Waterproof Pressure Transmitter

I. Product Definition

The QDW70A-F waterproof, direct-wiring diffused silicon pressure transmitter is an integrated smart transmitter designed specifically for fluid pressure monitoring in industrial applications, featuring a diffused silicon piezoresistive sensor at its core. It linearly converts pressure signals from media such as gases and liquids into standard industrial electrical signals (default 4–20 mA current signal, with support for 0–5 V/0–10 V voltage signals), enabling real-time pressure acquisition, transmission, and communication. It serves as an indispensable front-end sensing device in industrial automation control and pressure monitoring systems.

Its core functions cover the following areas:

1. Precise pressure signal acquisition: Utilizing a diffused silicon sensing element, it detects the static and dynamic pressure of the measured medium in real time, covering a wide measurement range from negative pressure to high pressure, and is compatible with various media such as water, oil, and mildly corrosive gases and liquids.

2. Standardized signal transmission: Converts non-standard physical pressure values into the 4-20mA current signal (or other standard signals) commonly used in industrial control systems. The signal features strong anti-interference capabilities and can be transmitted over long distances to terminal devices such as PLCs, DCS systems, and digital display instruments.

3. Integrated Waterproof Design: Featuring a fully stainless steel sealed structure and direct-wiring cable exit, it achieves an IP65 or higher protection rating. It withstands harsh field environments including humidity, dust, splashing water, and even brief exposure to water, eliminating the need for additional protective enclosures.

4. Stable Operation Across a Wide Temperature Range: Equipped with a built-in temperature compensation circuit, it maintains high-precision measurement in a wide temperature range of -20°C to 85°C, minimizing errors caused by temperature drift and adapting to complex temperature fluctuations in industrial environments.

5. Long-Term Reliable Operation: The all-stainless steel (304/316L optional) housing design is impact-resistant, vibration-resistant, and corrosion-resistant. With no moving mechanical parts and no risk of wear, it ensures long-term stable operation and reduces maintenance costs.

6. Convenient Installation and Compatibility: Standard external threaded mounting interfaces (common specifications include M20×1.5, G1/2, etc.) are compatible with the vast majority of industrial piping and tank installation scenarios. No additional adapters are required, ensuring quick and efficient installation.

II. Working Principle

The operating process of this transmitter can be broken down into four core steps: “Pressure Sensing → Signal Conversion → Signal Amplification and Compensation → Standardized Output.” A simplified explanation is provided below:

1. Pressure Sensing Stage (Core Sensing Element)

A diffused silicon piezoresistive sensor chip is encapsulated within the pressure port at the front end of the transmitter. When the pressure of the measured medium (water, oil, gas, etc.) acts on the chip, the silicon diaphragm undergoes minute elastic deformation. The four piezoresistive strain resistors fabricated on the chip via a diffusion process exhibit changes in resistance due to this deformation, forming a “Wheatstone bridge.”

2. Signal Conversion Stage (Physical Quantity → Electrical Signal)

When powered by a 24V DC supply, the Wheatstone bridge directly converts the deformation of the silicon diaphragm (pressure change) into a weak voltage signal. The greater the pressure, the greater the deformation of the silicon diaphragm, and the stronger the voltage signal output by the bridge, thereby achieving the first step of conversion from the “physical quantity of pressure” to an “electrical signal.”

3. Signal Amplification and Compensation Stage (Error Elimination)

Since the weak raw voltage signal cannot be transmitted directly, the transmitter incorporates a high-precision signal conditioning circuit:

First, an operational amplifier amplifies the weak millivolt-level voltage signal into a processable standard signal;

Simultaneously, a temperature compensation circuit corrects errors caused by changes in ambient temperature, such as silicon diaphragm resistance drift and zero-point temperature drift, ensuring stable measurement accuracy across different temperatures.

4. Standardized Output Stage (Adaptation to Industrial Systems)

The conditioned signal undergoes linearization and is converted into an industry-standard signal (default 4–20 mA current signal). For example: When the measured pressure is at the lower limit of the range (e.g., 0 MPa), the output is 4 mA; when the pressure reaches the upper limit of the range (e.g., 1.6 MPa), the output is 20 mA. The pressure and current signals have a linear relationship, allowing terminal devices to directly read pressure values from the current value, thereby enabling remote transmission and monitoring of pressure signals.

III. Core Value and Solutions to Pain Points

3.1 Key Customer Pain Points and Product Solutions

Pain Point 1: Industrial environments are often damp, dusty, and exposed to water spray. Conventional transmitters are prone to water ingress and damage, resulting in high replacement costs.

Answer: The QDW70A-F features a fully stainless steel sealed welded structure combined with a direct-wiring integrated cable outlet design, achieving an IP65 protection rating or higher. It is directly suitable for environments involving humidity, dust, splashing water, and even brief exposure to water jets. No additional protective housing is required, eliminating equipment damage caused by water or dust ingress at the source and significantly reducing replacement and maintenance costs.

Pain Point 2: Pressure signal transmission is susceptible to on-site electromagnetic interference, leading to signal distortion and significant fluctuations, which cause system misjudgments

Answer: The transmitter outputs a 4-20mA current signal by default. Current signals offer far greater resistance to interference during transmission than voltage signals, supporting long-distance transmission of hundreds of meters without significant attenuation. Additionally, the built-in anti-interference filtering circuit effectively counters electromagnetic interference from on-site equipment such as variable frequency drives and motors, ensuring a stable signal free of fluctuations and preventing misjudgments by the control system.

Pain Point 3: When temperature fluctuations are significant, the transmitter exhibits large measurement errors and inaccurate data, affecting process control precision.

Answer: The transmitter features a built-in high-precision temperature compensation circuit that precisely compensates for the temperature drift characteristics of the diffused silicon sensor. It maintains a measurement accuracy within 0.2% F.S. across a wide temperature range of -20°C to 85°C. Even with severe on-site temperature fluctuations, it ensures stable and accurate data, meeting the high-precision requirements of process control.

Challenge 4: Limited installation space on-site, cumbersome wiring, and time-consuming and labor-intensive installation and commissioning

Answer: The transmitter features a direct-wiring design, eliminating the need for an additional terminal box; wires can be connected directly to the end device. It is also equipped with standard external threaded mounting interfaces (such as G1/2 and M20×1.5), compatible with the vast majority of industrial pipes and tanks. No adapters are required, allowing a single person to complete installation quickly and significantly shortening the commissioning cycle.

Pain Point 5: The medium is corrosive, and standard transmitter housings are prone to corrosion, resulting in a short service life.

Answer: The transmitter housing is made of 304 stainless steel (316L stainless steel is available for highly corrosive media). It is resistant to water, oil, and mildly corrosive media. Even with long-term immersion or contact, it is unlikely to rust or be damaged, ensuring a service life of several years. It is suitable for corrosive environments such as chemical processing and water treatment.

Pain Point 6: The device has no moving mechanical parts, raising concerns about wear, failure, and high maintenance costs during long-term operation.
Answer: The transmitter features a fully solid-state design with no moving mechanical parts, eliminating the risk of wear or jamming. It offers excellent vibration and shock resistance, ensuring stable long-term operation. It requires virtually no daily maintenance—only periodic calibration—significantly reducing labor costs.

3.2 Summary of Core Product Value
1. Highly Reliable Field Adaptability: A waterproof and dustproof integrated design combined with a corrosion-resistant stainless steel housing allows direct deployment in harsh industrial environments—such as those with moisture, dust, or corrosive media—without requiring additional protection. This results in a low failure rate and a long service life.

2. Stable and Accurate Measurement Output: Diffused silicon piezoresistive sensor technology combined with temperature compensation circuits ensures high-precision measurement across a wide temperature range. The standard industrial signal output offers strong anti-interference capabilities, allowing direct integration with PLCs, DCSs, and other control systems, making it suitable for the vast majority of industrial automation scenarios.

3. Low Installation and Maintenance Costs: Standard threaded interfaces and a direct-wiring design ensure convenient installation and simple wiring; The all-solid-state structure with no mechanical wear requires virtually no routine maintenance, significantly reducing total lifecycle costs.

4. Wide Range of Application Compatibility: Supports multi-range customization (from vacuum to high pressure) and multiple signal outputs (4–20 mA, 0–5 V, 0–10 V, etc.), meeting pressure monitoring needs across various industries including water treatment, petrochemicals, HVAC, hydraulics and pneumatics, and industrial automation.

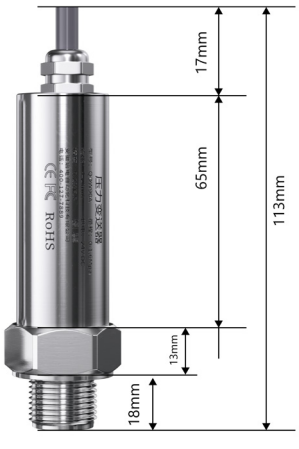
IV. Key Parameters & Specifications
4.1 Basic Electrical Parameters
Core Sensing Principle: Diffused Silicon Piezoresistive Sensing
Standard Output Signal: 4–20 mA (two-wire), optional 0–5 V / 0–10 V / 1–5 V / 0–10 mA
Measurement Range: Standard: 0–0.1 MPa to 0–100 MPa; Customizable for negative pressure, absolute pressure, and gauge pressure
Measurement Accuracy: Typical ±0.2% F.S.; Optional ±0.1% F.S. / ±0.5% F.S.
Nonlinearity Error: ≤±0.1% F.S.
Hysteresis Error: ≤±0.1% F.S.
Repeatability Error: ≤±0.05% F.S.
Zero Drift: ≤±0.02% F.S/°C
Full-Scale Drift: ≤±0.02% F.S/°C
Response Time: ≤5 ms (standard medium)
Load Capacity: 4–20 mA signal: ≤750 Ω; Voltage signal: ≥10 kΩ

4.2 Isolation Performance Parameters
Input-Output Isolation Voltage: 1000 V AC @ 1 min (standard); optional 1500 V AC reinforced isolation
Insulation Resistance: ≥100 MΩ @ 500 V DC (between housing and circuitry)
Electromagnetic Interference Immunity: Complies with GB/T 17626 standard; resistant to surges, burst pulses, and electrostatic interference
Isolation Method: Circuit-level electrical isolation (suitable for two-wire power distribution systems, with no signal ground loop interference)
Media Compatibility: 316L stainless steel contact parts; suitable for water, oil, and mildly corrosive gases/liquids

4.3 Power Supply & Power Consumption Parameters
Standard Supply Voltage: 24V DC (12–36V DC wide-voltage compatible)
Power Consumption:4–20mA signal: ≤0.5W; Voltage signal: ≤0.3W
Power Supply Stability:Output error ≤ ±0.1% F.S. at ±10% voltage fluctuation
Reverse Polarity Protection:Built-in reverse polarity protection circuit; withstands reverse polarity connection without damage
Overvoltage Protection:Supports short-term overvoltage protection up to 40V DC on the power supply side

4.4 Environmental Adaptation Parameters
Operating Temperature:-20°C to +85°C (standard); optional wide-temperature version: -40°C to +125°C
Medium Temperature:-20°C to +100°C (standard); optional high-temperature heat dissipation structure supports media up to 150°C
Storage Temperature:-40°C to +125°C
Operating Humidity:0–95% RH (non-condensing)
Protection Rating:IP65 (fully stainless steel sealed + direct lead-out, splash-proof and dust-proof)
Explosion-Proof Rating: Optional intrinsically safe type Ex ia II C T4 Ga; compatible safety barrier models: Zener-type / isolated safety barriers (e.g., GS8000 series, MTL5500 series)
Vibration Resistance:10–2000 Hz, amplitude 1.5 mm, acceleration 20 g, no mechanical damage or performance degradation
Shock Resistance:50 g, 11 ms half-sine wave shock, no mechanical damage or performance degradation

4.5. Physical Parameters
Installation Method
Standard threaded installation: External thread M20×1.5 (default); optional specifications include G1/2, G1/4, NPT1/4, NPT1/2, etc., suitable for direct installation on industrial pipes and tanks.
Installation orientation: Can be installed in any direction (vertical upward orientation is recommended to minimize the impact of media impurity deposition).
Dimensions (refer to actual product diagram; units: mm)
Body length: Approx. 85 mm (excluding threads and leads)
Body diameter: Φ26 mm (standard stainless steel housing)
Pressure port thread length: Approx. 15 mm (standard M20×1.5 external thread)
Hex nut diagonal dimension: 27 mm (compatible with standard wrenches for installation)
Cable Exit: Direct lead-out type, standard 1.5m cable (optional extension to 5m/10m, waterproof crimped connection)
(Dimension Notes:
The top is the cable exit port, featuring a built-in waterproof sealed connector welded as a single unit with the housing;
The middle section is the stainless steel body, laser-etched with model, range, and parameter markings;
The bottom features the pressure port thread + hex mounting nut, designed for pipe installation.)
Weight
Standard configuration (including 1.5m cable): Approx. 150g (±10g)
316L Housing: Approx. 170g (±10g)
Housing Material and Protection Details
Main Body Material: 304 stainless steel (standard), optional 316L stainless steel (for corrosive media)
Pressure-Contacting Components: 316L stainless steel (standard), suitable for mildly corrosive media
Sealing Structure: Fully laser-welded seal; cable entry features a rubber crimp seal resistant to high and low temperatures and aging; IP65 protection with no weak points
Surface Finish: Brushed stainless steel finish, corrosion-resistant and fingerprint-resistant, suitable for long-term use in industrial environments
Protection Details: No exposed terminals on the housing; integrated sealed design prevents moisture and dust from entering the circuitry



V. Application-Specific Selection Guide

5.1 Key Selection Criteria

1. Signal Type Selection

For conventional industrial automation, PLCs, DCS systems, and water treatment control cabinets, prioritize 4–20 mA two-wire current signals, which offer strong interference resistance, are suitable for long-distance wiring, and are less prone to signal drift even in complex on-site electromagnetic environments. For indoor short-distance data acquisition, direct instrument connection, and simple control loops, voltage signals such as 0–5 V, 0–10 V, or 1–5 V may be selected. For negative pressure and vacuum measurement applications, prioritize models with dedicated negative pressure ranges; for absolute pressure measurement, select the appropriate absolute pressure signal calibration version separately.

2. Channel Selection

The QDW70A-F is a single-channel, standalone pressure measurement model. Select this model for single-point, single-pipe, or single-tank pressure monitoring. For multi-point pressure data acquisition on a single piece of equipment where multi-channel integration is not required, multiple units can be deployed independently. If single-input-to-multi-output or centralized multi-channel transmission is required, a custom multi-channel combination solution must be requested separately.

3. Power Supply Selection

For standard on-site centralized power distribution, select the standard 24 V DC two-wire power supply, which is compatible with the vast majority of industrial control cabinets and PLC power distribution modules. For on-site power supply with significant fluctuations or outdoor environments without voltage stabilizers, select the version supporting a wide voltage range of 12–36 V DC. For low-power, unattended sites, a low-power custom model can be selected, compatible with solar power and DC backup power supply systems.

4. Selection Based on Explosion-Proof Requirements

For standard indoor environments without flammable or explosive media or hazardous gases, directly select the general-purpose waterproof QDW70A-F model. For chemical storage tanks, oil and gas transmission facilities, pharmaceutical explosion-proof workshops, and hazardous areas with flammable gas vapors, the intrinsically safe explosion-proof model must be selected and used in conjunction with an intrinsically safe isolating barrier. It is strictly prohibited to use the general-purpose model as a substitute in explosion-proof applications.

5. Selection Based on Installation Environment

For environments with high humidity, water exposure, outdoor open-air settings, water spray, heavy dust, or areas near water treatment tanks, the QDW70A-F waterproof direct-wiring model must be used. Its IP65 fully sealed structure eliminates the need for an external junction box. For high-temperature media or high-temperature workshop environments, select the custom version with wide-temperature compensation and high-temperature-resistant diaphragm. For weakly corrosive water, oils, or mildly acidic/alkaline media, the default 316L pressure port is sufficient; for highly corrosive conditions, upgrade to a version with special corrosion-resistant materials.

5.2. Recommended Selection Guidelines for Industry Scenarios

1. Chemical industry applications often involve humidity, mild corrosion, on-site dust, and electromagnetic interference. For long-term online monitoring of pipeline and tank pressure, prioritize the QDW70A-F waterproof direct-wiring diffused silicon pressure transmitter. Its 4-20mA standard signal is compatible with chemical DCS systems, and the all-stainless-steel sealed construction resists moisture and mild corrosion. The direct-wiring design eliminates the need for an additional waterproof junction box, making it suitable for various installation locations such as open-air workshop areas, around tanks, and direct mounting on pipelines.

2. Pressure monitoring in the power industry for circulating water, water supply and drainage, hydraulic oil circuits, and auxiliary equipment cooling systems. In environments with high humidity and strong electromagnetic interference from equipment start-up and shutdown, the QDW70A-F standard 4-20mA version is recommended. Its wide operating temperature range accommodates seasonal temperature fluctuations in machine rooms, and it offers resistance to vibration and electromagnetic interference, ensuring stable long-distance signal transmission. This makes it suitable for long-term, unattended online monitoring in power plants.

3. In the metallurgical industry, pressure monitoring in hydraulic pipelines, cooling water systems, and dust removal networks involves complex operating conditions. With high on-site vibration, dense dust, and harsh environments, the QDW70A-F's integrated waterproof and sealed structure withstands dust and moisture. Its design features no exposed wiring points, preventing dust accumulation and moisture ingress, while the diffused silicon core offers impact and vibration resistance, meeting the high reliability requirements for long-term continuous operation in metallurgical settings.

4. In the pharmaceutical industry, pressure monitoring in cleanrooms, process water pipelines, and purified water systems demands high standards for equipment sealing, stability, and contamination-free operation. The QDW70A-F, featuring food-grade contact materials, offers a sealed structure with no dust-prone dead zones. Its waterproof lead-through design complies with cleanroom wiring standards, and its stable measurement accuracy meets pharmaceutical process automation standards.

5. Pressure data acquisition for mechanical hydraulic and pneumatic systems, tooling pipelines, and automated production lines in the smart manufacturing and automation equipment industries. Installation space is compact, and wiring requirements are minimal. The QDW70A-F threaded direct-mount model is compact in size, and its direct wiring eliminates the need for intermediate connections. It supports rapid integration with PLCs and various industrial control instruments. With a wide range of selectable measurement ranges, it can be matched to pressure detection points on various small and medium-sized automated equipment.

5.3 Common Selection Pitfalls

1. Ignoring isolation level selection: Focusing solely on accuracy while neglecting electrical isolation. In environments with high interference from on-site inverters and motors, this can lead to signal fluctuations, value drift, and control system malfunctions, necessitating the retrofitting of isolation modules and increasing renovation costs.

2. Incorrect selection of signal type and range specifications: Selecting a range that is too wide results in low resolution and poor control sensitivity in the low-pressure range, while selecting a range that is too narrow increases the risk of overpressure damage to the sensor element. Arbitrarily using voltage signals for long-distance wiring causes signal attenuation and measurement inaccuracies.

3. Neglecting load matching issues: When using a 4–20 mA signal, failing to account for the input load resistance of downstream instruments or PLCs. Exceeding the load limit causes the output to drop, resulting in abnormal operation and the inability to properly collect pressure data.

4. Incorrect selection of general-purpose models in explosion-proof environments: Unauthorized use of non-explosion-proof transmitters in flammable and explosive workshops or tank farms violates safety regulations, poses safety hazards, and will fail safety inspection acceptance.

5.4 Customization Recommendations

1. Special Signal Customization: Supports non-standard voltage signals, 0–20 mA, special linear calibration, reverse output, and other customizations to accommodate legacy equipment and integration with specialized imported instruments.

2. Customization for Non-Standard Operating Conditions: Custom ranges for ultra-high pressure, low pressure, and negative absolute pressure; special stainless steel, anti-corrosion coatings, and extended heat dissipation structures for high-temperature and highly corrosive media; extended waterproof leads and enhanced sealing versions for outdoor deep-buried or submerged applications.

3. Multi-Channel Integration Customization: A single housing integrates multiple pressure measurement channels and integrated transmitter outputs, suitable for centralized multi-point monitoring of equipment. This saves installation space and wiring costs, and the number of channels

and signal output methods can be customized based on the number of field measurement points.

4. Structural and Installation Customization: Custom non-standard threaded interfaces, extended pressure connectors, and special mounting brackets are available to accommodate non-standard piping, confined spaces, and special installation angles in field conditions.

VI. Installation and Commissioning Guidelines

6.1. Pre-installation Preparation

1. Checking the Accessories

Upon delivery, verify each item of the standard package: QDW70A-F main unit, waterproof lead-in cable, sealing gasket, threaded mounting seal, product specification label, factory certificate of conformity, and quick start guide. Confirm that the model, range, output signal, and power supply specifications match the purchase order. Ensure the exterior is free of dents, the housing is undamaged, the leads are free of chafing, and the threads are intact with no stripped threads.

2. Environmental Inspection

The installation site must be verified in advance: ensure there are no persistent highly corrosive gases or conditions of prolonged submersion; avoid direct exposure to high-temperature heat sources, open flames, sources of strong vibration, high-power variable frequency drives, and high-voltage cables running in close proximity; ensure that ambient temperature and medium temperature are within the product's rated operating range; For outdoor or damp locations, ensure that the installation point is not exposed to direct rainwater, and that the IP65 protection rating remains intact.

3. Tool List

Essential tools: Adjustable wrench / open-end wrench, wire strippers, electrical tape, multimeter, insulated gloves, cable ties, cable clamps, standard pressure gauge (for on-site calibration), ground connection wire.

4. Safety Precautions

Before installation, the power supply to the on-site control cabinet and the downstream PLC/DCS must be disconnected. It is strictly prohibited to disconnect or connect wires while the system is energized. In flammable or explosive areas, intrinsically safe models must be used, and explosion-proof installation regulations must be strictly followed. During wiring, avoid exposing bare wires and prevent short circuits and electrical leakage. Implement protective measures for work at heights or on pipelines. Do not install or remove transmitters under pressure; installation or removal must only be performed after depressurization.

6.2 Standard Installation Procedure

1. Mechanical Installation and Securing

First, relieve pressure from the pressure ports of the pipe or tank to be measured, and clean debris and scale from the threaded connections;

Wrap with PTFE tape or install a sealing gasket, then manually screw the transmitter into the M20×1.5/G1/2 standard threaded connection;

Use a wrench to grip the transmitter's hexagonal locking tab to tighten it; do not directly tighten the housing or the base of the lead wires to prevent loosening of internal components or seal failure;

Preferably install vertically upward; horizontal or sideways installation is also acceptable, but avoid long-term accumulation of media impurities at the pressure-sensing diaphragm;

Route the lead cable smoothly, allowing for an appropriate bend radius; do not pull it forcefully or kink it sharply, and avoid external pulling forces at the lead exit point.

2. Wiring Specifications

This product features a waterproof direct-wiring design with no external terminal block; cables are routed directly from the unit. General wiring rules for 2-wire 4-20mA systems:

Distinguish between power lines and signal loops. In a 2-wire system, there are no separate input and output lines; power and signal share the same two wires;

Connect the red or brown wire to the power supply positive (+) terminal, and the black or blue wire to the power supply negative (-) terminal, which also serves as the signal loop;

Ground the cable shield at a single point—only on the control cabinet side. Leave the shield floating (ungrounded) at the transmitter end to prevent ground loop interference;Ensure all connections are securely crimped. Do not expose bare wires. After wiring is complete, wrap and seal the connections with electrical tape or waterproof insulating sleeves.

3. Grounding Requirements

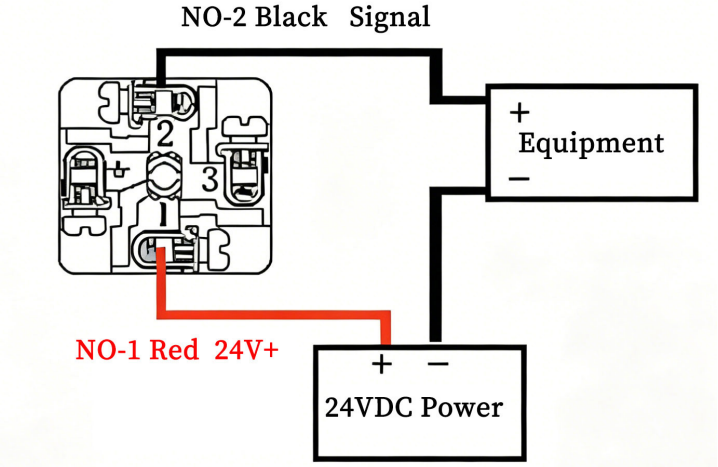
The transmitter's metal housing must be reliably connected to the field protective ground to reduce static electricity and electromagnetic interference;

The shielding must strictly follow the single-point grounding principle; grounding at both ends is prohibited;

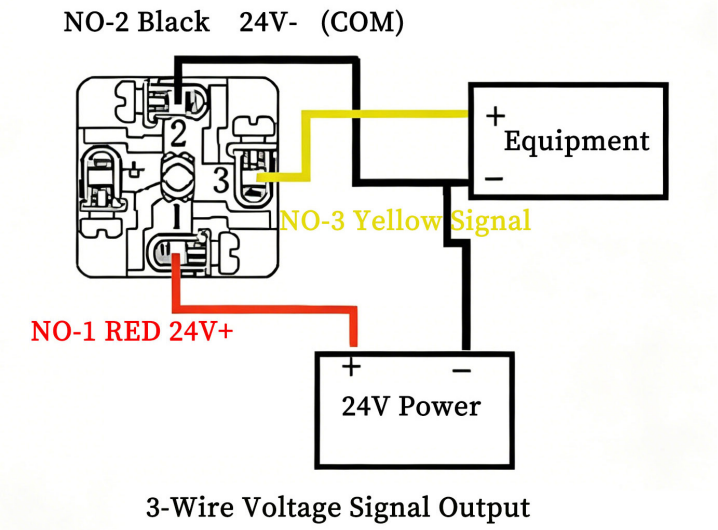
The grounding busbar in the control cabinet, instrument grounding, and system grounding must all be connected to a single grounding point; multiple dispersed grounding points are not permitted.

6.3, Text Version of Wiring Diagram Specifications

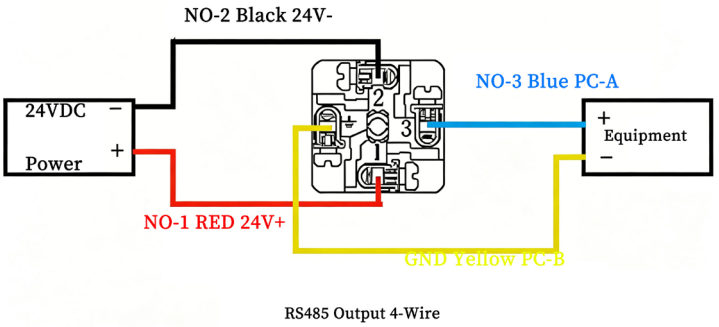
1. Current Signal Type 4-20mA



2. Voltage Signal Type (0–5 V/0–10 V)



3. RS485 Modbus RTU Signal Output



4. Comparison of Correct and Incorrect Wiring
☒ Correct: Two-wire circuit connected in series, shield grounded at a single point, no sharp bends in the cable, secure connections with intact insulation, and reliable housing grounding.
☒ Incorrect: Shield grounded at both ends; power and signal wires routed in the same conduit; wiring performed while the system is energized; tightening the housing threads; tension on the base of the lead wires; forced installation under pressure beyond the rated range.

6.4 Power-On Commissioning Procedure
1. No-Load Test
After installation and wiring are complete, do not apply medium pressure yet. Apply 24 VDC power in a no-load state; use a multimeter to measure the loop current. The standard no-load zero point should be close to 4 mA. If there is no fluctuation or significant variation, the power supply and wiring are normal.

2. Signal Calibration
Connect a standard field calibration pressure gauge and slowly apply pressure to the four points: 25%, 50%, 75%, and 100% of the full scale. Compare the transmitter's output current/voltage with the standard pressure gauge readings at each point to verify linearity and stability.

3. Operational Status Assessment
This model has no external indicator lights; assess status based on data behavior:
If readings stabilize after power-on and the zero point does not drift: Normal operation;
If readings fluctuate erratically or show irregular variations: Interference, poor grounding, or incorrect shielding wiring;
If the reading remains fixed at full scale without change: Wiring break, reversed polarity, or mismatched range.

4. Calibration Methods
Zero-point calibration: With the unit at rest and no pressure applied, observe whether the output matches the standard zero-point value; if there is a deviation, perform fine-tuning of the zero-point via the backend system software;
Full-scale calibration: Apply pressure up to the rated full scale, then compare with a standard gauge to adjust the system's display ratio;
Do not attempt to open the housing and adjust internal potentiometers on-site. Contact the manufacturer's technical support for hardware calibration.

6.5 Installation Precautions
1. Never operate beyond the rated pressure range or subject the device to instantaneous high-pressure surges. Exceeding the rated range will directly damage the diffused silicon pressure-sensing core, causing permanent failure.

2. Never exceed the rated supply voltage. Prolonged operation at voltages exceeding 36 V DC may burn out the internal signal conditioning circuitry. Strictly use a compliant regulated power supply within the 12–36 V DC range.

3. Avoid running wiring in close proximity to high-voltage equipment such as inverters, motors, and contactors. Keep high- and low-voltage wiring separate to minimize signal drift caused by electromagnetic interference.

4. In damp, rainy, or outdoor environments, do not remove the lead sealing structure or expose wiring. Maintain the unit's fully sealed condition; do not drill holes or modify wiring without authorization.

5. Do not use standard non-explosion-proof models in flammable or explosive hazardous areas. It is strictly prohibited to connect the system directly without a safety barrier in explosion-proof environments.

6. Do not forcefully bend the base of the leads or drag or pull the cables, as this may damage the internal seal, allowing water or dust to enter and cause malfunctions.

VII. Recommendations for Daily Use and Maintenance
7.1 Key Points for Daily Inspections
1. Visual Inspection of Equipment
Conduct a daily on-site visual inspection to ensure the transmitter's housing shows no deformation, rust, or cracks; check that the waterproof lead wires have no damaged insulation, signs of aging or cracking, or evidence of external pulling or bending; verify that threaded connections have no leaks, scaling, or rust, and that the overall sealing structure remains intact with no signs of water or dust ingress.

2. Signal Stability Monitoring
Monitor pressure readings in real time on the PLC, DCS, or digital display instrument to observe for any abnormal phenomena such as erratic fluctuations, slight drifts, sudden drops to zero, or values remaining at full scale. Compare pressure data with adjacent measurement points on the same pipeline to determine if the readings align with process logic, and promptly identify issues such as signal interference, loose wiring, or sensor element performance degradation.

3. On-Site Temperature, Humidity, and Operating Condition Monitoring
Continuously monitor the ambient temperature and medium temperature at the installation site to ensure they remain within the product's rated operating temperature range, preventing prolonged operation at extremely high or low temperatures. Conduct thorough inspections of environmental humidity at locations prone to moisture, rain exposure, or proximity to water treatment tanks to prevent prolonged condensation or water accumulation that could soak the housing or lead connectors.

4. Installation Condition Inspection
Ensure the transmitter installation location is free from significant vibration or impact, and that the piping is free from severe water hammer pressure surges; verify that the lead wiring is securely fastened, with no loose or dangling sections, and that it is not squeezed or worn by equipment; keep a reasonable safety distance from strong electromagnetic radiation sources such as high-power variable frequency drives, high-voltage motors, and contactors.

7.2 Periodic Maintenance Plan
1. Overall Cleaning Schedule
In standard industrial environments, clean the exterior every 3 months; in environments with heavy dust, high humidity, or mild chemical corrosion, clean monthly. Use a dry, soft cloth to wipe dust, oil, and scale from the housing surface. Never rinse the housing or lead sealing areas directly with water, and do not use strong acid or alkali cleaning agents.

2. Wiring and Fastening Inspection
Conduct a full wiring inspection every six months: Check that the lead wire crimp terminals are free of looseness, oxidation, or blackening, and that there are no loose connections; ensure the shielding layer is properly grounded with no broken wires or exposed bare wires; verify that the transmitter mounting threads and hex fasteners are secure. If slight looseness is detected, relieve pressure immediately and tighten appropriately; never forcefully tighten while the system is under pressure.

3. Recommendations for Accuracy Verification
Under normal operating conditions, perform accuracy comparison and calibration every 6 months; For operations with high process control requirements and strict metrological oversight, perform on-site comparison and verification every 3 months; use a standard precision pressure gauge to compare five data points at the same location: zero, 25%, 50%, 75%, and 100% of the range. If the error exceeds the allowable range, perform fine-tuning of the system's zero and full-scale points; do not disassemble the housing to adjust internal components without authorization.

4. Aging Hazard Inspection
Conduct a comprehensive aging inspection once a year: Check the cable sheath for signs of aging, hardening, or cracking; inspect sealing areas for whitening, deformation, or loss of elasticity; for long-term outdoor or open-air applications, focus on checking waterproof sealing performance. Replace components promptly upon discovering aging hazards to prevent sudden water ingress, malfunctions, and downtime.

7.3 Long-Term Maintenance Tips

1. Long-Term Dust and Moisture Protection
Maintain the transmitter's fully sealed original structure; do not drill holes, remove seals, or modify junction boxes without authorization. In humid or condensation-prone environments, install simple waterproof barriers around the lead-out ports and housing to prevent direct rain exposure and condensation buildup. Route indoor and outdoor wiring through cable trays whenever possible to minimize exposure to dust and moisture.

2. Optimized Maintenance for Interference Resistance
Strictly separate high- and low-voltage cables into different cable trays or conduits; signal lines must not be routed in the same conduit or bundled alongside power cables. Always ensure the shielding layer is grounded at a single point to prevent ground loop interference caused by dual grounding. Ensure proper grounding and filtering for on-site variable frequency drives and motor equipment to reduce the impact of electromagnetic radiation on the transmitter signal.

3. Specialized Protection for Extreme Environments
High-Temperature Environments: Keep the transmitter away from direct heat sources such as boilers and hot pipes; install thermal shields when necessary to prevent prolonged high temperatures from accelerating the aging of electronic components.
Low-Temperature Environments: Ensure outdoor installations are protected against wind and freezing in winter to prevent lead wires from cracking due to freezing and condensation within internal circuits.
Corrosive Environments: Regularly inspect the 316L pressure-sensing ports for corrosion and scaling; promptly remove crystallized media and oil residue to prevent

4. the pressure sensing orifice from becoming blocked, which could affect measurement accuracy;
High-Vibration Environments: Reinforce pipelines with vibration-damping brackets to reduce fatigue damage to the transmitter core and sealing structures caused by prolonged high-frequency vibrations, thereby extending the service life of the entire unit.

VIII. Troubleshooting & Emergency Response
8.1 List of Common Faults
The transmitter has no output signal; the instrument/PLC displays no values, and there is no change in current or voltage.
Signal zero drift; values shift slowly; readings rise or fall on their own when the system is idle and there is no pressure.
Measurement values fluctuate erratically or are distorted; data jumps frequently or fluctuates irregularly even when pressure is stable.
Full-scale lockout: Regardless of actual pressure, the display remains fixed at full scale and does not change
No response to pressure changes: Field pressure rises or falls significantly, but the transmitter's output remains unchanged
Abnormalities caused by environmental interference: Values change abruptly when nearby inverters or motors start, returning to normal after shutdown
Failure due to moisture or water ingress: After prolonged exposure to moisture or water, values become erratic, circuits short-circuit, and downstream equipment triggers alarms

8.2 Analysis of Failure Causes
1. Wiring-related causes
Reversed polarity, broken wires, shielding grounded at both ends, loose or oxidized terminals, mixing high- and low-voltage lines in the same conduit, or incorrect wiring (e.g., treating a two-wire system as a three-wire system).

2. Power supply-related causes
Supply voltage below 12 V DC or above 36 V DC; excessive power supply ripple; damaged regulated power supply; circuit load resistance exceeding specifications; reverse polarity connection without protection.

3. Signal Load-Related Causes
Input load of downstream PLCs or instruments exceeds the transmitter's permissible load range; unshielded signal lines that are excessively long; exposed signal line connectors that have become damp.

4. Environmental Interference Causes
Excessively close proximity to variable frequency drives, high-power motors, or contactors; parallel routing of power and signal cables; chaotic or multi-point grounding at the site; outdoor humidity, condensation, or dust ingress into sealed structures.

5. Causes Related to Equipment Damage
Overpressure surges damaging the diffused silicon core; pressure-sensing diaphragms clogged or corroded by impurities; aging internal circuits; lead wires snapped at the base due to pulling; component failure caused by prolonged high temperatures.

8.3 Step-by-Step Troubleshooting
Fault 1: No output signal; instrument displays no reading
Troubleshooting Steps
Use a multimeter to measure the supply voltage and confirm it is within the standard range of 12–36 V DC;
Check whether the positive and negative leads are reversed, whether the core wires are broken, and whether the terminals are loose or oxidized;
Measure the loop current to determine if there is a short circuit or open circuit;
Check whether the cable is pinched, has damaged insulation, or has internal breaks.
Remedial Actions
Recorrect the positive and negative connections, tighten terminals, and replace oxidized terminals; if the power supply is unstable, replace it with a regulated DC power supply; if there is a break in the wiring, re-crimp the connection or replace the entire section of wiring.
Emergency Workaround
If immediate on-site troubleshooting and repair are not possible, directly replace the faulty unit with a spare QDW70A-F transmitter of the same measurement range and signal specifications to temporarily restore system operation. The faulty device should be repaired at a later time.

Fault 2: Signal Zero Drift, Spontaneous Value Shift
Troubleshooting Steps
Fully depressurize and let the unit stand; observe whether the zero point deviates from the standard 4 mA;
Check whether the ambient temperature has undergone sudden cooling or heating, exceeding the normal operating temperature range;
Verify whether there has been prolonged slight overpressure or whether the pressure-sensing orifice is blocked by crystallized medium;
Check for improper grounding or incorrect shield grounding methods.
Remedial Measures
Perform zero-point fine-tuning at the control system end; clean impurities from the pressure interface and unblock the pressure-sensing orifice; ensure proper single-point grounding of the shield; keep the device away from high-temperature heat sources and areas with sudden temperature fluctuations.
Emergency Workaround
Temporarily set up offset compensation within the control system to maintain normal process monitoring; perform cleaning, maintenance, or equipment replacement during a scheduled shutdown window.

Fault 3: Erratic readings, interference-induced distortion, and significant fluctuations
Troubleshooting Steps
Check if there are variable frequency drives (VFDs) or motors in the vicinity whose start/stop actions cause synchronized fluctuations in readings;
Check if signal cables are routed in the same conduit or cable tray as power cables;
Confirm whether the shielding layer is grounded at both ends or if there is chaotic multi-point grounding on-site;
Check if the outer sheath of the leads is damaged or damp, and if there is condensation on exposed connection points.
Remedial Measures
Route power and signal cables separately, increasing the spacing between them; modify the shielding layer to be grounded at a single point in the control cabinet; consolidate the system's common ground and eliminate multi-point grounding; apply waterproof insulation wrapping to exposed connections.
Emergency Workaround

Temporarily increase signal filtering parameters and extend instrument sampling time to suppress value fluctuations, ensuring process visibility and controllability; rewire and implement anti-interference measures at a later stage.

Fault 4: No response to pressure changes; values stuck and unresponsive
Troubleshooting Steps
Manually increase or decrease on-site pressure to observe whether the output follows the changes;
Check whether the pressure port is completely blocked by scale, oil residue, or impurities;
Confirm whether an overpressure surge has damaged the sensor element;
Check whether the downstream PLC module is frozen or experiencing channel failure.
Remedial Actions
Dismantle the transmitter, relieve pressure, and clear any debris blocking the pressure sensing orifice; if the sensor element is damaged by overpressure, replace the entire unit; troubleshoot and reset any faults in the downstream industrial control channel.
Emergency Workaround
Switch to a backup measurement point or channel for temporary monitoring; return the faulty device to the factory for inspection and repair.

Fault 5: Full-scale lockout; maximum value remains fixed and does not change
Troubleshooting Steps
Check for irreversible damage to the sensor element caused by severe overpressure or water hammer;
Check for short circuits in signal wires or adhesion between positive and negative wires;
Verify whether the range model matches the on-site operating conditions.
Remedial Actions
Disconnect short-circuited or adhered cables and re-insulate them; if the model is mismatched, replace with the correct range; if the sensing element is damaged by overpressure, replace the entire unit directly.
Emergency Workaround
Activate a backup transmitter of the same specification for replacement, ensuring uninterrupted operation of production lines, water treatment systems, and chemical process piping.

Fault 6: Alarm triggered by moisture ingress or seal failure
Troubleshooting Steps
Check the base of the leads and the housing welds for signs of water ingress or condensation;
Check for unauthorized disassembly or modification of the seal, or removal of the waterproofing structure;
Long-term exposure to rain or immersion in standing water has caused internal circuitry to become damp.
Remedial Measures
Do not disassemble the housing without authorization; for minor moisture ingress, disconnect power, allow the unit to air dry, and reapply waterproof protection to the leads; if the seal is irreparably damaged, replace the unit immediately.
Emergency Workaround
Temporarily install a waterproof shield to prevent direct exposure to rain while replacing the unit with a spare.

8.4. After-Sales Repair Guidelines
1. Criteria for Determining Equipment Failure and Reporting Repairs
If any of the following conditions occur, the equipment is deemed to have a hardware failure, and an after-sales repair request must be submitted:
All wiring, power supply, grounding, and cabling are correct and compliant, yet there is no output or the readings remain permanently abnormal;
There is no unauthorized overpressure or physical damage, yet severe zero-point drift occurs and calibration is impossible;
Internal circuit damage, natural cracking of the lead sealing at the base, or failure due to non-human-induced water ingress;
Sensor core measurement failure, complete lack of pressure response, and inability to repair on-site.

2. Required Information for Service Requests
When submitting a service request, please provide: product model QDW70A-F, measurement range, output signal, installation environment and operating conditions, fault symptoms, duration of installation and use, on-site power supply conditions, and details regarding any overpressure, exposure to rain, or corrosive conditions.

3. Repair Process
First, self-inspect external factors such as wiring, power supply, interference, and installation conditions;
After ruling out external issues, contact sales or technical support to submit a fault report;
Customer service will verify warranty status and provide a return address or arrange for a direct replacement;
Return the faulty device with the model number and fault description clearly marked; the manufacturer will inspect, repair, or replace it.

4. Warranty Coverage
Under normal operating conditions, standard warranty service applies to non-human-induced damage, seal failure, circuit malfunctions, and natural component failure;
The following are not covered by the free warranty: intentional overpressure, unauthorized disassembly of the housing, unauthorized rewiring that compromises the waterproof structure, damage caused by external impact, and malicious use involving strong corrosion;
Failures resulting from compliant use within the warranty period are eligible for free repair or replacement.