system can interpret. The digital display version can also “read out” real-time values simultaneously, while the explosion-proof version is equipped with additional “safety protection,” enabling it to operate normally even in hazardous environments.

III. Core Values

1. Common Industry Challenges: Low measurement accuracy and significant drift in differential pressure across multiple operating conditions, resulting in unreliable data
Q: In industrial settings, where medium temperatures fluctuate and electromagnetic interference, vibrations, and shocks are frequent, traditional differential pressure devices suffer from significant measurement drift and high error rates, failing to meet process control requirements. What can be done?
A: The QDX50A/QDX50A-2088 differential pressure transmitters utilize a highly stable piezoresistive sensing element and an intelligent temperature compensation circuit. They undergo high- and low-temperature aging calibration before leaving the factory, effectively suppressing temperature drift and zero-point drift; Additionally, they feature a fully metal-shielded structure and anti-interference circuitry, enabling them to withstand strong electromagnetic interference and vibration/shock in industrial environments. Long-term measurement error is ≤0.2% FS, ensuring stable and reliable differential pressure data and providing accurate basis for process control.

2. Customer Pain Points: Ordinary differential pressure transmitters cannot be used in hazardous environments (flammable and explosive), posing safety risks
Q: In flammable and explosive environments such as petroleum, chemical, and gas industries, ordinary differential pressure equipment lacks explosion-proof certification, posing a risk of spark ignition and making it non-compliant for use. What should be done?
A: The explosion-proof QDX50A/QDX50A-2088 differential pressure

transmitters feature flameproof and intrinsically safe designs that comply with industrial explosion-proof standards. Their circuitry and housing structure prevent the transmission of electrical sparks and high temperatures, thereby avoiding ignition of flammable and explosive media. At the same time, they retain full differential pressure measurement and signal output capabilities, enabling safe and compliant measurement in hazardous environments and eliminating on-site safety hazards.

3. Customer Pain Points: On-site readings are required, and integration with control systems is needed—traditional equipment cannot meet both needs.
Q: In some operating conditions, it is necessary to view real-time differential pressure values on-site while also transmitting data to PLC/DCS systems. Installing a display meter and a transmitter separately is costly and involves complex wiring. What is the solution?
A: The digital display (LED/LCD) QDX50A/QDX50A-2088 differential pressure transmitters integrate a local display module that shows real-time differential pressure readings (the LCD model features a backlight for use in both low-light and bright environments). They also output standard 4-20mA/RS485 signals to interface with control systems, achieving an integrated "local reading + remote control" solution, eliminating the need for additional display instruments and reducing wiring costs and installation complexity.

4. Customer Pain Points: Significant variations in installation space and output requirements across different operating conditions, coupled with limited equipment options and poor adaptability
Question: Installation space, signal transmission distance, and display requirements vary across different sites. A single model cannot cover all scenarios. What should be done?
A: The QDX50A/QDX50A-2088 differential pressure transmitters offer a comprehensive product series:
Non-display models: Direct signal output via Hirschmann connectors; compact design suitable for space-constrained applications where local readings are unnecessary;
Display models (LED/LCD): Feature local display, suitable for applications requiring on-site readings;
Explosion-proof models: Suitable for flammable and explosive hazardous environments;
They also support threaded mounting and optional heat sinks (for high-temperature media such as steam). Output signals support 4-20mA and RS485 Modbus, allowing flexible adaptation to various industries including water treatment, HVAC, and petrochemicals, achieving "one series, full-scenario coverage."

5. Customer Pain Points: Differential pressure measurement cannot directly monitor extended parameters such as liquid level or flow rate, requiring the installation of additional equipment, which is costly.
Q: For monitoring liquid levels in sealed containers and flow rates through orifice plates, additional level transmitters and flow meters must be installed, resulting in high costs and complex maintenance. What is the solution?
A: The QDX50A/QDX50A-2088 differential pressure transmitters can indirectly monitor multiple parameters via differential pressure signals:
Level in sealed vessels: By measuring the differential pressure between the vapor and liquid phases in the vessel, the liquid level height is calculated;
Flow rate through orifice plates: By measuring the differential pressure before and after the orifice plate, the fluid flow rate is calculated;
No need to install additional specialized instruments—a single device can monitor multiple parameters including differential pressure, level, and flow rate, reducing equipment procurement and maintenance costs while simplifying on-site instrumentation configuration.

6. Customer Pain Points: When measuring high-temperature media (such as steam), the sensor element of standard transmitters is prone to damage from high temperatures, resulting in a short service life.
Q: When measuring high-temperature media such as steam, the sensor element of standard differential pressure transmitters is prone to damage from thermal shock, leading to a short service life. What can be done?
A: Opt for the high-temperature models QDX50A/QDX50A-2088 differential pressure transmitters with heat sinks. The heat sink structure reduces the temperature transferred from the medium to the sensor core, preventing high-temperature damage to the core. These models are suitable for measuring high-temperature media such as steam, extending equipment service life and reducing replacement costs and downtime for maintenance.

IV. Key Product Parameters & Specifications
4.1 Basic Electrical Parameters
Measured Media: Gas, liquid, steam (media compatible with 316L stainless steel)
Measuring Range (Differential Pressure):
Low Differential Pressure: 0–0.6 kPa … 6 kPa
Standard Differential Pressure: 0–2 kPa … 40 kPa, 2.5 kPa … 250 kPa
High Differential Pressure: 0–30 kPa … 3000 kPa, 0.1–10 MPa
Turndown Ratio (Adjustable): 100:1
Accuracy Class: ±0.2% FS (typical); ±0.1% FS / ±0.075% FS (high-spec)
Repeatability: ≤±0.05% FS
Hysteresis: ≤±0.1% FS
Long-term Stability: ≤±0.1% FS/year
Temperature Drift (compensation range 0–70°C): ≤±0.2% FS/56°C
Response time: ≤50 ms
Output signal (optional):
Standard: 2-wire 4–20 mA DC
Digital: RS485 Modbus-RTU
Voltage (custom): 1–5 V / 0–5 V / 0–10 V
Load resistance (4–20 mA):
24 V DC power supply: ≤700 Ω
Minimum Load: 0 Ω
Insulation Resistance: ≥100 MΩ @ 500 V DC
Overcurrent Protection: Output limit 25 mA ±10%
Reverse Polarity Protection: No damage from reversed power supply polarity
Surge Suppression: TVS suppresses surge current 35 A/20 ms/1.5 kW

4.2 Isolation Performance Parameters
1) Differential Pressure Isolation (Sensor Section)
Isolation Diaphragm: 316L Stainless Steel
Filling Fluid: Silicone Oil (Standard); High-Temperature / Low-Temperature Filling Fluids Available
Single-Side Overpressure Limit:
<3.5 MPa: 2 times FS
≥3.5 MPa: 2.5 times FS
Burst Pressure: ≥4 times FS
2) Explosion-Proof Isolation (Explosion-Proof Models Only)
Explosion-proof rating:
Flameproof: Ex db IIC T6 Gb
Intrinsically safe: Ex ia IIC T6 Ga
Compatible safety barriers (intrinsically safe models): MTL5042, P+F KFD2-STC-EX1.2O, etc.
Explosion-proof housing material: Cast aluminum (corrosion-resistant coating) / 316L stainless steel (optional)
Isolation Method: Sealed explosion-proof chamber + Intrinsically safe circuit energy-limiting design

4.3, Power Supply & Power Consumption Parameters
Supply Voltage: DC 10–36 V; typical 24 V DC
Polarity: 2-wire (4–20 mA) non-polarity; RS485 requires polarity distinction
Full-Load Power Consumption (24 V DC):
Model without display: ≤1.2 W
LED Display Model: ≤1.5W
LCD Display Model: ≤1.3W (backlight off) / ≤1.6W (backlight on)
Explosion-Proof Model: ≤1.8W (including explosion-proof circuitry)
Power Distribution Output (optional, for field sensors): DC 24V / 50mA (short-circuit protection)

4.4 Environmental Adaptation Parameters
1) Temperature
Medium Temperature:
Standard Model: -40°C to +120°C
High-Temperature Model (with heat sink): -40°C to +180°C
Low-Temperature Model: -60°C to +80°C
Operating Ambient Temperature:
No Display / LED / Explosion-Proof Models: -40°C to +85°C
LCD Display Model: -20°C to +60°C (LCD Low-Temperature Limit)

Storage Temperature:
Models without display / LED / explosion-proof: -46°C to +110°C
Models with LCD display: -40°C to +70°C
2) Humidity and Protection
Relative Humidity: 0–100% RH (non-condensing)
Protection Rating:
Electrical connectors / housing: IP67
Explosion-proof models: IP66/IP67 (Explosion-proof certification)
3) Vibration and Shock
Vibration resistance: 10–2000 Hz, 0.1 mm amplitude, no damage
Shock resistance: 100 g, 11 ms, half-sine wave

4.5, Physical Parameters
1) Mounting Options
Process Connection: M20×1.5 external thread (standard); 1/4 NPT, G1/2, G1/4 optional
Mounting Orientation: Any (recommended: vertical or horizontal; avoid liquid accumulation)
Electrical Interface: HARTING connector (standard); M20×1.5 cable gland (explosion-proof version)
Explosion-proof version: Same dimensions, thickened housing;
With heat sink: Height +35 mm.
Dimension Notes (for direct use in drawings):
Center-to-center distance between high-pressure (H) and low-pressure (L) ports: 50 mm
Center-to-bottom distance of HART connector: 22 mm
Display window (LCD): 48 mm × 28 mm (Model 2088, centered on front)
2) Weight
Non-display model: Approx. 0.8 kg
LED display model: Approx. 0.85 kg
LCD display model: Approx. 0.95 kg
Explosion-proof model: Approx. 1.3 kg (cast aluminum) / Approx. 2.1 kg (316L stainless steel)
3) Housing Material and Protection Details
Housing: Aluminum alloy (hard anodized + anti-corrosion coating); 316L stainless steel available for explosion-proof models
Process connections / wetted parts: 316L stainless steel (standard)
Seals: Fluorocarbon rubber (FKM) (standard); Nitrile rubber (NBR) / Ethylene Propylene Diene Monomer (EPDM) available
Surface protection: Salt spray, mold, and damp heat resistant (industrial grade)



Waterproof Model



Standard Model



Digital Display Model



High-Temperature Model



2088 Model



2088 High-Temperature

V. Application-Specific Selection Guide
5.1 Key Selection Criteria
1. Model Selection
The QDX50A/QDX50A-2088 differential pressure transmitters come standard with a universal industrial 4–20 mA analog current signal; an RS485 Modbus-RTU digital communication signal is available as an optional feature. Analog signals are compatible with traditional PLCs, DCS systems, and legacy digital display instruments, offering stable transmission and strong resistance to interference; digital signals support networked communication, remote parameter debugging, and centralized monitoring of multiple devices, making them suitable for intelligent, unmanned sites.

2. Channel Configuration Selection
The standard configuration for the entire series is a single-channel architecture with one input and one output. High- and low-pressure ports on one side connect to the medium's differential pressure, while a single standard signal is transmitted and output, meeting the requirements of the vast majority of single-point differential pressure, level, and flow monitoring applications. There is no standard version with native 1-in-2-out configuration. If you need to measure a single signal while outputting two different signals simultaneously, this can be achieved through an external signal isolation distributor.

3. Power Supply Selection
The unit is standardly configured for common industrial 24V DC power supply and is compatible with a wide input voltage range of 10–36V DC. The entire series features a two-wire power supply architecture, where power and signal share the same lines, resulting in simplified wiring and reduced installation costs. There is no version with direct 220V AC power supply; if no DC power source is available on-site, a switching power supply must be used for conversion.

4. Selection Based on Explosion-Proof Requirements
For standard indoor or outdoor ventilated environments without explosion-proof requirements, choose from models without a display, LED display models, or standard LCD display models. In flammable and explosive hazardous areas such as petroleum, chemical, gas, and oil and gas storage and transportation facilities, explosion-proof models must be exclusively selected; the use of non-explosion-proof models as substitutes is strictly prohibited. Explosion-proof models can be paired with corresponding safety barriers to meet on-site explosion-proof compliance standards.

5. Selection Based on Installation Environment
For confined spaces, cabinet-mounted installations, or areas with dense piping where on-site readings are not required, prioritize compact models without displays; for outdoor environments with direct strong sunlight or open-air pipeline installations requiring on-site readings, prioritize models with high-brightness LED displays; for indoor pump rooms, basements, or dimly lit environments, models with backlit LCD displays are suitable; For high-humidity, dusty, or corrosive outdoor conditions, prioritize the IP67 high-protection housing version; for high-temperature steam applications, use the heat sink model.

5.2 Industry Application Recommendations
1. For standard production workshops, water treatment sections, and general fluid differential pressure and level monitoring in the chemical industry, select the non-display or LED display models; For chemical industry flammable and explosive reaction workshops, tank farms, and hazardous chemical pipeline conditions, uniformly select the QDX50A-2088 explosion-proof transmitter to ensure production safety and compliance.

2. Power Industry: For differential pressure monitoring in power plant circulating water, HVAC piping, and dust removal pipelines—where operating conditions are stable and there are no explosion-proof requirements—prioritize cost-effective models without a display or with an LED display; For hazardous chemical storage areas associated with power plants, directly select the explosion-proof version.

3. Metallurgy Industry: For differential pressure monitoring of cooling water in metallurgical pipelines, flue gas pipelines, and auxiliary liquid levels in furnaces—where on-site conditions involve high vibration and

heavy dust—the LED display model with a robust structure and strong anti-interference capabilities is recommended to facilitate on-site reading during inspections; for applications involving coal gas or flammable media, select the explosion-proof version.

4. For cleanroom piping, purified water systems, and differential pressure/level monitoring of sealed vessels in pharmaceutical manufacturing facilities, where high standards for equipment appearance and display clarity are required, the LCD backlit display model is the preferred choice. The standard version is suitable for general cleanroom environments, while the explosion-proof version is recommended for areas where hazardous chemical reagents are stored or reactions take place.

5. For smart manufacturing automated production lines, fluid measurement and control integrated equipment, and unmanned monitoring stations in intelligent pipeline networks, the RS485 digital communication version is recommended. Pairing it with an LCD display model facilitates equipment commissioning and parameter viewing; for cabinet-mounted integrated installations, compact models without displays are preferred to save installation space.

5.3 Common Selection Pitfalls
1. Neglecting isolation grade selection: In environments with corrosive media or strong electromagnetic interference, arbitrarily selecting standard base models without matching 316L wetted parts and circuit anti-interference isolation design can lead to sensor corrosion, measurement data drift, and unstable signal fluctuations during long-term use.

2. Incorrect selection of signal range: Failing to select a model based on the actual maximum and minimum pressure differentials at the site. Selecting a range that is too wide reduces measurement accuracy, while selecting a range that is too narrow causes overpressure and overload, leading to transmitter damage and measurement failure.
Neglecting load matching: When selecting a 4–20 mA signal output, failing to calculate the total load resistance of the downstream PLC and instrumentation circuits, resulting in exceeding

3. the transmitter's allowable load range, resulting in signal drop, transmission anomalies, and inaccurate data.
Selecting general-purpose models for explosion-proof environments: In flammable and explosive hazardous areas, opting for standard non-explosion-proof models to cut costs fails to meet safety regulation acceptance standards, posing a major safety hazard of electric sparks igniting the medium, and resulting in failure to pass subsequent safety inspections.

5.4 Customization Recommendations
1. Custom signal options: In addition to standard 4-20mA and RS485, voltage signal outputs such as 1-5V, 0-5V, and 0-10V can be customized to meet the specific signal interface requirements of legacy measurement and control equipment.

2. Customization for Non-Standard Operating Conditions: For media with extremely high or low temperatures, highly corrosive fluids, or high-salt-fog coastal environments, we can customize special sealing materials, dedicated filling fluids, reinforced corrosion-resistant housings, and extended heat sink structures to accommodate non-standard extreme operating conditions.

3. Multi-channel integration customization: When standard single-channel models cannot meet multi-point simultaneous measurement requirements, we provide integrated multi-channel differential pressure measurement solutions. Multiple sensor units are consolidated into a single unit with unified power supply and communication output, saving on-site installation space and equipment procurement costs.

4. Structural and Functional Customization: We offer customization options including non-standard threaded interfaces, special mounting dimensions, on-site specific range calibration, factory-preset zero and span settings, as well as versions with additional features such as alarm contact outputs and local audible and visual alerts.

VI. Installation and Commissioning Guidelines
Applicable Models: QDX50A / QDX50A-2088 HARTman Integrated Differential Pressure Transmitter
Scope: Models without display, LED display models, LCD display models, and explosion-proof models. General Installation and Commissioning Standards
6.1. Pre-installation Preparation
1. Verification of Accessories
Upon delivery, verify each item of the main unit and accompanying accessories. Confirm that the main unit has no dents or scratches, the housing has no cracks, and the threaded connections are intact. Check that the standard-equipped HART connectors, sealing gaskets, mounting hardware, user manual, and factory certificate of conformity are complete. For explosion-proof models, additionally verify that the explosion-proof nameplate, explosion-proof parameter labels, and 配套 explosion-proof sealing connectors are intact and undamaged.

2. Environmental Inspection
The installation location must be kept away from strong sources of electromagnetic interference, such as high-power variable frequency drives, contactors, and high-voltage cables. Avoid locations subject to prolonged high temperatures, direct sunlight, direct water spray, or severe vibration and shock. In corrosive environments, verify that the ambient medium is compatible with the 316L wetted parts material. In explosion-proof zones, confirm the on-site explosion-proof zone classification and ensure the equipment model matches the zone classification; it is strictly prohibited to install non-explosion-proof models in explosion-proof zones.

3. Tool List
Prepare Allen wrenches, adjustable wrenches, Phillips screwdrivers, a multimeter, electrical tape, cable ties, shielded signal cables, and sealing tape. For commissioning, have a standard 24V DC power supply, a signal calibrator, and a pressure gauge on hand.

4. Safety Precautions
All on-site installation work must be performed with the power disconnected; live wiring is strictly prohibited. For installations in explosion-proof zones, strictly adhere to explosion-proof construction standards; do not modify the housing or alter the wiring configuration without authorization. Ensure proper protective measures are in place for work at heights or on pipelines. Maintain ventilation when working in damp or enclosed spaces, and avoid unauthorized live operations.

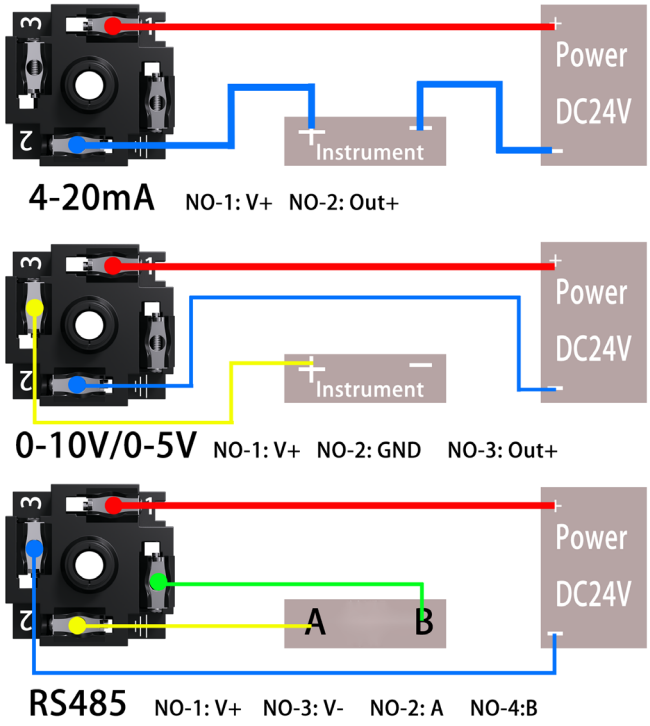
6.2 Standard Installation Steps
1. Mounting Methods
The device supports two installation methods: direct threaded mounting on pipes and wall-mounted installation using brackets. During installation, ensure that the high-pressure (H) and low-pressure (L) ports are installed horizontally or vertically in the correct orientation to prevent long-term accumulation of liquid or gas from affecting measurement accuracy. Wrap an appropriate amount of PTFE tape around the threaded connections and tighten them moderately; do not use excessive force to avoid damaging the threads or the internal sensor core. After installation, ensure the unit is secure with no looseness or wobbling.

2. Wiring Specifications
The unit uses HARTING aviation connectors for wiring. Strictly distinguish between power supply positive and negative terminals and signal output polarity; do not reverse or misconnect them.
For the 24V DC power supply, connect the positive terminal to the power source + and the negative terminal to the power source -; for the 4-20mA signal loop, match the positive and negative terminals to the corresponding signal terminals on the PLC or instrument; for the RS485 communication model, distinguish between the A and B signal lines; reversing connections or causing a short circuit is strictly prohibited; all terminal connections must be securely crimped, with no loose connections or exposed wires.

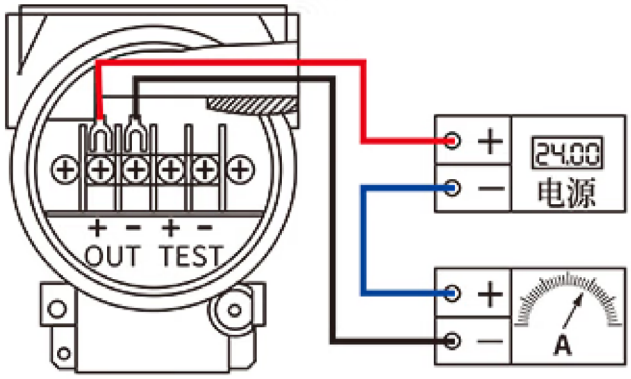
3. Grounding Requirements
The transmitter housing and the shielding layer of shielded cables must be grounded at a single point, connected to a dedicated protective ground at the site; multiple grounding points that could cause loop current interference are prohibited; the housing of explosion-proof models must

be reliably grounded with a grounding resistance of less than 4 Ω to prevent static electricity buildup and associated safety hazards; in high-interference environments, the shielding layer must be fully wrapped along the entire length and must not be arbitrarily cut or exposed.

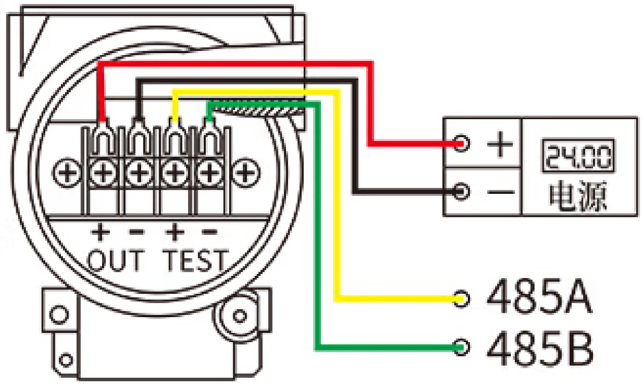
6.3, Wiring Diagram



2-Wire 4-20mA



4-Wire RS485



1. Wiring Specifications for Explosion-Proof Models
Explosion-proof models use explosion-proof sealed cable glands. After the cable is inserted, the sealing compound must be compressed to ensure the enclosure's explosion-proof integrity. The internal wiring polarity remains the same as in standard models; it is strictly prohibited to add additional terminal blocks or parallel circuits inside the explosion-proof enclosure. Intrinsically safe models must be connected to a compatible safety barrier. The front end of the safety barrier connects to the control room, and the rear end connects to the field transmitter. It is strictly prohibited to mix intrinsically safe circuits with non-intrinsically safe power sources.

2. Shield Grounding Specifications
The shield should be grounded at only one end (the control room end); the transmitter end at the field should remain floating (ungrounded). Grounding at both ends is prohibited to prevent ground loops from causing signal drift and value fluctuations. When routing cables, keep the shielded cable away from 380V power cables, maintaining a separation distance of at least 20 cm.

3. Correct vs. Incorrect Wiring Practices
Correct Practices: Correct polarity, secure crimped connections, single-ended shield grounding, separate routing of high- and low-voltage cables, and fully sealed explosion-proof enclosures.
Incorrect Practices: Reversed polarity of power and signal lines, loose or bare wire connections, shield grounded at both ends, high- and low-voltage cables routed in the same conduit, unauthorized opening of explosion-proof enclosures for rewiring, and direct connection without a safety barrier.

6.4 Power-On Commissioning Procedure
1. No-Load Test
After completing the installation and wiring, do not apply medium pressure yet. Connect the DC 24V power supply while the unit is in a no-load state. Observe the unit's power-on status: for models without a display, ensure it remains in a stable standby mode with no abnormal heating; for LED and LCD models, ensure the screen lights up normally with no flickering or black screen; for explosion-proof models, ensure there are no unusual noises or abnormal heating upon power-up, indicating normal operation.

2. Signal Calibration
Use a multimeter to measure the loop current; under no-load conditions, the output should be close to the 4mA standard zero point. Connect a standard pressure source and apply pressure in stages to verify the 4-20mA linear output at four points corresponding to 25%, 50%, 75%, and 100% of the full scale. For RS485 models, connect a communication module and verify that the address and baud rate are correct, and that data transmission is stable with no packet loss.

3. Indicator Status Assessment
Non-display models: Normal operation is indicated by no abnormal heating and a stable signal output;
LED display models: A steady, constant reading is normal; erratic or flashing readings indicate wiring or interference issues;
LCD display models: Normal operation is indicated by a lit backlight and stable readings; a black screen or distorted display requires checking the supply voltage and wiring;
Explosion-proof models: No external fault indicator; normal operation is determined by stable signal output and no abnormal temperature rise in the housing.

4. Calibration Methods
If zero drift occurs on-site, use the built-in calibration points to reset the zero; adjust range deviation using the linear adjustment method described in the manual; do not force calibration beyond the rated range; After calibration, repeat the pressure test three times to ensure repeatability and linearity meet standards. Save the parameters and lock the settings to prevent accidental changes.

6.5 Installation Precautions
1. Overvoltage supply is strictly prohibited. The device's rated supply voltage is DC 10–36 V. Do not connect to AC 220 V or DC voltages exceeding 36 V to avoid burning out the circuitry and sensor core.

2. Avoid routing cables in the same cable tray or conduit as variable frequency drives, high-power motors, or high-voltage cables to prevent signal fluctuations and measurement inaccuracies caused by strong electromagnetic interference.

3. In damp, rainy, or outdoor environments, ensure all connectors are properly sealed and protected against water and rain; do not use

connectors with exposed terminals or cables that have been submerged in water to prevent water ingress, short circuits, and equipment damage.

4. Never operate the device beyond its rated pressure. The actual operating pressure differential must not exceed the transmitter's rated range or the single-side overpressure limit to prevent diaphragm deformation or permanent damage.

5. In explosion-proof areas, it is strictly prohibited to disassemble the device housing, alter internal wiring, or replace parts with non-original components without authorization. Any such modifications will invalidate the explosion-proof certification and pose a serious safety hazard.

VII. Recommendations for Daily Use & Maintenance

Applicable Models: QDX50A/QDX50A-2088 HARTing Integrated Differential Pressure Transmitter

Covers: General maintenance guidelines for models without display, LED display models, LCD display models, and explosion-proof models

7.1 Key Points for Daily Inspections

1. External Inspection of Equipment

Conduct daily inspections to check the transmitter housing for dents, deformation, corrosion, or rust; ensure that HART electrical connectors and cable seals are secure, free of water ingress or condensation, and show no signs of aging or cracking; verify that process pressure ports are free of leaks, liquid accumulation, or scaling. For explosion-proof models, pay special attention to ensuring the explosion-proof rating plate is intact and that sealed connectors are secure and undamaged.

2. Signal Stability Monitoring

Monitor the 4–20 mA current signal or RS485 communication values in real-time via the central control system. Observe whether the differential pressure readings are stable, free of sudden fluctuations, and show no unexplained drift. Compare the measured values with the actual on-site process differential pressure to verify if they match the process conditions. If readings fluctuate erratically, exhibit a fixed offset, or fail to upload data, immediately investigate wiring issues and potential sources of interference.

3. Operating Temperature and Humidity Monitoring

Record the ambient temperature and air humidity around the equipment during routine inspections to ensure the operating temperature remains within the product's rated range at all times; avoid prolonged exposure to high temperatures, low-temperature condensation, or high-humidity, stuffy environments; for models with LCD displays, pay special attention to low-temperature environments to prevent screen freezing or display abnormalities; strictly control ambient temperature and humidity in explosion-proof zones to prevent condensation from entering the explosion-proof enclosure.

4. Installation Condition Inspection

Check that the equipment mounting brackets are secure with no loosening or noticeable vibration or swaying; ensure pressure-transmitting lines are free of blockages, air locks, or liquid blockages; verify that no new high-power variable-frequency equipment has been installed on-site and that high-voltage cables are not laid in close proximity, to prevent new sources of electromagnetic interference from affecting measurement accuracy.

7.2. Regular Maintenance Plan

1. Overall Cleaning Schedule

In standard industrial environments, perform exterior cleaning every 3 months; in high-dust environments such as metallurgy and construction, clean monthly; in corrosive chemical or high-salt-fog coastal environments, perform anti-corrosion and dust removal maintenance every 2 months. Use a dry, soft cloth to wipe dust and oil residue from the housing surface; strictly avoid direct water spraying on electrical connectors and display windows.

2. Wiring Tightness Inspection

Conduct a comprehensive wiring inspection every six months to tighten HART connectors, cable terminals, and shielding ground points; check power and signal cables for aging, fraying, or loose connections; for explosion-proof models, verify the tightness of explosion-proof sealing connectors to ensure the integrity of the chamber seal; ensure there is no loosening, air leakage, or seal failure.

3. Maintenance and Clearing of Pressure-Taking Lines

Every six months, drain and vent the high- and low-pressure pressure-taking ports and lines to prevent blockages caused by accumulated impurities, which can lead to measurement lag and inaccurate readings. In cold winter conditions, inspect the lines in advance to prevent freezing and avoid damage to the sensor diaphragm caused by frozen media.

4. Recommendations for Accuracy Retesting and Calibration

Under normal operating conditions, perform accuracy retesting and zero-point calibration once a year; For applications with high process control requirements or metrological applications, perform calibration once every six months; use a standard pressure source and signal calibrator to re-measure the zero point and 25%, 50%, 75%, and 100% of the full scale range point by point. If deviations are found, promptly perform fine adjustments to the zero point and range. Lock the parameters after calibration to prevent accidental modifications.

7.3 Long-Term Maintenance Tips

1. Dust and Moisture Protection

In long-term outdoor, pump room, or damp basement environments, ensure HART connectors are installed facing downward to prevent rainwater from flowing back along the cables. Store idle spare equipment in a dry, well-ventilated room with proper dust-proof packaging. For on-site equipment, install simple protective rain covers to prevent exposure to sunlight, rain, and dust accumulation. Seal gaps around electrical interfaces with sealant to prevent moisture and dust from entering internal circuits.

2. Interference Prevention and Maintenance Optimization

Use shielded cables throughout the signal path and ensure the shielding layer is reliably grounded at one end. Route power and signal cables through separate cable trays or conduits, keeping them away from interference sources such as variable frequency drives, contactors, and high-voltage motors. Replace aged shielded cables promptly, and regularly check ground resistance to ensure proper grounding and prevent loop current interference. When adding new electrical equipment on-site, implement wiring isolation in advance to prevent interference with signal transmission.

3. Protection in Extreme Environments

In high-temperature steam environments, consistently use models equipped with heat sinks; regularly inspect the heat sinks to ensure they are free of dust buildup and blockages, maintaining optimal heat dissipation; In low-temperature and severe cold environments, install heat tracing and insulation on pressure-measuring lines in advance to prevent freezing and blockage of the medium; In highly corrosive chemical environments, regularly inspect the corrosion-resistant condition of wetted parts and, if necessary, replace seals or switch to corrosion-resistant models; In explosion-hazardous areas, strictly prohibit unauthorized disassembly, circuit modification, or replacement of non-original parts. Maintain the integrity and compliance of the explosion-proof structure throughout the entire process to extend equipment service life and ensure safe and stable on-site operation.

VIII. Troubleshooting & Emergency Procedures

Applicable Models: QDX50A/QDX50A-2088 HARTman Integrated Differential Pressure Transmitter

Coverage: Universal troubleshooting guidelines for the entire series, including models without display, LED display models, LCD display models, and explosion-proof models

8.1 List of Common Faults

Transmitter has no output signal; no 4-20mA value at the central control unit; no communication data via RS485

Severe measurement signal drift; values slowly shift on their own; zero point drifts spontaneously

Display and indicator light abnormalities: LED does not light up; LCD screen is black / distorted / flickering; values freeze

Process differential pressure is normal, but the transmitter triggers abnormal alarms or reports out-of-range errors

Signal interference and distortion: values fluctuate frequently, fluctuate between high and low, or exhibit irregular fluctuations

Inaccurate measurement: actual process differential pressure is stable, but the transmitter reading is too high or too low, or exhibits significant linear deviation

Water ingress in the explosion-proof model's seal or condensation in the chamber, resulting in unstable signals or intermittent disconnections

2. Analysis of Failure Causes
1. Wiring Errors
Reversed power supply polarity; signal line short circuit; incorrect connection of HART connector terminals; reversed RS485 A/B lines; shielding wire grounded at both ends, causing loop current interference; unauthorized modification of wiring in explosion-proof models; intrinsic safety circuits not equipped with safety barriers, resulting in circuit abnormalities.

2. Power Supply Abnormalities
Supply voltage is below 10 V DC or above 36 V DC; high ripple in the switching power supply causing unstable power; circuit load resistance exceeds specifications, surpassing the transmitter's load capacity; loose connections or excessive voltage drop leading to insufficient power supply.
Signal Overload and Range Mismatch Issues
Actual process pressure differential exceeds the transmitter's rated measurement range; Single-sided overpressure surges causing slight deformation of the sensing diaphragm; selection of an excessively wide measurement range resulting in poor resolution at the lower end and reduced accuracy.

3. Environmental Interference Factors
Cabling routed in the same cable tray as variable frequency drives, high-power motors, or high-voltage cables; strong electromagnetic radiation at the site and poor grounding; moisture condensation or dust entering internal connectors causing minor leakage; excessive vibration leading to unstable internal circuit contacts.

4. Damage to the Device Itself and Operating Conditions
Blocked pressure tubing or trapped air/liquid causing pressure transmission lag; the process medium corroding seals and diaphragms; prolonged high temperatures without heat dissipation leading to circuit aging; failure of the explosion-proof chamber seal allowing water ingress, resulting in damage to internal components.

8.3 Step-by-Step Troubleshooting
1. No Output Signal, No Data at Central Control
Troubleshooting Steps:
First, disconnect power and inspect the HART connector terminals to verify that the power supply polarity and signal output terminals are correctly matched; use a multimeter to measure the on-site supply voltage and confirm it is within the normal range of 10–36 V DC; check the downstream PLC and instrument loops for open circuits or loose terminals; inspect the pressure input ports for severe blockages that may be causing a lack of pressure input.
Remedial Actions:
Recorrect the wiring polarity and tighten the connectors to the terminals; replace with a stable 24V DC power supply; clear any debris blocking the pressure tubing; resolve circuit open-circuit issues and address load overload problems.
Emergency Workaround:
Temporarily replace the transmitter on-site with a spare unit of the same model to restore process operation; remove the faulty unit for inspection and repair.

2. Signal Drift, Spontaneous Zero-Point Shift
Troubleshooting Steps:
Confirm whether there have been sudden changes in ambient temperature and humidity, or if the equipment is exposed to direct high temperatures; check whether the shielded cable is grounded at both ends and whether the grounding is incorrect; observe whether newly added variable-frequency equipment is causing interference; check if the zero point drifts spontaneously under no-load conditions.
Remedial Actions:
Ground the shielded cable at a single point in the control room; organize the wiring to separate high- and low-voltage circuits; perform zero-point calibration; improve equipment ventilation and provide shade to reduce the impact of temperature drift.
Emergency Workaround:

3. Indicator Lights / Display Malfunctions (LEDs not lit, LCD screen is black or distorted)
Troubleshooting Steps:
Check for power outages or low voltage; inspect HARTING connectors for water ingress, oxidation, or poor contact; for LCD models, verify that the operating temperature does not exceed the specified range in low-temperature environments; for explosion-proof models, check the chamber seal for water ingress or condensation.
Remedial Actions:
Repair the power supply circuit or replace the voltage regulator; clean the oxidized layer from the connectors and reinsert them securely; provide thermal insulation for LCD devices in low-temperature environments; for units with seal failure, replace the seals and reapply waterproof sealing.
Emergency Workaround:
Temporarily switch to a non-display version of the same transmitter model, retaining only the remote transmission signal and not relying on local display, to ensure uninterrupted process monitoring.

4. Out-of-range alarms and differential pressure errors
Troubleshooting steps:
Verify whether the actual differential pressure under operating conditions has truly exceeded the measurement range; check if the high/low pressure ports are connected in reverse (H/L); check if the pressure tubing is blocked, causing false high or low pressure readings.
Remedial measures:
Re-match the transmitter with an appropriate measurement range; swap the wiring of the high and low pressure ports; clear the pressure tubing by venting and flushing to eliminate false differential pressure.
Emergency Workaround:
Temporarily adjust the central control alarm thresholds to prevent false shutdowns; replace with a transmitter with the appropriate measurement range at a later date.

5. Signal Interference, Distortion, and Frequent Value Fluctuations
Troubleshooting Steps:
Check whether signal cables are unshielded or routed in the same conduit as high-voltage power lines; verify if grounding is improper or involves multiple grounding points; check for nearby variable frequency drives or high-frequency equipment.
Remedial Measures:
Replace signal cables with shielded ones; route high- and low-voltage cables separately; implement single-point grounding and rectify grounding loops; add shielding and filtering to variable frequency drives to reduce on-site electromagnetic interference.
Emergency Workaround:
Install a signal filtering module on the central control side to temporarily smooth out fluctuating data without affecting process control.

8.4, After-Sales Repair Guidelines
1. Criteria for Determining Faults and Reporting Repairs
In the following situations, it is recommended to report the issue directly to after-sales service rather than attempting on-site disassembly and repair:
No response whatsoever when powered on; no output even after replacing the power supply or rewiring;
Physical damage to the transmitter, oil leakage from interfaces, or obvious deformation of the diaphragm;
Water ingress into the housing of explosion-proof models, or failure of the explosion-proof structure following unauthorized disassembly;
Persistent severe drift or significant loss of linearity despite repeated calibration;
Internal circuitry burnout; abnormally hot housing.

2. Repair Process
Record the complete model number, version (no display / LED / LCD / explosion-proof model), and serial number;
Record on-site operating conditions: medium type, operating temperature, measurement range, and installation environment;
Record the fault symptoms, time of occurrence, and troubleshooting steps already taken;
Contact the manufacturer's after-sales technical support and provide the information for remote troubleshooting guidance;
If the issue cannot be resolved remotely, return the unit for repair or

replacement as instructed.

3. Warranty Coverage

The entire unit is covered by standard industrial product warranty service. Under normal operating conditions—excluding damage caused by human error, unauthorized disassembly, or use beyond rated pressure or load limits—repairs and replacement of parts are provided free of charge during the warranty period. However, damage resulting from human disassembly, overpressure, unauthorized circuit modifications, or unauthorized opening and modification of explosion-proof models is not covered by the free warranty; paid repair services are available for such cases.

4. Usage Notes

For explosion-proof models, it is strictly prohibited to open the housing, alter internal wiring, or replace non-original sealed components on-site. Doing so will not only void the explosion-proof certification but also directly invalidate the warranty, and poses significant on-site safety hazards.