Sanitary Flat-Diaphragm Pressure Transmitter

I. Product Definition

The QDW50A Sanitary Flat-Diaphragm Pressure Transmitter is a high-temperature pressure measurement device developed by Anhui Qidian Automation Technology Co., Ltd. specifically for sanitary fluid measurement applications in the food and beverage, pharmaceutical, biotechnology, and fine chemicals industries.

Featuring a fully stainless steel flat-diaphragm structure, quick-connect flange connections, and high-temperature-adapted heat sinks as its core design elements, it can directly measure the pressure of viscous, crystallization-prone, and suspended-particle-containing media. It outputs standard industrial signals to enable precise pressure monitoring and control under sanitary conditions, while meeting hygiene standards such as GMP and 3-A.

Its core functions cover the following aspects:

1. Hygienic-grade precision pressure measurement: The flat-diaphragm design eliminates blind spots and residual chambers, allowing direct contact with the fluid to achieve precise pressure and level data acquisition under hygienic conditions, making it suitable for clean fluid environments in the food and pharmaceutical industries.

2. High-Temperature Media Compatibility: Features an integrated heat sink design to accommodate high-temperature fluid media, preventing direct thermal shock to the sensor core and ensuring long-term stable operation. It meets pressure measurement requirements for processes such as pasteurization, high-temperature sterilization, and hot filling.

3. Easy-to-clean quick-connect design: Utilizes standard sanitary quick-connect clamp interfaces for rapid installation and removal without additional tools. Supports online CIP/SIP cleaning, significantly reducing cleaning and maintenance costs, and is suitable for sanitary production lines requiring frequent cleaning.

4. Standard Industrial Signal Output: Provides a 4–20 mA standard current signal output, enabling direct integration with industrial control systems such as PLCs, DCSs, and digital displays to achieve real-time transmission of pressure data, remote monitoring, and automatic control.

5. Interference Resistance and Long-Term Stable Operation: Equipped with a high-precision diffused silicon pressure sensor core and a fully sealed stainless steel structure, it offers strong resistance to electromagnetic interference, vibration, and corrosion. It ensures long-term stable operation in complex industrial environments, minimizing the risk of failure-related downtime.

6. Wide Range and Customization: Supports customization of various pressure ranges, output signals, and flange specifications. It can be adapted to sanitary fluid piping with different pipe diameters and process pressure requirements, meeting diverse on-site application scenarios.

II. Working Principle

The working process of the QDW50A Sanitary Flat Diaphragm Pressure Transmitter can be broadly divided into four core steps:

1. Pressure Sensing (Flat Diaphragm): The pressure of the fluid medium acts directly on the sanitary-grade flat diaphragm at the front end of the transmitter. The diaphragm has no recesses or dead corners, preventing medium residue, and the pressure is uniformly transmitted to the internal diffused silicon pressure sensing element.

2. Signal Conversion (Physical Deformation → Electrical Signal): The diffused silicon resistors inside the pressure cell undergo minute deformation under pressure, causing a change in resistance. This converts the physical quantity of pressure into a faint electrical signal.

3. Signal Conditioning (Amplification and Compensation): The faint electrical signal is transmitted to the transmitter's internal signal processing circuitry. Through amplification, temperature compensation, and nonlinearity correction, temperature drift and errors are eliminated, ensuring signal stability and accuracy.

4. Standard Output (Industrial Signal Transmission): The processed signal is converted into a standard 4–20 mA industrial current signal and transmitted via electrical interfaces to control systems such as PLCs and digital displays, enabling real-time display, monitoring, and control of pressure data.

5. The function of the heat sink is to rapidly dissipate heat through air convection in high-temperature media applications, preventing direct heat transfer to the sensor element and circuitry, thereby ensuring measurement accuracy and service life in high-temperature environments.

III. Core Value and Solutions to Pain Points

3.1 Core Value

The QDW50A Sanitary Flat-Diaphragm Pressure Transmitter is specifically designed for sanitary fluid measurement applications. It addresses customer pain points from three dimensions—structure, performance, and maintenance—delivering the following core value:

1. Eliminates media residue and meets hygiene compliance requirements: The flat-diaphragm design with no dead corners, combined with quick-connect fittings, ensures no residual media cavities. It supports in-line cleaning, preventing bacterial growth and cross-contamination, and complies with hygiene standards in the food and pharmaceutical industries, thereby reducing compliance risks.

Suitable for high-temperature applications, preventing equipment damage and data distortion: The integrated heat sink design accommodates high-temperature media, protecting the sensor element from thermal shock while ensuring measurement accuracy in high-temperature environments, thereby preventing equipment failures and data drift caused by high temperatures.

2. Suitable for viscous/contaminated media, solving clogging issues: The flat-diaphragm design, free of holes and cavities, allows direct contact with viscous, crystallizing, or suspended-particle media. It prevents clogging of pressure-transmitting holes, reduces maintenance frequency, and ensures continuous, stable production line operation.

Quick Installation, Removal, and Cleaning to Reduce Maintenance Costs: Standard sanitary quick-connect flange interfaces allow for rapid installation and removal without special tools. Supports CIP/SIP in-line cleaning, significantly shortening maintenance time and reducing labor costs and downtime losses.

3. Precise and stable output ensures process control accuracy: A high-precision diffused silicon core combined with temperature compensation technology delivers high measurement accuracy and minimal drift. It outputs standard industrial signals, enabling precise monitoring and control of process pressure to prevent product quality issues caused by abnormal pressure.

4. Fully Stainless Steel Corrosion-Resistant Construction Extends Equipment Lifespan: Parts in contact with the medium are made of food-grade/medical-grade stainless steel, offering corrosion and wear resistance. Suitable for weak acid and weak alkali fluid environments, this design reduces equipment replacement frequency and lowers long-term operating costs.

3.2 Key Pain Points and Solutions

Customer Pain Point: In fluid pipelines of food and pharmaceutical production lines, the media are viscous and prone to crystallization. The pressure ports of standard pressure transmitters are easily clogged, leading to measurement failure and frequent shutdowns for cleaning, which impacts production efficiency.

Solution: The QDW50A features a sanitary flat-diaphragm, portless design with no pressure chambers or dead zones. The medium acts directly on the diaphragm, completely eliminating clogging issues. It is suitable for viscous, crystallizing, and suspended-particle-containing media, ensuring continuous production.

Customer Pain Point: In high-temperature processes (such as pasteurization and hot filling), high-temperature media directly impact the transmitter's core, which can easily cause core damage, measurement drift, and a significant reduction in equipment lifespan.

Solution: The transmitter is equipped with an integrated heat sink that rapidly dissipates heat through air convection, reducing the temperature transmitted to the core and protecting critical components. Additionally, a built-in temperature compensation circuit ensures measurement accuracy and stability in high-temperature environments.

Customer Pain Point: The sanitary industry imposes extremely high equipment cleanliness requirements. Conventional threaded-connection transmitters are difficult to install and remove, and incomplete cleaning can lead to media residue and bacterial growth, failing to meet GMP standards.
Solution: Utilizes a standard sanitary quick-connect clamp interface that allows for rapid installation and removal without specialized tools. It supports online CIP/SIP cleaning, eliminates dead zones for media residue, meets hygiene compliance requirements, and reduces compliance risks.

Customer Pain Point: The operating environment of equipment on production lines is complex. Factors such as electromagnetic interference, vibration, and temperature fluctuations can easily cause unstable pressure signals, affecting process control accuracy and leading to fluctuations in product quality.
Solution: Utilizing a high-precision diffused silicon pressure sensor core, combined with an all-stainless-steel sealing structure and signal conditioning circuitry, the device offers strong resistance to electromagnetic interference and vibration, as well as temperature compensation capabilities. It outputs a stable 4–20 mA standard signal, ensuring process control accuracy.

Customer Pain Point: The materials in contact with the medium in standard pressure transmitters are not corrosion-resistant. In weakly acidic or alkaline fluids common in the food and pharmaceutical industries, they are prone to rusting and contaminating the medium, compromising product safety.
Solution: The parts in contact with the medium are made of food-grade/medical-grade 316L stainless steel, which is corrosion-resistant, leach-free, and does not contaminate the medium. This design is suitable for fluid environments in the food, pharmaceutical, and fine chemical industries, ensuring product safety.

Customer Pain Point: On-site piping diameters and process pressure requirements vary widely. Standard transmitters often have incompatible interfaces or unsuitable measurement ranges, requiring costly and time-consuming customization and retrofitting.
Solution: Supports customization of various flange specifications, pressure ranges, and output signals. It can be adapted to sanitary fluid piping with different diameters and process pressure requirements without the need for additional modifications, enabling rapid on-site integration.

IV. Key Product Parameters & Specifications

4.1 Basic Electrical Parameters

Product Model QDW50A Sanitary Flat-Diaphragm Pressure Transmitter
Measured Media Gases and liquids compatible with 316L stainless steel (including viscous, crystallizing, and media containing suspended solids)
Pressure Range Standard Range: 0–0.1 MPa (Customizable: –0.1–0 MPa, 0–1 MPa, 0–2.5 MPa, etc.)
Measurement Accuracy 0.25% FS (typical), with 0.1% FS high-precision customization available
Non-linearity ≤±0.1% FS
Hysteresis ≤±0.1% FS
Repeatability ≤±0.05% FS
Long-term Stability ≤±0.1% FS / year
Output Signal Standard: 4–20 mA (2-wire); Optional: 0–5 V, 0–10 V, RS485 (Modbus-RTU)
Load Capacity 4–20 mA: 0–500 Ω; Voltage Output: ≥10 kΩ
Electrical Connection Hirschmann connector (standard M12×1), protected terminal block

4.2 Isolation Performance Parameters

Isolation Method Media pressure and circuitry isolated via stainless steel diaphragm + silicone oil (standard); fully solid-state isolation available upon request
Insulation Resistance ≥100 MΩ (DC 500 V, between housing and circuitry)
Dielectric Strength AC 500 V/1 min (between housing and circuitry, no breakdown or arcing)
Electromagnetic Interference Resistance Complies with GB/T 17626 standard, resistant to electromagnetic radiation interference in industrial environments
Signal Isolation (Optional) Supports customization for isolation between output signals and power supply; isolation voltage DC 1500V, meeting requirements for high-interference environments

4.3 Power Supply & Power Consumption Parameters

Supply Voltage DC 12–36 V (typical value: DC 24 V), reverse polarity protection
Full-Load Power Consumption ≤1.2 W (DC 24 V supply, 4–20 mA output)
Power Distribution Output No additional power distribution output; two-wire loop power supply; no separate power module required
Ripple Suppression ≥40 dB, capable of withstanding ripple interference in the power supply circuit
Surge Protection Built-in TVS (Transient Voltage Suppressor) diodes, capable of withstanding ±2 kV surge impacts

4.4 Environmental Adaptation Parameters

Ambient Temperature -20°C to +150°C (standard heat dissipation type); high-temperature custom versions available (up to +200°C)
Operating Ambient Temperature -20°C to +85°C
Storage Temperature -40°C to +125°C
Relative Humidity 0–95% RH (non-condensing)
Protection Rating IP65 (with HARTING connector locked); IP67 (Optional waterproof connector customization)
Explosion-proof rating Optional intrinsically safe type Ex ia II C T4 Ga; compatible safety barrier models: GS8000-EX series, MTL5500 series
Vibration resistance 10–2000 Hz, 10g, 2 hours in each of the X, Y, and Z directions (compliant with GB/T 13823 standard)
Shock Resistance 100g, 11ms, half-sine wave shock (3 times in each of the XYZ directions)

4.5 Physical Parameters

1. Installation Method

Connection Type: Sanitary quick-connect flange
Standard Flange Specifications: G1/4 flange (optional food-grade standard flanges: Φ50.5mm, Φ64mm, Φ77.5mm, etc.)
Installation Orientation: Horizontal or vertical installation is acceptable; prioritize positioning the diaphragm perpendicular to the fluid flow direction to prevent media buildup

2. Dimensions (for reference; actual product dimensions prevail)

Overall Length: Approx. 140–160 mm (including heat sink and clamp)
Body Diameter: Approx. 30 mm (stainless steel body)
Heat Sink Length: Approx. 50–60 mm (standard heat sink type)
Chuck Outer Diameter: Standard Φ50.5 mm (custom specifications available)
Hirschmann Connector Dimensions: Standard industrial connector, outer diameter approx. 18 mm, cable exit hole compatible with Φ6–8 mm cables

3. Weight

Approx. 300–350 g (standard configuration, stainless steel)

4. Housing Material and Protection Details

Media-contacting parts: 316L stainless steel (food/medical grade), surface roughness Ra ≤ 0.8 μm, no dead corners, no leaching, compliant with sanitary standards
Main housing: 304 stainless steel, integrally welded and sealed, corrosion-resistant and wear-resistant
Heat sink: 304 stainless steel, integrally stamped, fin-type structure, enhancing high-temperature heat dissipation efficiency
Diaphragm Material: 316L stainless steel flat diaphragm, free of indentations and pressure-transmitting holes, preventing media residue
Electrical Connectors: PA66 engineering plastic housing with built-in rubber O-rings, featuring anti-loosening, waterproof, and dustproof functions
Protection Details: Entire structure features no exposed threads and no sanitary dead zones; supports CIP/SIP in-place cleaning; meets the clean process requirements of the food and pharmaceutical industries



V. Scenario-Based Selection Guide

This module is specifically designed for engineering, procurement, and on-site technical upgrade personnel. It systematically addresses issues such as arbitrary selection, model mismatches, and operational incompatibility. By covering four key dimensions—core criteria, industry scenarios, common pitfalls, and customized solutions—it provides standardized selection guidance to precisely meet the requirements of different processes, industries, and on-site operating conditions.

5.1 Core Selection Dimensions

1. Signal Type Selection

When interfacing with standard PLCs, conventional instruments, or secondary digital display instruments on-site, prioritize standard 4–20 mA two-wire current output. This offers long transmission distances, strong anti-interference capabilities, and the widest compatibility. For long-distance digital communication or networking multiple devices with a central control system, select RS485-Modbus RTU digital signal output; for low-voltage control or small industrial control board data acquisition scenarios, choose 0-5V or 0-10V voltage signal output to match the interface protocols of downstream data acquisition devices as needed.

2. Channel Selection

The QDW50A features a single-channel, independent measurement structure, with each unit corresponding to a single sanitary-grade pipeline pressure measurement point. For on-site applications involving multiple pipelines, reactors, or production lines requiring multi-point pressure monitoring, a one-to-one configuration is used, with each measurement point equipped with a dedicated QDW50A unit. The device does not support multi-channel signal acquisition from a single unit, ensuring that measurements at each point remain independent, free from interference, and highly accurate.

3. Power Supply Selection

For standard industrial environments, the standard configuration uses a wide-range DC 12–36 V power supply. The system is designed to be compatible with the commonly used 24 V DC industrial power distribution. It employs a two-wire circuit for power supply, eliminating the need for a separate power circuit, resulting in simple wiring and low cabling costs. For small-scale equipment installations without external DC power distribution, the system can be paired with an integrated on-site DC power supply module. The device features built-in reverse polarity protection and overvoltage protection, making it suitable for environments with fluctuating on-site supply voltages.

4. Selection Based on Explosion-Proof Requirements

For general non-hazardous areas, standard food processing facilities, and general daily chemical production lines, the standard general-purpose model is sufficient. For pharmaceutical, fine chemical, and hazardous areas where flammable and explosive gases or dust are present, the intrinsically safe (Ex ia II C T4 Ga) version must be selected and used in conjunction with a corresponding intrinsically safe barrier. The standard general-purpose model must never be used directly in explosion-proof zones to comply with safety production regulations.

5. Selection Based on Installation Environment

For standard indoor environments with normal temperatures and ventilation, the standard version with a conventional structure is sufficient. For high-temperature media or high-temperature piping conditions, the QDW50A standard model with an integrated heat sink must be selected to withstand high-temperature heat conduction from the medium. For outdoor, open-air environments with high humidity, moisture, or significant dust, prioritize the IP67 high-protection-rating configuration to prevent moisture and dust from entering the internal circuitry. For factory environments with strong vibrations and electromagnetic interference, select the anti-vibration and enhanced electromagnetic compatibility version to ensure long-term measurement stability without drift.

5.2. Industry-Specific Selection Recommendations

1. Chemical Industry: For sanitary piping applications in fine chemicals, biochemistry, and chemical mixing reactors, where media are often viscous, prone to crystallization, or contain trace amounts of suspended solids, prioritize the QDW50A sanitary flat-diaphragm pressure transmitter. Its flat-diaphragm design with no dead corners completely prevents blockage of the pressure-taking ports. The 316L stainless steel construction is suitable for corrosive environments involving weak acids and alkalis, supports CIP (Clean-in-Place) cleaning, and fully meets the pressure monitoring and closed-loop control requirements of chemical clean process flows.

2. For sanitary-grade pure water and purified water piping applications in the power industry—such as water treatment, pharmaceutical-grade water production at power plants, pure water transportation, and boiler feedwater systems—the QDW50A standard chuck-mounted version is recommended. It offers high measurement accuracy and stability, and its sanitary-grade design prevents secondary contamination of the medium. It is suitable for real-time pressure monitoring of pure water and ultrapure water and can be directly integrated with power plant DCS control systems to achieve automated constant-pressure regulation.

3. For applications in the metallurgical industry—such as water treatment systems, clean piping for metallurgical auxiliary material preparation, and sanitary-grade circulating water networks—where on-site environments feature high dust levels and intense vibration, the QDW50A high-protection, anti-vibration version is recommended. Its flat-diaphragm structure resists clogging and offers strong adaptability to a wide temperature range, ensuring stable long-term operation under complex metallurgical conditions and guaranteeing continuous, reliable pressure monitoring of the piping network.

4. In core process scenarios within the pharmaceutical industry—such as API production, formulation production lines, fermentation tanks, purified water systems, and drug solution transfer pipelines—the QDW50A sanitary flat-diaphragm model must be selected. It complies with GMP clean production standards; the 316L food-grade stainless steel diaphragm ensures no leaching or residue, and supports SIP high-temperature sterilization and CIP in-place cleaning. The quick-release chuck design facilitates rapid disassembly and disinfection, fully meeting the pharmaceutical industry's stringent requirements for sterility and zero cross-contamination.

5. In the smart manufacturing sector—including automated production lines for food and beverages, automated ingredient dosing for personal care products, aseptic filling lines, and fluid conveyance pipelines in smart warehouses—the QDW50A standard 4–20 mA output version is recommended. The stable signal is compatible with smart manufacturing PLCs, industrial gateways, and central control configuration systems. It offers easy installation and minimal maintenance, and can be integrated into the overall line's automation control logic to achieve real-time

pressure data acquisition, remote monitoring, and intelligent adjustment.

5.3 Common Selection Pitfalls

1. Ignoring Isolation Levels and Selecting Blindly

Most selection personnel focus solely on measurement range and signal type, neglecting medium isolation and electrical isolation levels. Using standard transmitters with pressure ports in viscous, corrosive, or high-temperature environments can easily lead to blockages, corrosion, and data drift. When selecting a transmitter, it is essential to verify the flat-diaphragm isolation structure, medium isolation material, and electrical insulation isolation level. For complex operating conditions, prioritize the QDW50A with its fully isolated sanitary flat-diaphragm structure.

2. Measurement Failure Due to Incorrect Pressure Range Selection

Selecting a range that is too large results in insufficient accuracy in the low-pressure range, while selecting a range that is too small leads to long-term overpressure operation that damages the sensor element and shortens service life. When selecting a range, a safety margin of 1.25 to 1.5 times the actual process operating pressure must be reserved. Long-term full-scale operation is prohibited, and the measurement span should not be too wide to avoid compromising control accuracy.

3. Signal Abnormalities Due to Neglected Load Matching

When selecting a 4–20 mA output, failure to verify the input load resistance of downstream instruments or PLCs can result in signal fluctuations, unstable readings, or inability to output full-scale signals if the field load exceeds the transmitter's rated load capacity. During selection, confirm the downstream load resistance in advance to ensure it matches the QDW50A's standard load range, guaranteeing stable and accurate signal transmission.

4. Incorrect Selection of General-Purpose Models in Explosion-Proof Environments

In hazardous areas of flammable and explosive chemical and pharmaceutical workshops, the arbitrary use of standard, non-explosion-proof general-purpose models poses significant safety hazards. In explosion-proof zones, intrinsically safe explosion-proof models must be strictly selected and paired with safety barriers; the use of general-purpose models as substitutes for explosion-proof models is strictly prohibited.

5.4 Customization Recommendations

1. Custom Signal Outputs

If standard 4–20 mA or conventional voltage interfaces are unavailable on-site, we can customize various non-standard voltage or special current signal outputs. For multi-device networking and remote IoT data uploads, we can customize RS485 communication protocol adapters, as well as define custom communication addresses and baud rates, ensuring compatibility with mainstream configuration software and IoT platforms.

2. Customization for Non-Standard Operating Conditions

For extreme high-temperature or low-temperature environments, extended heat dissipation structures and special high/low-temperature-resistant diaphragm materials can be customized. For non-standard pipe diameters, non-standard collet outer diameters and special mounting interfaces can be provided. For highly corrosive media, upgrades to special stainless steel or anti-corrosion coatings can be customized to accommodate strong acids, alkalis, and special organic solvents.

3. Multi-Channel Integration Customization

To meet the needs of multi-point centralized monitoring on production lines, we offer complete multi-point solutions. Multiple QDW50A units can be integrated with a wiring box, power distribution module, and signal distributor in a unified configuration featuring consistent specifications, installation dimensions, and communication protocols. This facilitates centralized cabling and central control management while reducing the complexity of on-site selection, installation, and commissioning.

VI. Installation and Commissioning Guidelines

Scope: Hands-on on-site construction guidance, standardized installation, proper wiring, and streamlined commissioning to minimize installation errors, wiring faults, commissioning anomalies, and future failure rates from the outset. Suitable for sanitary-grade on-site implementation in the food, pharmaceutical, fine chemical, and water treatment industries.

6.1 Pre-installation Preparation

1. Component Verification

Upon delivery, conduct a thorough item-by-item inventory check to prevent missing parts or incorrect installation:

Verify that the product model is the QDW50A Sanitary Flat Diaphragm Pressure Transmitter, and confirm that the measurement range, output signal, flange specifications, and explosion-proof version match the order;

Inspect the entire unit for dents or scratches; ensure the diaphragm is free of scratches, deformation, or dents, and that the sanitary flat diaphragm surface is intact and undamaged;

Standard Accessories: Sanitary quick-connect flange O-rings, waterproof terminal connectors, mounting hardware, product certificate of conformity, and factory calibration data sheet;

Additional Verification for Explosion-Proof Versions: Ensure explosion-proof markings, intrinsically safe parameters, and compatible safety barrier model documentation are complete.

2. Environmental Inspection

Install the unit away from high-temperature heat sources, direct open flames, and areas with intense radiant heat. In high-temperature environments, ensure adequate ventilation and heat dissipation space is maintained;

Keep the device away from sources of strong electromagnetic interference such as variable frequency drives, high-power motors, contactors, and high-voltage cables; avoid running cables in close proximity to these devices;

The site must be free of severe, continuous mechanical vibration and strong impact conditions; if vibration is excessive, install vibration-damping brackets;

In humid, high-moisture, or washdown environments, ensure the IP65/IP67-rated version is selected and implement proper waterproofing and splash protection;

In explosion-proof zones, strictly verify the on-site explosion-proof zone classification; use only the corresponding intrinsically safe explosion-proof model; mixing with general-purpose models is prohibited.

3. Tool List

Flathead/Phillips screwdrivers, adjustable wrench, Allen wrench, multimeter, insulated voltage tester, cable ties, shielded signal cable, electrical tape, ground wire, spirit level.

4. Safety Precautions

The on-site power supply must be disconnected before installation or disconnection of wiring; it is strictly prohibited to plug or unplug terminal blocks while the system is energized;

In explosion-proof areas, strictly adhere to explosion-proof regulations; perform all operations with the power off; it is strictly prohibited to open the cover and perform live wiring on-site;

It is strictly prohibited to strike, press, or scratch the sanitary diaphragm with hard objects; damage to the diaphragm will directly result in measurement failure;

Do not install or remove the transmitter while the pipeline is under pressure; work must only be performed after depressurization;

Keep power and signal cables separate during wiring; power cables and signal cables must not be routed through the same pipe or conduit.

6.2 Standard Installation Steps

1. Pipeline / Clamp Mounting

First, secure the sanitary quick-mount clamp base to the process pipeline connection. Place a food-grade sealing gasket to ensure a flat, offset-free seal;

Align the flat diaphragm end of the QDW50A with the clamp opening, insert it vertically and smoothly, and tighten the clamp band with moderate force to avoid over-tightening and compressing the diaphragm;

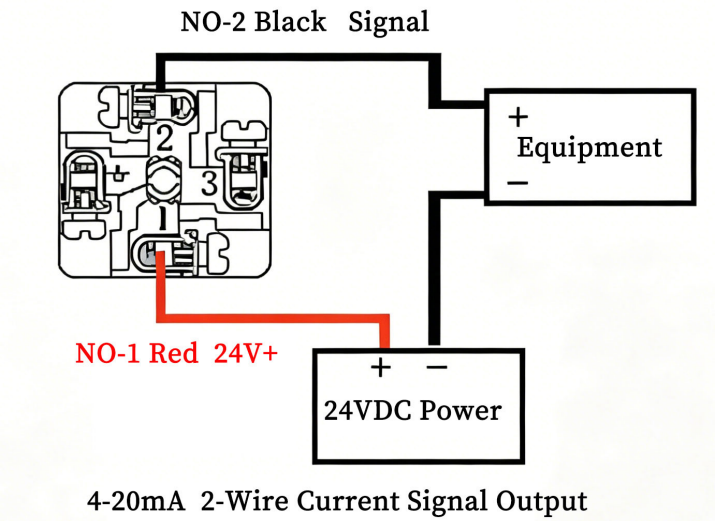
Prioritize vertical or horizontal installation orientation, ensuring the flat diaphragm surface aligns with the direction of the medium flow to prevent long-term accumulation of bubbles or impurities on the diaphragm surface;

Ensure adequate space is reserved around the main unit for heat dissipation, with no obstructions nearby, to allow for normal convective cooling via the heat sink.

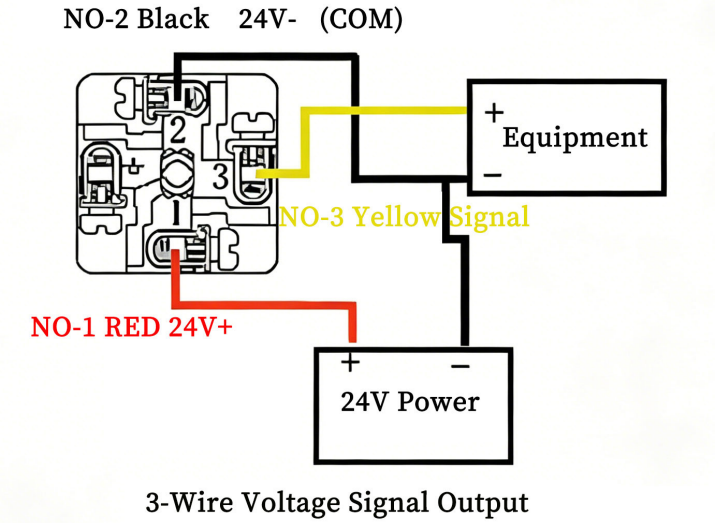
2. Wiring Specifications (Power / Output Terminal Differentiation)
The QDW50A primarily uses the industrial standard two-wire 4-20mA system, with standardized terminal definitions:
Power Positive: Connect to the DC 24V positive terminal to supply power to the transmitter;
Signal Loop Negative: Serves as both the power supply negative and the 4–20 mA signal return path; connect to the analog input terminal of the PLC or instrument;
For voltage output and RS485 communication models, strictly distinguish between power supply and signal A/B wires according to terminal markings; do not mix connections;
All wiring terminals must be securely crimped, with no loose connections, loose wires, or exposed bare wires.

3. Grounding Requirements
The transmitter's metal housing must be reliably grounded at a single point, connected to the site's protective ground, with a grounding resistance ≤4Ω;
Shielded signal cables must be grounded at a single end: one end at the control cabinet and the other end left floating (ungrounded) at the transmitter end to prevent loop current interference caused by multiple grounding points;
In explosion-proof environments, grounding must strictly follow intrinsic safety grounding specifications; it must not be mixed or shared with lightning protection ground or power ground.

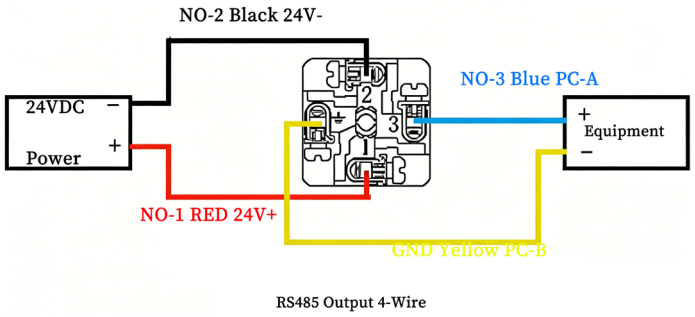
6.3 Standardized Textual Explanations for Wiring Diagrams



4-20mA 2-Wire Current Signal Output



3-Wire Voltage Signal Output



RS485 Output 4-Wire

2. Dedicated Wiring Guidelines for Isolated and Power-Supply-Integrated Models
Isolated transmitters: The power supply circuit and signal circuit are electrically isolated; power and signal lines must be routed separately and must not share a common ground or be mixed.
Power-supply-integrated models do not require an external power supply circuit; power is supplied directly from the PLC or instrument's analog port, so simply follow the standard two-wire wiring method.
Never connect 220V AC power directly to the transmitter's signal terminals, as this will cause an instantaneous short circuit and burn out the device.

3. Correct vs. Incorrect Wiring
☒ Correct Practices:
Separate wiring for high- and low-voltage circuits; ensure terminals are securely crimped; ground the shield at a single point; do not reverse DC polarity; and ensure the enclosure is reliably grounded.
☒ Incorrect Practices:
Routing high- and low-voltage cables in the same conduit; reversing positive and negative polarity; grounding the shield at both ends; exposing bare wires or making loose connections; failing to ground the enclosure; disconnecting or connecting wires while the device is powered on.

6.4 Power-On Commissioning Procedure
1. No-Load Test
After confirming correct wiring and secure installation, turn on the power supply;
Keep the pipeline in a pressure-free, no-load state and observe the equipment's operating condition; ensure there is no overheating or abnormal noise;
Use a multimeter to measure the supply voltage and confirm it is stable within the DC 12–36 V range; under standard operating conditions, it should be stable at DC 24 V.

2. Signal Verification
Verify the zero-point output under no-load conditions: the standard 4–20 mA output should be close to the 4 mA reference value;
Slowly increase the pipeline pressure in stages from low pressure to the rated range, observing that the PLC/secondary instrument readings follow the changes smoothly;
If there are no jumps, drifts, or stutters throughout the process, signal transmission is normal.

3. Indicator Light Status Assessment
Device power/operating status indicators:
Constant on: Normal power supply, device operating normally;
Flashing: Signal abnormality, loose connection, or load mismatch;
Off: Power supply interruption, reversed polarity, or internal circuit failure.

4. Calibration Methods
Zero-point calibration: After the pipeline has been fully depressurized and allowed to stabilize, perform zero-point calibration using the downstream instrument or configuration software;
Full-scale calibration: Pressurize to the rated full scale; after stabilization, perform full-scale adjustment;
After calibration, repeat the pressure cycling test 2–3 times to confirm that linearity and repeatability meet specifications, with no temperature drift or zero-point drift.

6.5 Installation Precautions

1. Never exceed rated pressure or supply voltage limits

The supply voltage must not exceed DC 36 V; do not connect to AC 220 V mains power. Process pressure must not exceed the transmitter's rated range for extended periods; avoid pressure surges to prevent permanent damage to the sensor element.

2. Avoid High-Voltage and Strong Electromagnetic Interference

Power cables and variable frequency drive control lines must not be routed in the same cable tray or conduit as the transmitter's signal cables. Keep the transmitter away from high-power motors, variable frequency drives, and high-frequency equipment to prevent interference-induced value fluctuations or drift.

3. Strictly Prohibit Impact or Pressure on the Sanitary Flat Diaphragm

During installation, cleaning, or maintenance, do not allow any hard objects to touch, press, or scratch the flat diaphragm. Damage to the diaphragm will result in immediate loss of measurement accuracy and cannot be repaired.

4. Precautions for Humid and Spray Environments

In open-air, water-wash, or high-humidity environments, do not use standard IP65 unprotected units. You must select the IP67-rated version and ensure the wiring port is properly waterproofed to prevent moisture from entering the wiring compartment.

5. Strict Prohibitions on Improper Selection and Opening of Covers in Explosion-Proof Zones

In explosion-hazardous areas, standard general-purpose models must not be used as substitutes for intrinsically safe explosion-proof models. Under no circumstances should the cover be opened or wiring modified while the device is in operation; power must be disconnected before performing any work in accordance with regulations.

6. Do Not Over-Tighten or Misalign the Clamping Collar

Excessive tightening of the clamping collar will compress and deform the diaphragm. Misaligned installation can cause medium leakage and uneven stress distribution, leading to long-term measurement errors.

VII. Recommendations for Daily Use & Operation and Maintenance

This module is designed for on-site operation and maintenance, equipment management, and process maintenance personnel. It standardizes procedures for daily inspections, periodic maintenance, and long-term upkeep to extend equipment service life, reduce downtime due to failures, and ensure sustained measurement accuracy and process stability over the long term. It is suitable for long-term operation and maintenance management in sanitary-grade environments such as food processing, pharmaceuticals, fine chemicals, and smart manufacturing.

7.1 Key Points for Daily Inspections

1. Inspection of Equipment Appearance and Installation Status

Conduct a daily on-site visual inspection of the entire unit's exterior to ensure there are no dents, deformations, rust, or water ingress or condensation in the junction box. Check that the sanitary flange is securely installed with no looseness, no media leakage, and that the sealing gaskets are intact and free from aging. Confirm that the flat diaphragm surface is free from material adhesion, scaling, or obvious stains, and keep the diaphragm clean and flat.

2. Monitoring Signal Stability

Monitor pressure readings in real time on the central control system, PLC, and secondary digital displays. Observe whether the readings are stable without sudden jumps, unexplained drifts, or step-like fluctuations; compare these readings with actual process operating pressures to confirm they match the actual conditions, with no abnormalities such as excessive high or low readings, or readings that remain stuck; record peak pressure data in the morning and evening to facilitate subsequent comparative analysis of equipment stability.

3. Operating Temperature, Humidity, and Environmental Monitoring

Inspect the ambient temperature around the equipment; ensure it does not exceed the equipment's rated operating temperature range for extended periods. In high-temperature conditions, check that heat sinks are free of dust and obstructions to ensure normal air convection for heat dissipation. In high-humidity or spray workshops, pay special attention to ensuring that wiring ports and electrical connectors are free of moisture and condensation. Maintain ambient humidity within the permissible range and prevent prolonged condensation or water accumulation.

4. Power Supply and Grounding Inspection

Regularly verify that the supply voltage remains stable within the standard range of 12–36 V DC, with no sudden voltage spikes or excessive fluctuations. Check that the housing grounding and signal line shielding grounding are intact, with no loose or faulty connections. For explosion-proof versions, additionally verify that the explosion-proof interfaces are properly sealed, with no looseness or damage.

5. Process Conditions Adaptation Inspection

Monitor the viscosity, crystallization, and temperature changes of the medium. If conditions arise where the medium tends to adhere to the walls or form scale, make a preliminary assessment for cleaning to prevent long-term buildup on the flat membrane, which could cause measurement errors.

7.2. Regular Maintenance Plan

1. Cleaning Cycle Guidelines

Routine Light Cleaning: During production line downtime at the end of each shift or daily, use a lint-free soft cloth and neutral cleaning solution to gently wipe the flat membrane surface and the device housing. Do not scrape with hard objects or apply excessive pressure to the membrane.

Routine Deep Cleaning: Under normal operating conditions, perform a thorough deep cleaning of the entire unit every 30 days, synchronized with the production line's CIP/SIP (Cleaning-in-Place/Sterilization-in-Place) cycles to remove material buildup and scale residues from the piping and membrane;

Pharmaceutical/Food High-Cleanliness Conditions: Conduct specialized cleaning and disinfection every 15 days, strictly adhering to GMP cleaning standards. Replace aged chuck sealing gaskets to prevent bacterial growth and cross-contamination.

2. Wiring Tightness Inspection Schedule

Conduct a comprehensive wiring tightness inspection quarterly: Check HARTING electrical connectors and terminal connections for looseness, oxidation, or exposed wires; re-crimp loose terminals; organize signal cable routing to prevent excessive pulling or bending; verify shield grounding methods and maintain single-point grounding standards.

3. Recommendations for Accuracy Retesting and Calibration

Standard industrial conditions: Conduct accuracy comparison retests every 6 months. Use a standard pressure calibrator to compare zero-point and full-scale errors on-site; perform zero-point and full-scale calibration immediately if out of tolerance.

Pharmaceutical and Precision Process Applications: Perform accuracy verification every 3 months to ensure high-precision and stable process pressure control;

After major shutdowns, pipeline cleaning, or restarting following prolonged production halts, zero-point calibration and linearity testing must be performed to confirm accuracy compliance before resuming production.

4. Regular Replacement of Wear Parts

Sanitary chuck sealing gaskets are wear parts and should be replaced every 6 to 12 months. In high-temperature or high-frequency cleaning environments, replacement intervals should be shortened to 3 to 6 months to prevent aging, leakage, and compromised hygiene standards or sealing performance.

7.3 Long-Term Maintenance Tips

1. Optimizing Dust and Moisture Protection

Install the equipment in locations that avoid areas prone to dust accumulation or direct exposure to moisture. Keep wiring ports and electrical connectors securely sealed and locked at all times; install waterproof plugs on unused ports. In humid workshops, place desiccant packets inside the wiring compartment and replace them regularly to prevent moisture-induced corrosion of circuit boards. For outdoor or high-humidity environments, prioritize the use of IP67-rated high-protection versions to enhance dust and moisture resistance at the hardware level.

2. Long-Term Optimization Techniques for Electromagnetic Interference (EMI)

Route signal cables through separate conduits, maintaining a safe distance from variable frequency drives, high-power motors, and high-voltage power cables; do not route them through the same cable trays or conduits. Use shielded signal cables throughout the system and strictly adhere to the standard of single-point grounding at the control cabinet and floating ground at the transmitter end. In high-interference field conditions, install signal isolators and surge protectors to further suppress electromagnetic interference and prevent value fluctuations or drift.

3. Protection in Extreme Environments
High-Temperature Environments: Keep heat sinks free of dust and obstructions, ensure sufficient ventilation space for heat dissipation, and do not wrap or cover the transmitter body; for ultra-high-temperature media conditions, select models with extended heat dissipation structures to reduce heat conduction to the circuitry;
Low-Temperature and Freezing Environments: Insulate and protect piping and equipment against freezing in winter to prevent media from freezing and causing damage to the diaphragm and internal components due to expansion;
Highly Corrosive Conditions: Regularly inspect the 316L diaphragm and housing for corrosion. If minor pitting or discoloration is observed, assess and replace promptly to prevent medium penetration and damage to the internal core;
High-Vibration Conditions: Install vibration-damping mounting brackets to reduce the long-term transmission of mechanical vibrations to the transmitter, thereby delaying component aging and ensuring long-term measurement stability.

4. Long-Term Maintenance During Downtime
When production lines are shut down for extended periods, clean the flat membrane surface of the transmitter and cover it to protect against dust; disconnect the power supply and remove any exposed or loose cables; store the unit in a dry environment at room temperature, free from corrosive gases, and avoid exposure to direct sunlight, rain, or moisture. Before putting the unit back into service, it must be cleaned and its accuracy retested.

VIII. Troubleshooting & Emergency Response
This module is designed for field operations and maintenance personnel, electricians, and process management staff. It enables rapid fault localization, independent troubleshooting and repair, emergency fallback procedures, and standardized post-sales reporting, thereby minimizing downtime and reducing production losses. It is suitable for use in sanitary-grade environments such as food processing, pharmaceuticals, fine chemicals, and smart manufacturing.
8.1 List of Common Faults
Transmitter has no output signal; instrument/PLC displays no values or consistently shows zero
Severe pressure signal drift: does not return to zero under no-load conditions; values slowly rise or fall under pressure
Abnormal indicator light status: stays on continuously, does not light up, or flashes frequently
Frequent system alarms: out-of-range alarm, loop fault alarm, analog signal loss alarm
Measurement interference and distortion: value jumps, fluctuations, or erratic jitter
Measured values are too high or too low, clearly inconsistent with actual on-site pressure
Leaks at sanitary interfaces or diaphragm scaling causing sluggish measurement and slow response

8.2 Analysis of Failure Causes
1. Wiring Errors
Reversed polarity, signal lines mixed with high-voltage power lines, shield grounded at both ends, loose or faulty connections, short circuits in bare wires, and wiring a two-wire system as a four-wire system are the most common causes of failure in the field.

2. Power Supply Abnormalities
Abnormal circuit operation caused by supply voltage below 12 V DC or above 36 V DC, excessive power supply ripple, circuit load exceeding specifications, poor power supply contact, or transient voltage surges.

3. Signal Overload and Load Mismatch
The input load resistance of downstream PLCs or instruments exceeds the transmitter's rated load range, resulting in the signal being unable to drive the load, failure to reach full scale, or value fluctuations.

4. Environmental Interference
Installation in the same conduit or cable tray as variable frequency drives, high-power motors, or high-voltage power lines; Strong electromagnetic radiation at the site, excessive vibration, moisture and condensation, or dust entering the terminal compartment causing leakage current interference.

5. Equipment Damage
Deformation of the sanitary flat diaphragm due to impact or compression by hard objects; damage from medium corrosion; aging of internal components; failure due to temperature drift; circuit breakdown caused by lightning surges; irreversible damage resulting from prolonged overpressure.

6. Improper Operating Conditions
Long-term operation beyond the rated range; high-temperature conditions without heat dissipation protection; excessive temperature or pressure during CIP/SIP cleaning; aging seals causing leaks; severe scaling or deposits on the diaphragm affecting pressure sensing.

8.3. Step-by-Step Troubleshooting
Fault 1: No output signal; reading remains at 0
Troubleshooting Steps
First, disconnect the power supply and visually inspect the wiring for loose or faulty connections, and check whether the positive and negative terminals are reversed;
Use a multimeter to measure the supply voltage and confirm it is within the normal range of DC 12–36 V;
Check whether the downstream PLC analog channel is damaged or the terminals are burnt out;
Check whether the signal cable is broken or if water has entered the connectors, causing a short circuit.
Remedial Actions
Re-wire according to specifications, correct polarity, and tighten terminals; replace damaged signal cables; if the power supply is abnormal, replace it with a compatible DC 24V regulated power supply; if the PLC channel is damaged, switch to a backup channel.
Emergency Alternative Solution
Directly replace and install a spare QDW50A of the same model, replicate the wiring according to the original configuration, quickly resume production line operation, and take the faulty unit offline for repair.

Fault 2: Signal drift, failure to return to zero under no-load conditions, and gradual value deviation
Troubleshooting Steps
Completely depressurize the piping and let it stand; observe whether zero-point drift persists;
Check for installation misalignment due to stress or excessive tightening of the chuck causing mechanical stress on the diaphragm;
Check for drastic changes in ambient temperature or dust accumulation obstructing the heat sink;
Check for improper shielding wire grounding or ground loop interference caused by multiple grounding points.
Remedial Actions
Perform on-site zero-point calibration; loosen the clamping ring, re-center the installation, and eliminate mechanical pre-stress; clean dust from the heat sink to ensure proper ventilation; modify the shielding wire to single-point grounding.
Emergency Workaround
Temporarily adjust the zero-point offset within a small range via the central control instrument to maintain normal process control; replace the device or return it to the factory for calibration during a scheduled shutdown window.

Fault 3: Abnormal Indicator Lights (Not Lit / Constant On / Frequent Flashing)
Troubleshooting Steps
Light not lit: First check for power supply, reversed polarity, or open circuits;

Constant on with no changes: Power supply is normal but signal circuit is not conducting, or the downstream load is open;
Frequent flashing: Load mismatch, severe electromagnetic interference, or internal circuit malfunction.
Remedial Actions
Correct wiring and restore normal power supply; check circuit continuity; move away from strong interference sources and rework wiring; add a signal isolator if the load exceeds specifications.
Temporary Workaround
Temporarily disregard the indicator light status and rely on the actual values collected by the PLC to ensure normal process pressure monitoring; replace the equipment during the next shutdown.

Fault 4: Frequent System Alarms, Circuit Fault / Out-of-Range Alarm
Troubleshooting Steps
Verify whether the actual process pressure truly exceeds the transmitter's range;
Check for transient pressure surges or water hammer effects causing momentary overpressure;
Check the wiring circuit for intermittent connectivity or poor contacts.
Remedial Actions
If the range is too small, replace with a QDW50A model with an appropriate range; install a buffer device in the piping to reduce water hammer impact; retighten all terminal connections and inspect for hidden wire breaks.
Temporary Workaround
Temporarily reduce the process pressure load to avoid the alarm range; replace with a model of the appropriate range after shutdown.

Fault 5: Interference Distortion, Value Jumps, Irregular Flicker
Troubleshooting Steps
Check whether signal cables are routed in the same cable tray or conduit as power cables;
Check for nearby operation of variable frequency drives or high-frequency equipment;
Check whether the shielding layer is damaged or the grounding method is incorrect.
Remedial Measures
Separate power and signal cables into distinct cable trays or conduits;
Replace signal cables with shielded cables and ensure proper single-point grounding;
Install signal isolators and surge suppressors;
Ensure the equipment housing is reliably grounded.
Emergency Workaround
Increase the digital filter parameters in the configuration or on the instrument to suppress fluctuations and temporarily stabilize readings.

Fault 6: Significant Deviation Between Measured Value and Actual Pressure
Troubleshooting Steps
Verify that the range and model match the process requirements;
Check whether the flat diaphragm surface has scale buildup or material adhesion affecting sensing;
Cumulative errors resulting from long-term use without regular calibration.
Remedial Measures
Clean scale buildup from the flat diaphragm surface; perform zero and full-scale recalibration; replace with the appropriate model and range if mismatched.
Emergency Workaround
Temporarily calibrate the instrument using range correction and deviation compensation to ensure process control.

Fault 7: Leaks at sanitary connections; sluggish diaphragm response
Troubleshooting Steps
Check for aging, deformation, or misalignment of the chuck seal;
Check for severe scaling or crystallization covering the diaphragm surface.
Remedial Actions
Replace with food-grade sealing gaskets; realign and securely tighten the clamp; shut down the system for CIP deep cleaning to remove deposits from the diaphragm surface.
Emergency Workaround
Temporarily tighten the clamp band moderately and evenly to reduce leakage; schedule a shutdown during a shift to formally replace the components.

8.4 After-Sales Service Request Guidelines
1. Criteria for Determining Faults and Reporting Issues
If any of the following conditions occur and cannot be independently diagnosed or repaired on-site, an after-sales service request must be submitted immediately:
Physical deformation, damage, or cracking of the sanitary flat diaphragm;
No response whatsoever when powered on; no output even after repeatedly verifying wiring and power supply;
Internal circuitry burned out; housing charred; severe water ingress and corrosion;
Severe accuracy deviation that cannot be restored even after multiple calibrations;
Damage to the sealing structure of the explosion-proof version, resulting in loss of explosion-proof safety performance.

2. Information Required for Service Request
Complete product model: QDW50A Sanitary Flat Diaphragm Pressure Transmitter
Serial number, measurement range, output signal, installation conditions and industry
Fault symptoms, on-site photos, wiring configuration, duration of use
On-site environment: temperature, medium type, whether located in an explosion-proof zone

3. Repair Process
First, take the faulty equipment out of service, ensure power is safely disconnected, and depressurize the piping;
Compile fault information and on-site photos, then contact sales or technical support;
Follow instructions to mail the unit back for factory repair, or request a replacement with a new unit of the same model;
Upon completion of repairs, a calibration report will be provided, and factory-certified parameters will be reissued.

4. Warranty Coverage
Standard warranty service applies to non-human-induced damage, non-impact damage, and non-burnout caused by overpressure or overvoltage under normal operating conditions;
Free repair and calibration are provided within the warranty period;
Damage resulting from accidental knocks or scratches, unauthorized disassembly or modification, improper overpressure use, or accidental connection to high-voltage power is not covered by the free warranty; paid repair services are available.