3051 Pressure Transmitter

I. Product Definition

The QD-3051-J series of high-precision, through-hole-mounted monocrystalline silicon pressure transmitters is an industrial-grade pressure measurement and transmission device developed by Anhui Qidian Automation Technology Co., Ltd. Designed specifically for industrial on-site pressure monitoring applications, it is an intelligent pressure measurement terminal that integrates pressure signal acquisition, high-precision conversion, digital compensation, and standardized signal output.

Its core functions cover the following aspects:

1. Precise Pressure Signal Acquisition: Utilizing a monocrystalline silicon piezoresistive sensor chip, it enables continuous and stable physical signal acquisition of gauge pressure, absolute pressure, and differential pressure (depending on the model) for media such as gases, liquids, and steam. The measurement range covers common industrial scenarios (e.g., 0–1.6 MPa, with customizable expansion options) and is compatible with various media, including water, oil, and mildly corrosive fluids.

2. High-Precision Signal Conversion and Compensation: Built-in temperature compensation, nonlinearity compensation, and zero/span calibration circuits ensure high-precision pressure signal conversion. The basic accuracy reaches Class 0.1, eliminating measurement deviations caused by temperature drift and nonlinearity errors to ensure measurement stability across the entire temperature range and measurement span.

3. Standardized Industrial Signal Output Equipped with a standard 4–20 mA analog signal output and support for the HART digital communication protocol, it is compatible with mainstream industrial control systems (PLC/DCS), enabling continuous transmission of analog signals as well as remote debugging and parameter retrieval for digital signals.

4. Intelligent Display and Local Interaction: Equipped with an LCD display, it provides real-time local display of pressure values, temperature values, and percentage of full scale, among other information. It supports on-site parameter viewing and zero/span adjustment, allowing basic commissioning to be completed without additional tools.

5. Explosion-Proof and Industrial-Grade Protection: Features an explosion-proof design with an enclosure protection rating of IP65 or higher, making it suitable for flammable and explosive environments such as petroleum, chemical, and natural gas industries. It also offers resistance to electromagnetic interference, vibration, and impact, ensuring stable operation in complex industrial settings.

6. Plug-in Installation Compatibility It features a standard external threaded plug-in structure (typically industrial standard threads such as M20×1.5), allowing direct installation on pipes or tanks without the need for additional pressure tubing. This reduces installation steps and the risk of leaks, making it suitable for space-constrained direct-mount applications.

II. Working Principle

The operational process of the QD-3051-J monocrystalline silicon pressure transmitter can be broken down into four core steps: “Signal Sensing – Signal Conversion – Signal Processing – Signal Output.” A simplified explanation is as follows:

1. Signal Sensing: The monocrystalline silicon chip detects pressure changes

The transmitter’s measuring end (the stainless steel connector in contact with the medium) transmits the medium’s pressure to the internal monocrystalline silicon sensor chip. The chip integrates a piezoresistive strain gauge based on a Wheatstone bridge structure. When pressure acts on the chip, it undergoes minute deformation, causing the resistance value of the strain gauge to change, thereby converting the physical quantity of “pressure” into a faint electrical signal.

2. Signal Conversion: Electrical Signal Amplification and Analog-to-Digital Conversion

The weak electrical signal output by the chip is first amplified by an internal signal conditioning circuit and then converted into a digital signal by an analog-to-digital converter (ADC). During this process, the circuit simultaneously acquires the ambient temperature signal for subsequent temperature compensation.

3. Signal Processing: Digital Compensation and Calibration

The transmitter’s built-in microcontroller (MCU) processes the digital signal. Using preset compensation algorithms, it eliminates factors that affect measurement accuracy—such as temperature drift, nonlinearity errors, and zero-point offset—while calculating the current actual pressure value based on the user-set range parameters.

4. Signal Output and Interaction: Standardized Transmission and Local Display

The processed pressure signal is converted via a digital-to-analog converter (DAC) into a standard 4–20 mA analog current signal for output to control systems such as PLCs or DCSs. Simultaneously, it is transmitted to an LCD display for local value readout. Additionally, the HART protocol module superimposes a digital signal to support remote debugging, parameter modification, and device diagnostics.

III. Core Value

1. High-Precision Measurement Challenges and Solutions

Q: Temperature fluctuations and medium variations in industrial environments can easily lead to inaccurate pressure measurements, resulting in data drift and excessive deviations. How can this be addressed?

A: The QD-3051-J employs a single-crystal silicon sensor chip with built-in temperature and nonlinearity compensation algorithms. Achieving Class 0.1 accuracy, it eliminates temperature drift and nonlinearity errors, maintaining stable measurements across the entire temperature range and full measurement span. This resolves the data deviation issues caused by the low accuracy and significant temperature drift of traditional transmitters.

2. Installation and Leakage Risks: Challenges and Solutions

Q: Traditional transmitters require installation with pressure tubing, which involves cumbersome steps and is prone to leaks and blockages in the tubing, resulting in high maintenance costs. How can this be addressed?

A: The QD-3051-J features a direct-threaded installation design that allows for direct mounting on pipes or tanks without the need for additional pressure tubing. This reduces installation steps and potential leak points, lowering the risk of leaks and blockages while simplifying both installation and maintenance procedures.

3. Challenges and Solutions for Flammable and Explosive Environments

Q: In flammable and explosive environments such as the petroleum and chemical industries, instruments must meet high explosion-proof performance standards. Standard transmitters pose safety hazards. What is the solution?

A: The QD-3051-J features a flameproof explosion-proof design with an enclosure rated at IP65 or higher, ensuring safe operation in flammable and explosive environments. It also offers resistance to electromagnetic interference, as well as shock and vibration, meeting the safety and stability requirements of industrial sites.

4. Challenges and Solutions for Commissioning and Maintenance Efficiency

Q: Traditional transmitters require specialized tools for commissioning, making on-site and remote commissioning inconvenient. Parameter modification and device diagnostics are inefficient. What can be done?

A: The QD-3051-J supports the HART digital communication protocol, enabling remote zero/span calibration, parameter modification, and device diagnostics. It also features an LCD display that supports local real-time data viewing and basic commissioning, allowing operations to be completed without additional tools and significantly improving commissioning and maintenance efficiency.

5. Signal Compatibility Challenges and Solutions

Q: Different brands of PLC/DCS systems have varying signal

compatibility requirements. When transmitter output signals do not match, the system cannot read the data. What should be done?
A: The QD-3051-J comes standard with a 4–20 mA analog signal output and also supports the HART digital communication protocol. It is compatible with the vast majority of mainstream industrial control systems on the market, resolving system integration issues caused by signal mismatches.

6. Challenges and Solutions for Stability in Complex Operating Conditions
Q: Industrial environments often involve issues such as vibration, electromagnetic interference, and media corrosion, which can cause transmitters to malfunction and disrupt production continuity. How can this be addressed?
A: The QD-3051-J features an industrial-grade stainless steel measurement connector suitable for mildly corrosive media. It is also designed to resist electromagnetic interference, vibration, and impact, ensuring long-term stable operation in complex industrial environments. This reduces the risk of equipment failures and downtime, thereby safeguarding production continuity.

IV. Key Product Parameters & Specifications
4.1 Basic Electrical Parameters
Sensor Type: Monocrystalline silicon piezoresistive (high precision, low temperature drift)
Pressure Measurement Type: Gauge pressure (G), Absolute pressure (A)
Measurement Range (Standard): 0–1 kPa … 0–40 MPa (customizable)
Accuracy Class: ±0.075% FS / ±0.1% FS (optional)
Non-linearity: ≤±0.05% FS
Repeatability: ≤±0.025% FS
Hysteresis: ≤±0.05% FS
Long-term Stability: ≤±0.1% FS / 3 years
Output Signal:
Analog: 4–20 mA DC (2-wire)
Digital: HART protocol (superimposed on 4–20 mA)
Resolution: 16-bit
Response Time: ≤100 ms (damping adjustable)
Damping Time: 0–32 s, continuously adjustable
Load Resistance:
4–20 mA: 0–800 Ω (when powered by 24 V)
Dielectric Strength: AC 500 V / 1 min, no breakdown

4.2, Isolation Performance Parameters
Input/Output Isolation: Electrical isolation (sensor side isolated from circuit side)
Isolation Withstand Voltage: AC 1500V / 1 min (between input–output–ground)
Insulation Resistance: ≥1000 MΩ @ 100 VDC
Common-Mode Rejection Ratio (CMR): ≥120 dB
Differential-Mode Rejection Ratio: ≥60 dB
Electromagnetic Interference (EMI) Resistance: Complies with GB/T 17626 (EMC Industrial Grade)
Process Isolation Diaphragm: 316L stainless steel (standard); optional Hastelloy C, tantalum, or Monel

4.3 Power Supply & Power Consumption Parameters
Supply Voltage: DC 24V (typical); allowable range 15–36 VDC
Polarity Protection: Reverse polarity protection
Full-Load Power Consumption:
Analog Operation: ≤25mA @ 24VDC
With HART Communication: ≤30mA @ 24VDC
Power Distribution Output: No external power distribution (two-wire passive loop)
Loop Voltage Requirement: Minimum 12V (to ensure 4mA normal operation)

4.4 Environmental Parameters
Medium temperature: −40°C to +85°C (standard)
Ambient temperature:
Operation: −40°C to +85°C
With LCD display: −20°C to +65°C
Storage temperature: −50°C to +100°C
Relative humidity: 0–95% RH (non-condensing)
Protection rating: IP65 (dust-tight, water-jet-proof)
Explosion-proof rating (optional):
Flameproof: Ex db IIC T6 Gb
Intrinsically safe: Ex ia IIC T4 Ga (with safety barrier)
Compatible safety barrier models (for intrinsically safe applications): Qidian QD-GS series isolation safety barriers (e.g., QD-GS-11, QD-GS-12)
Vibration Resistance: 4–2000 Hz, 0.1 mm amplitude, fault-free

4.5. Physical Parameters
Mounting Method: Plug-in, external thread direct mounting (no pressure tubing required)
Process Connection Thread: M20×1.5 (standard); optional G1/2, NPT1/2
Dimensions (L × W × H, approximate):
Overall height: approx. 173 mm
Indicator width: approx. 145 mm
Process connection length: approx. 60 mm
Display window: approx. 40 × 25 mm (LCD)
Weight: approx. 1.2 kg (excluding accessories)
Housing material:
Indicator: Aluminum alloy (corrosion-resistant powder coating, blue)
Process Connection: 316L Stainless Steel
Enclosure Protection Details:
Surface: Electrostatic powder coating, salt spray resistant, weather resistant
Sealing: Nitrile rubber / Fluorocarbon rubber O-ring (optional)
Cable Entry: M20×1.5 waterproof cable gland, IP65



V. Application-Specific Selection Guide
5.1 Key Selection Criteria
1. Signal Type Selection
The QD-3051-J comes standard with a 4–20 mA analog current output combined with the HART digital communication protocol. For integration with conventional industrial PLCs and DCS systems, the 4–20 mA + HART combination is recommended. If only simple local monitoring is required and there is no need for remote debugging, the pure 4–20 mA analog output version may be selected. It is not recommended to arbitrarily switch to non-standard voltage signals to avoid system compatibility issues.

2. Channel Configuration Selection
The product comes standard with a 1-input, 1-output configuration: one pressure medium input and one 4-20mA standard signal output. No additional signal splitting is required. Native 1-input, 2-output or multi-input, multi-output configurations are not supported. If simultaneous transmission of multiple signals is required, an external signal isolation distributor must be used for expansion; hardware channels must not be forcibly modified.

3. Power Supply Selection

For standard operating conditions, use the industrial standard 24 VDC two-wire circuit power supply, which is compatible with the power distribution in most control cabinets. In scenarios where a stable 24 VDC power source is unavailable on-site and power must be sourced locally, do not connect to 220 VAC mains power. Instead, use a power converter to convert the supply to 15–36 VDC wide-range power, strictly adhering to two-wire power distribution standards.

4. Selection Based on Explosion-Proof Requirements
For standard indoor ventilation environments without flammable or explosive media, the general-purpose standard model is sufficient. In flammable and explosive hazardous areas such as petroleum, chemical, gas, and oil tank facilities, explosion-proof or intrinsically safe versions must be selected. Intrinsically safe models must be used in conjunction with isolation safety barriers; it is strictly prohibited to substitute general-purpose models for explosion-proof models.

5. Selection Based on Installation Environment
For indoor control cabinets and temperature-controlled, dry environments, select the standard version; for outdoor, open-air, humid, dusty, or water-sprayed/drenched environments, prioritize the IP65 high-protection version; for locations with continuous vibration or strong electromagnetic interference, such as metallurgical facilities or areas near variable-frequency drives, select the vibration-resistant, EMC-compliant industrial-grade reinforced version; for extreme high or low-temperature conditions, use models rated for wide temperature ranges to avoid operating outside the specified temperature limits.

5.2 Industry Application Recommendations
1. Chemical Industry
For monitoring acid/alkali fluids, pipeline pressure, and reactor vessel pressure—where the medium exhibits mild corrosion and certain areas are classified as explosion-hazard zones— We recommend the QD-3051-J single-crystal silicon high-precision direct-mount model with an optional 316L stainless steel diaphragm. For flammable and explosive sections, select explosion-proof or intrinsically safe versions. The built-in electrical isolation is suitable for highly interfered chemical environments, and the direct-mount installation eliminates the need for pressure tubing, reducing the risk of medium leakage.

2. Power Industry
Pressure monitoring for power plant water circulation, steam pipelines, and oil/gas supply systems. Given the strong electromagnetic interference on-site and the equipment's continuous year-round operation, the standard high-precision QD-3051-J model is recommended. Leveraging the advantages of the single-crystal silicon chip—low temperature drift and excellent long-term stability—it supports 24V DC power supply. The 4-20mA + HART signal facilitates remote debugging and data acquisition via the central control DCS.

3. Metallurgy Industry
Pressure monitoring in steelmaking and rolling mill circulating water systems, as well as hydraulic and pneumatic pipelines. Given the high levels of vibration, dust, and temperature fluctuations at these sites, we recommend the IP65-rated, vibration-resistant, reinforced version of the QD-3051-J. Its wide operating temperature range accommodates extreme on-site temperature variations, while electrical isolation mitigates electromagnetic interference from variable-frequency drives. The push-in installation design is ideal for compact pipeline spaces.

4. Pharmaceutical Industry
Pressure monitoring for pharmaceutical pure water pipelines, process tanks, and cleanrooms. These environments demand high measurement accuracy, stability, and equipment cleanliness. We recommend the high-precision Class 0.075 standard version of the QD-3051-J. Its 316L stainless steel contact materials meet cleanroom requirements, and its oil-free design prevents external leakage. The standard non-explosion-proof model is sufficient for conventional cleanroom applications.

5. Smart Manufacturing / Automation Equipment
For industrial control assembly lines, hydraulic stations, air compressors, and fluid automation systems, where equipment integration is high and installation space is limited, the QD-3051-J direct-plug-in model is the preferred choice. It requires no additional adapters, and its standard 4–20 mA signal can be directly integrated with servo and PLC control systems. Its compact size makes it suitable for embedded installation within equipment.

5.3 Common Selection Pitfalls
1. Neglecting Isolation Grade
Many selections focus solely on accuracy and range while ignoring electrical isolation performance. Using transmitters with no isolation or low isolation grades in chemical plants or environments with strong variable-frequency interference can easily lead to signal drift, value fluctuations, system interference, and crashes. Retrofitting isolators later increases costs.

2. Misjudging Signal Range
Blindly selecting a wide range for low-pressure applications results in insufficient measurement resolution and excessive error in small signals; conversely, selecting a range that is too narrow allows actual pressure peaks to exceed the range, causing sensor overload damage and permanent measurement errors.

3. Neglecting Load Matching
Failure to calculate the total load (including PLC and line resistance) during selection can exceed the transmitter's maximum load capacity, resulting in issues such as incomplete 4–20 mA signal pull-up, inaccurate lower limits, severe signal attenuation over long distances, and communication disconnections.

4. Misapplication of General-Purpose Models in Explosion-Proof Environments
In hazardous areas such as flammable and explosive chemical plants or gas storage tanks, selecting standard non-explosion-proof models to save costs violates safety regulations. This poses fire and explosion hazards and prevents the system from passing safety inspections.

5.4 Customization Recommendations
1. Custom Signal Formats
In addition to the standard 4–20 mA output, we offer customizable voltage signal outputs (0–5 V, 0–10 V) and RS485 digital communication versions to accommodate non-standard signal interfaces for legacy industrial control equipment and IoT data acquisition modules.

2. Customization for Non-Standard Operating Conditions
For highly corrosive media, custom diaphragms made of Hastelloy or tantalum can be provided. For ultra-high or ultra-low temperature environments, chips and circuits with extended temperature ranges can be customized. For special installation threads, non-standard process connection interfaces such as G1/2 or NPT1/2 can be provided.

3. Multi-Channel Integration Customization
When equipment requires centralized monitoring of multiple pressure channels, we offer a complete integrated solution consisting of multiple QD-3051-J transmitters paired with a multi-channel signal isolator and a multi-channel safety barrier—without modifying the hardware of individual transmitters. This enables centralized data acquisition from multiple channels within a single cabinet and unified upload to the central control system, meeting the customized support requirements of turnkey automation projects.

VI. Installation and Commissioning Guidelines
6.1 Pre-installation Preparation
1. Verification of Components
Unpack the unit and verify that the main unit, process connection gaskets, waterproof cable glands, mounting hardware, product certificate of conformity, and instruction manual are all present. Confirm that the model, range, explosion-proof rating, and output signal match the purchase order. Ensure there are no dents or scratches on the exterior, no stripped threads, and no damage to the display.

2. Environmental Inspection
Ensure the installation site is free from severe mechanical shocks and prolonged exposure to highly corrosive gases; verify that ambient and medium temperatures do not exceed the product's rated operating range; for flammable and explosive areas, confirm that the site complies with explosion-proof regulations and that the appropriate explosion-proof

version has been selected; reserve sufficient space at the installation location for maintenance, reading, and operation, and avoid high-temperature heat sources, fans, and strong interference sources such as variable frequency drive control cabinets.

3. Tool List
Adjustable wrench, Phillips/flathead screwdrivers, multimeter, electrical tape, shielded signal cable, grounding copper wire, spirit level, pressure calibrator; for explosion-proof applications, use dedicated explosion-proof installation tools; open flames are strictly prohibited.

4. Safety Precautions
Before installation, the on-site power supply and the valves on the process piping must be shut off; work may only proceed after pressure has been relieved. It is strictly prohibited to disassemble the transmitter under pressure. In explosion-proof zones, strictly adhere to explosion-proof installation regulations; do not modify the housing or wiring compartment without authorization. Keep the work area dry and free of condensation during wiring; avoid handling electrical terminals with wet hands.

6.2 Standard Installation Steps
1. Direct-Plug-In Installation Steps
Clean the threads of the pipe or tank mounting interface, removing debris, rust, and burrs;
Apply PTFE tape or install a sealing gasket, then manually screw the transmitter into the threaded connection;
Tighten using a wrench with moderate force; do not forcefully twist or pry the transmitter to prevent damage to the internal sensor structure;
Adjust the display angle by freely rotating the transmitter to a convenient viewing position, then lock it in place.

2. Wiring Specifications
This product operates on a two-wire 4-20mA DC loop power supply and does not have separate input terminals; the power supply and signal share a single set of terminals:
Positive terminal: Connect to the positive terminal of the 24 V DC power supply or the positive terminal of the PLC/DCS analog input;
Negative terminal: Connect to the negative terminal of the power supply or the negative terminal of the PLC/DCS analog input;
There are no additional internal signal input channels; no external measurement signal wires are required;
The HART version is available and operates directly over the 4–20 mA loop, requiring no additional wiring.

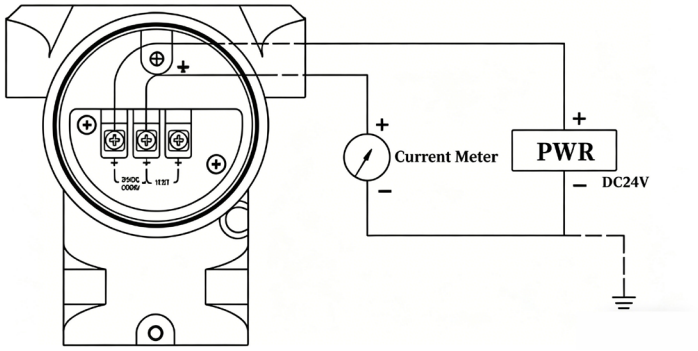
3. Grounding Requirements
The transmitter housing grounding terminal must be reliably connected to the field protective ground, with a grounding resistance ≤4Ω;
The shielding layer must be grounded at a single point: one end at the control cabinet side and the other end left floating on the transmitter side to avoid loop current interference caused by double-ended grounding;
In explosion-proof environments, the housing and all metal parts of the wiring compartment must be reliably bonded to the same potential ground throughout.

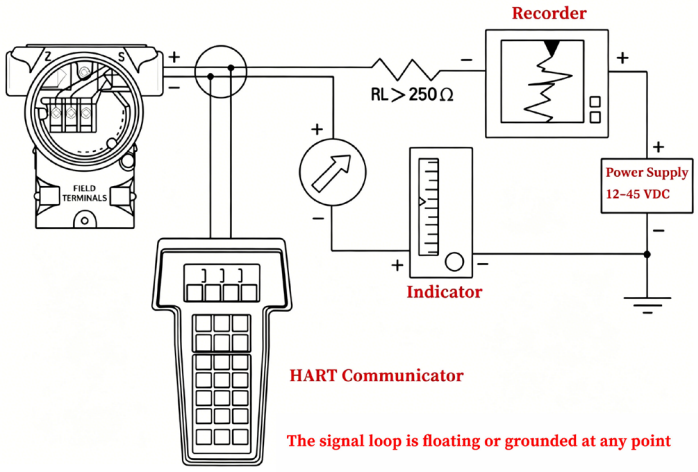
6.3, Labeling Standards for Wiring Diagrams
1. Standard Wiring Labeling
Terminal 1: Power + / Signal +
Terminal 2: Power - / Signal -
Use a two-core shielded cable, feed it through a waterproof cable gland into the terminal compartment;
Crimp the cable jacket tightly to ensure IP65 protection and prevent moisture from entering the terminal box.

2. Wiring Specifications for Isolated Models
When connecting to an external safety barrier or signal isolator:
Connect the two-wire system from the transmitter side to the field end of the safety barrier;
Connect the control room end of the safety barrier to the PLC/DCS;
The shielded cable must be grounded at a single point throughout its length; route the cable away from AC 220V and power cables, and run them on separate routes.

3. Correct vs. Incorrect Wiring Comparison
☒ Correct: Two-wire system with separate power and signal lines; shield grounded at one end; cable glands sealed and tightened; housing reliably grounded.
☒ Incorrect: Forced four-wire configuration; shield grounded at both ends; routed in the same conduit as high-voltage power lines; housing not grounded; loose or non-waterproof cable glands.







6.4 Power-On Commissioning Procedure
1. No-Load Test
Power on with the pipeline under no pressure; ensure the power supply is stable between 15–36 V DC. Observe whether the LCD display lights up, check for any error codes, and verify that the current zero-pressure value is displayed normally.

2. Signal Verification
Use a multimeter to measure the current in the circuit: the no-load standard should be 4 mA; slowly apply standard pressure up to full scale; the current should rise linearly to 20 mA, with linear readings at intermediate scales and no jumps or drift.

3. Indicator Status Assessment
The unit has no external fault indicator lights; refer to the display status:
Normal Power-On: Screen remains lit, values are stable with no flickering;

Power Abnormality: Screen dims and brightens intermittently, values fluctuate erratically;
Overpressure / Fault: Screen displays an error code, values remain locked.

4. Calibration Method
Enter the local menu under no-load conditions and perform zero-point calibration;
Apply standard full-scale pressure and perform span calibration;
After calibration, repeat the three-point verification: zero-point, 50% of span, and full-scale, to confirm that the error is within the permissible accuracy range;
The damping time can be fine-tuned on-site to suppress value fluctuations caused by on-site pressure fluctuations.

6.5 Installation Precautions
Never operate under overpressure or run continuously beyond the full-scale range to prevent deformation or permanent damage to the sensor diaphragm;
Never exceed the rated supply voltage; do not connect to AC 220V; only DC 15–36V power supply is permitted;
Avoid routing wiring in close proximity to variable frequency drives, motors, or power cables to prevent signal drift caused by electromagnetic interference;
In damp, outdoor, or rain-exposed environments, ensure the waterproof gland and sealing ring are securely tightened; do not leave the wiring compartment open or exposed;
In explosion-proof environments, do not disassemble the explosion-proof housing or alter the wiring compartment structure without authorization; doing so will void the explosion-proof certification and create safety hazards;
Do not forcefully bend the housing or climb on or step on the instrument to avoid mechanical damage to internal sensor components.

VII. Recommendations for Daily Use and Maintenance
7.1 Key Points for Daily Inspections
1. Inspection of Equipment Appearance and Installation Status
During daily or shift inspections, first examine the transmitter's exterior: ensure the display face and terminal chamber show no damage or deformation; check that the process connection threads show no signs of leakage; verify that the display face is installed at the correct angle with no misalignment or looseness. Pay special attention to the explosion-proof terminal chamber's sealing gasket and waterproof gland to ensure they are intact, with no water ingress, condensation, or corrosion; confirm that the housing's grounding terminal is securely connected and has not come loose.

2. Signal Stability Monitoring
Use the central control system or the on-site LCD screen to monitor in real-time whether the pressure readings are stable: no frequent fluctuations, no abnormal drift, and no out-of-range value variations. Simultaneously, use a multimeter to spot-check the loop current to confirm that the 4–20 mA signal is linear and normal, with no signal loss or fixed offset, and that HART communication has no disconnections or timeout errors.

3. Environmental and Operating Condition Monitoring
Record the ambient temperature and humidity at the installation site to ensure the equipment operates within the rated temperature range (-40°C to +85°C), away from direct sunlight and heat sources. Closely monitor the medium conditions to avoid prolonged overpressure or negative pressure shocks. If pipeline pressure pulsations are excessive, check whether the damping settings are appropriate to prevent sustained fluctuations in readings.

7.2. Regular Maintenance Plan
1. Cleaning Frequency and Methods
Standard Conditions: Clean once every 3 months. Use a dry, soft cloth to wipe dust and grease from the meter face and housing surface. Do not rinse directly with water to prevent moisture from entering the terminal compartment.
Dusty/Humid Conditions: Clean once every month. Focus on removing accumulated dust and condensation from the waterproof gland and terminal compartment crevices. Inspect the sealing gaskets for aging or cracking.
Highly Corrosive Conditions: Inspect the housing's anti-corrosion coating every 2 months. If peeling or rust is detected, apply anti-corrosion treatment promptly to prevent corrosion from spreading to internal circuits.

2. Wiring and Fastening Inspection
Every 6 months: After powering down, open the terminal compartment. Check the terminal blocks for looseness or oxidation, retighten the terminal screws, and remove dust and oxidation layers from the terminals; Check the shielded cable sheath for damage and ensure the ground connection is secure; reorganize the wiring to prevent cables from being pulled or squeezed;
Annually: Check the sealing performance of the process connection threads. If there is a slight leak, replace the sealing gasket or reapply Teflon tape, and tighten the threads (only grip the joint area; do not twist the meter head).

3. Recommendations for Accuracy Recalibration
Standard industrial conditions: Perform an accuracy recalibration using a pressure calibrator every 12 months, verifying three points: zero, 50% of full scale, and full scale. If the error exceeds the accuracy class (±0.1% FS), recalibrate the zero and full scale;
High-precision applications (e.g., chemical/pharmaceutical industries): Perform accuracy verification every 6 months. Record calibration data simultaneously to maintain an operational log, ensuring compliance with process requirements;
After overpressure, impact, or maintenance: Immediately verify accuracy to confirm the sensor is undamaged and shows no zero-point drift.

7.3 Long-Term Maintenance Tips
1. Dust and Moisture Protection Optimization
Outdoor / Humid Environments: Ensure the waterproof gland is securely tightened and equipped with sealing O-rings; a rain cover may be installed to prevent rainwater and condensation from entering the terminal chamber;
Dusty Conditions: Regularly clean dust from the meter housing to maintain heat dissipation and ventilation, preventing dust buildup from affecting cooling. Also, prevent dust from entering the display window and affecting readings;
Long-Term Equipment Shutdown: After powering down, seal the wiring ports with dust plugs and store the equipment in a dry, well-ventilated environment to prevent moisture-induced corrosion.

2. Interference Suppression Optimization
Cabling Optimization: Route signal cables in separate channels from power cables and variable frequency drive (VFD) cables, maintaining a distance of at least 30 cm to avoid parallel routing; strictly implement single-ended grounding for shielded cables—ground only at the control room end and leave the field end floating to prevent loop current interference;
Grounding Optimization: Ensure the transmitter housing has a ground resistance ≤4Ω and is reliably connected to the control cabinet's protective ground to avoid single-point floating grounding;
Damping Settings: When on-site pressure fluctuations are significant, appropriately increase the transmitter's damping time (adjustable from 0 to 32 seconds) to suppress value fluctuations and improve signal stability.

3. Protection Against Extreme Environments
High and Low Temperature Environments: In cold winter conditions, inspect equipment insulation measures to prevent temperatures from dropping below -40°C. In hot summer conditions, keep equipment away from heat sources and direct sunlight; install a sunshade if necessary to prevent overheating.
Vibration Conditions: In metallurgical or piping environments with significant vibration, verify that mounting brackets are secure and check for any looseness or resonance in the transmitter. Install vibration-damping pads to reduce damage to the sensing elements caused by vibration;
Highly Corrosive Media: Select custom models with 316L stainless steel or Hastelloy diaphragms. Regularly inspect the diaphragm for corrosion or scaling, and clean or replace it as necessary to prevent media corrosion from affecting measurement accuracy.

VIII. Troubleshooting & Emergency Response

8.1 List of Common Faults

Transmitter has no output signal (no current in the 4–20 mA loop, no data at the central control system)

Signal drift / excessive measurement deviation (values consistently too high or too low, poor linearity)

Local display malfunction (black screen, dim display, error codes, erratic readings)

System alarm triggered (DCS/PLC reports out-of-range, line break, communication failure)

Signal interference and distortion (frequent value fluctuations, severe oscillations, unstable data)

8.2, Analysis of Failure Causes

Wiring errors: Reversed polarity, loose or faulty terminal connections, incorrect shield grounding, signal lines routed alongside high-voltage power lines

Power supply abnormalities: Supply voltage below 15V or above 36V, loop load exceeding the transmitter's maximum capacity, excessive power supply ripple

Signal Overload / Abnormal Operating Conditions: Actual pressure exceeds measurement range; excessive medium impact or pulsation; diaphragm corroded or clogged by the medium

Environmental Interference: On-site electromagnetic interference (inverters, motors); severe vibration or impact; operation at extreme high or low temperatures; moisture ingress

Hardware Damage: Deformed or damaged sensor diaphragm; burned-out circuit modules; corrosion in the wiring compartment due to water ingress; display unit failure

8.3 Step-by-Step Troubleshooting

1. Transmitter has no output signal

Troubleshooting steps:

Check the power supply circuit: Use a multimeter to verify that the 24 V DC power supply is normal; the voltage must be maintained within the 15–36 V range;

Check the wiring: Ensure that the positive and negative terminals are not reversed, that the terminal screws are tight and not loose, and that there are no broken wires or loose connections;

Load Troubleshooting: Calculate the total loop resistance; the total load of the 4–20 mA loop must not exceed 800 Ω (when powered by 24 V);

Hardware Inspection: After powering down, open the terminal compartment and check for terminal oxidation or burn marks on the circuit board.

Remedial Actions: Re-tighten or replace terminal blocks, adjust the loop load resistance, and replace the DC 24 V power supply module with a qualified unit.

Contingency Plan: Temporarily replace with a spare transmitter of the same model, restore power to the loop, and return the faulty unit to the factory for repair.

2. Signal Drift / Excessive Measurement Deviation

Troubleshooting Steps:

Operating Conditions Check: Verify that the actual pressure is within the measurement range; rule out issues such as overpressure or negative pressure surges;

Accuracy Calibration: Use a standard pressure source to calibrate the transmitter's zero point and full-scale range; confirm whether the deviation exceeds ±0.1% FS;

Environmental Check: Verify that the on-site temperature is within the operating range, and check whether the diaphragm has been corroded by the medium or is clogged by scale;

Calibration Procedure: Access the transmitter's local menu and re-perform zero and span calibration.

Remedial Actions: Clean or replace corroded or clogged diaphragms, recalibrate parameters, and adjust the damping time to suppress pressure pulsations.

Contingency Plan: Temporary corrections can be made via the central control system in the short term; if the deviation is excessive, replace with a spare transmitter and send the faulty unit to the factory for repair.

3. Display Abnormalities (Black Screen / Error Messages / Erratic Display)

Troubleshooting Steps:

Power Supply Check: Verify that the 24 VDC power supply is stable, with no under-voltage, over-voltage, or power supply ripple issues;

Terminal compartment inspection: After powering down, open the terminal compartment to check for condensation, water ingress, or signs of corrosion;

Operating condition inspection: Determine whether equipment protection was triggered due to overpressure or overtemperature;

Hardware inspection: Inspect the circuit board for burn marks or damaged components, and check if the display cable is loose.

Remedial actions: Remove condensation or accumulated water from the terminal compartment, replace the sealing gasket, and retighten the terminal connectors; Hardware failures require return to factory for repair.

Contingency plan: If there is no display but the signal is normal, temporarily operate based on central control data; if there is no signal output, replace with a spare transmitter.

4. System Alarm Triggered (Out-of-range / Line Break / Communication Failure)

Troubleshooting Steps:

Alarm Verification: Confirm DCS/PLC alarm messages to determine whether the issue is out-of-range, a line break, or a HART communication failure;

Loop Inspection: Measure the 4–20 mA loop current to determine if there is a wire break or short circuit;

Communication Troubleshooting: For HART communication failures, check if the loop resistance meets the ≥250 Ω requirement and if there is poor contact in the communication cable;

Operating Condition Verification: Confirm whether the actual pressure exceeds the transmitter's range to rule out false alarms.

Remedial Actions: Replace damaged signal cables, adjust the loop load resistance, and reconfigure HART communication parameters; For out-of-range conditions, replace the transmitter with one of the appropriate range.

Contingency Plan: If communication fails but the analog signal is normal, operate based on the analog data; for open-circuit or out-of-range faults, shut down the system and replace the equipment.

5. Signal Interference and Distortion (Value Jumps / Fluctuations)

Troubleshooting Steps:

Wiring Inspection: Ensure signal cables are routed in separate channels from power cables and variable frequency cables, with a minimum distance of ≥30 cm;

Grounding Check: Shielded cables should be grounded at one end only (control room side); the transmitter side should remain floating. The housing grounding resistance must be ≤4Ω;

Damping Check: Appropriately increase the transmitter's damping time to suppress value fluctuations caused by pressure pulsations;

On-site Inspection: Ensure equipment is free from strong vibrations and electromagnetic interference, and is located away from variable frequency drives and high-power motors.

Remedial Actions: Adjust the wiring configuration, optimize the grounding system, and reconfigure the damping parameters; install signal isolators if interference is severe.

Contingency Plan: Temporarily adjust the central control filter parameters to minimize the impact of data fluctuations; optimize on-site wiring and grounding during a scheduled shutdown.

8.4 After-Sales Repair Guidelines

1. Criteria for Determining a Malfunction

After completing the troubleshooting steps above, confirm the presence of hardware damage (e.g., ruptured diaphragm, burnt circuit board, corrosion due to water ingress in the terminal compartment);

Accuracy deviation exceeds the product's rated accuracy grade and cannot be restored through on-site calibration;

No output, no display, or communication failure that cannot be resolved through routine troubleshooting;

Physical damage to the equipment (cracked housing, damaged threads) that affects explosion-proof or protective performance.

2. Repair Process

Gather information about the faulty device: model, measurement range, serial number, installation date, fault symptoms, and on-site operating conditions;

Contact after-sales technical support and submit a description of the fault along with on-site troubleshooting records;
Complete the repair request form according to after-sales guidelines; if factory repair is required, return the device to the designated address;
After the after-sales team confirms the issue through inspection, discuss the repair plan, costs, and timeline; conduct acceptance testing upon completion of repairs.

3. Contact Information
Anhui Qidian Automation Technology Co., Ltd. After-Sales Technical Support: Official after-sales phone numbers and email addresses can be obtained through the official website or procurement channels;
Emergency Technical Support: Contact your procurement representative to coordinate on-site technical services or the provision of backup equipment.

4. Warranty Coverage
The warranty period is 12 months from the date of manufacture (as indicated on the Certificate of Conformity);
During the warranty period, free repair services are provided for equipment failures not caused by human error or force majeure;
The following situations are not covered by the warranty: improper operation, unauthorized disassembly or modification, use beyond rated conditions, water ingress or corrosion, damage from external forces, or repairs performed by third parties.