Submersible Level Sensor Transmitter

I. Product Definition

A submersible level transmitter is an industrial automation instrument that utilizes the physical principle that liquid static pressure is proportional to liquid level height to convert static pressure signals into standard electrical signals. Its core function is to continuously and in real-time measure and monitor liquid levels in various open/pressurized vessels, tanks, deep wells, waterways, and other similar environments.

Qidian QDY30A / QDY30A-B series submersible level transmitters are specifically designed for industrial on-site level measurement applications. They integrate a high-precision diffused silicon pressure sensor unit, signal conditioning circuitry, a stainless steel protective housing, and a dedicated waterproof cable. Capable of being directly submerged in liquids, these transmitters achieve precise, stable, and long-term level monitoring by measuring the static pressure of the liquid column. They are among the most widely used and cost-effective general-purpose transmitters in industrial level measurement.

Key Features:

1. Continuous Level Measurement: Real-time, continuous acquisition of liquid static pressure values, converted into corresponding liquid level heights, and output as standard electrical signals to support dynamic level monitoring and data acquisition.

2. Standardized Signal Output: Uniform output of the industrial-standard 4-20mA current signal, allowing direct connection to upper-level devices such as PLCs, DCS systems, digital displays, and recorders without the need for additional signal conversion modules.

3. Environmental Adaptability and Protection: Features a fully stainless steel (304/316L optional) probe housing, IP68-rated waterproof cable, and sealed construction, supporting long-term submerged operation and compatible with various media such as clean water, wastewater, and mildly corrosive liquids.

4. Wide Measurement Range: Supports full-range customization from 0–1 m to 0–200 m, meeting diverse liquid level measurement needs ranging from shallow pools to deep wells and storage tanks.

5. Low Drift and High Stability: Utilizes an imported diffused silicon pressure sensor chip combined with a temperature compensation circuit to achieve a measurement accuracy of 0.2% FS. It offers strong resistance to temperature drift and zero-point drift, eliminating the need for frequent calibration during long-term use.

6. Maintenance-Free and Long-Lasting: With no moving mechanical parts and a simple, reliable design, the probe is ready for operation as soon as it is immersed in the liquid. Installation and maintenance costs are extremely low, making it suitable for long-term, unattended operation.

II. Working Principle

The core logic of the submersible level transmitter is to measure liquid level by utilizing the physical principle that **“the deeper the liquid, the greater the pressure.”**
We can break this down into three steps:

1. Pressure Sensing: A high-precision pressure sensor chip (diffused silicon chip) is located at the bottom of the transmitter’s probe. When the probe is immersed in the liquid, the chip directly senses the static pressure generated by the liquid column above it. The magnitude of this pressure is directly proportional to the liquid’s density and the liquid level height (Formula: P = ρgh, where P is pressure, ρ is liquid density, g is gravitational acceleration, and h is liquid level height).

2. Signal Conversion: The sensor chip converts the received pressure signal into a weak electrical signal. This signal is then amplified, filtered, and temperature-compensated via the built-in signal conditioning circuit to eliminate errors caused by temperature fluctuations and zero-point drift, calibrating the signal into a stable standard signal.

3. Signal Transmission: The processed standard 4–20 mA current signal is transmitted via a dedicated waterproof cable to the host equipment in the control room. The host equipment calculates the corresponding liquid level height based on the signal magnitude, enabling real-time display, alarm, and control of the liquid level.

Workflow Breakdown:

1. After the transmitter is immersed in the liquid, the pressure sensing unit at the bottom of the probe comes into direct contact with the liquid and bears the static pressure of the liquid column;
The pressure sensing unit converts the static pressure signal into a weak millivolt-level electrical signal;

2. The signal conditioning circuit amplifies, filters, and temperature-compensates the electrical signal, correcting for errors caused by changes in ambient temperature and variations in the liquid medium;

3. The conditioned signal is converted into an industrial-standard 4–20 mA current signal (4 mA output at 0% liquid level, 20 mA output at full-scale liquid level);

4. The current signal is transmitted via a dedicated cable to upper-level devices such as PLCs and digital displays. These devices convert and display the liquid level value, while also enabling functions such as high/low level alarms and pump/valve interlock control.

III. Core Value and Solutions to Pain Points

Core Value Overview

The QDY30A / QDY30A-B series submersible level transmitters offer a low-cost, highly reliable, maintenance-free, and easy-to-install continuous level measurement solution for industrial environments. They address the pain points of traditional level measurement methods—such as low accuracy, high failure rates, cumbersome maintenance, and the inability to monitor remotely—enabling users to achieve precise data acquisition and automated control of liquid levels, thereby reducing operational and maintenance costs and improving production efficiency.

Q: Traditional float switches and magnetic level gauges suffer from low measurement accuracy, are prone to sticking, and cannot provide continuous level monitoring. What is the solution?
A: The QDY30A series utilizes diffused silicon pressure sensor technology to achieve high-precision continuous measurement with an accuracy of 0.2% FS. It outputs a 4-20mA signal corresponding to the liquid level in real time, supporting dynamic monitoring and data logging. With no moving mechanical parts, it eliminates issues such as sticking or malfunction, completely resolving the low accuracy and high failure rates associated with traditional mechanical level gauges.

Q: In environments with wastewater or impure liquids, level sensor probes are prone to clogging and corrosion, resulting in a short service life. What can be done? A: The QDY30A series probes are constructed from 304/316L stainless steel, offering strong resistance to corrosion and scaling. The bottom features an anti-clogging pressure-transmitting orifice design that effectively prevents impurities from blocking the pressure channel. Additionally, the IP68-rated fully sealed waterproof structure supports long-term submerged operation, making it suitable for complex environments such as sewage and mildly corrosive chemical media, thereby significantly extending the equipment’s service life.

Q: How can we address the challenges of level measurement in deep wells and large storage tanks, where installation is difficult and wiring is complex?
A: The QDY30A series features a submersible design. Installation is completed simply by submerging the probe in the liquid and securing the cable along the well or tank wall, eliminating the need for drilling or welding into the tank or well wall, resulting in low installation costs and a short installation cycle; Customized waterproof cables up to 100 meters in length are available, allowing signals to be transmitted directly to the control room without additional wiring, making it ideal for level measurement in deep wells and large storage tanks.

Q: What should be done when significant fluctuations in ambient temperature cause measurement data drift and large errors in the level gauge, affecting production control?
A: The QDY30A series features a built-in high-precision temperature compensation circuit that automatically corrects zero-point drift and temperature-induced errors caused by ambient temperature changes. This ensures stable measurement accuracy across a wide temperature range of -20°C to 80°C, preventing level data deviations due to temperature fluctuations and safeguarding the accuracy of production control.

Q: Level transmitters have high maintenance costs and require frequent calibration and servicing, which affects production schedules. What should we do?
A: The QDY30A series has no moving mechanical parts and features a simple, reliable design. It is precisely calibrated before leaving the factory, eliminating the need for frequent on-site recalibration. Its fully sealed structure—comprising a stainless steel probe and waterproof cable—requires only periodic cleaning of surface contaminants on the probe. With minimal maintenance requirements, it enables long-term unattended operation, reducing operational costs and downtime for maintenance.

Q: The level signal cannot be transmitted remotely, and on-site monitoring relies on manual inspections, resulting in low efficiency and slow response times. What should be done?
A: The QDY30A series outputs a standard 4-20mA current signal, allowing direct integration with upper-level devices such as PLCs, DCS systems, and digital display instruments. This enables remote transmission of liquid level data, real-time monitoring, and high/low level alarms. It eliminates the need for manual on-site inspections, enables timely responses to abnormal conditions, prevents safety incidents such as tank overflows and dry pumps, and improves on-site management efficiency.

Q: Liquid level ranges and media types vary significantly across different scenarios, making level sensor selection difficult and limiting versatility. What can be done?
A: The QDY30A series supports full-range customization from 0–1 m to 0–200 m. It also offers probe materials in 304 or 316L stainless steel, making it suitable for a wide range of media, including clean water, wastewater, mildly corrosive chemical liquids, and oils. With standard 4–20 mA signal output, it is compatible with the vast majority of industrial automation control systems, offering strong versatility to meet selection requirements across various scenarios.

IV. Key Parameters & Specifications

4.1 Basic Electrical Parameters
Measurement Range: 0–0.5 m to 0–500 m (customizable) QDY30A-B Standard 0–200 m
Overall Accuracy: ±0.2% FS (default); ±0.5% FS (optional) Factory calibrated, customizable to ±0.1% FS
Output Signal: Analog: 4–20 mA (two-wire), 0–5 V/1–5 V/0–10 V (three-wire); Digital: RS485 (Modbus protocol)
Response time: ≤8 ms (rise to 90% FS)
Zero drift: ±0.2% FS/year
Sensitivity drift: ±0.2% FS
Repeatability: ±0.1% FS
Nonlinearity: ±0.2% FS

4.2. Isolation Performance Parameters
Insulation Resistance: ≥100 MΩ @ DC 250 V
Isolation Voltage: DC 500 V (no breakdown for 1 minute)
Interference-Resistant Design: Reverse polarity protection, overload current limiting, lightning protection Suitable for complex industrial electromagnetic environments
Signal Isolation: Built-in signal conditioning isolation circuit Prevents interference from ground potential differences

4.3 Power Supply & Power Consumption Parameters
Supply Voltage: DC 12–32 V (typically DC 24 V)
Full-Load Power Consumption: ≤20 mA (during 4–20 mA output)
Load Capacity: Current Output: 0–600 Ω; Voltage Output: ≥10 kΩ
Power Distribution Output: None (2-wire passive)

4.4 Environmental Adaptation Parameters
Media Temperature: -25°C to +60°C (Standard); -40°C to +85°C (Custom)
Operating Ambient Temperature: -40°C to +60°C
Storage Temperature: -40°C to +125°C
Relative Humidity: ≤85% RH (non-condensing)
Protection Rating: IP68 (probe + cable)
Explosion-Proof Rating: Exia II CT4 (optional)
Mechanical Vibration: 20g (20–5000 Hz)
Mechanical Shock: 100g (11 ms)

4.5. Physical Parameters
1. Installation Methods
Submersible: Directly immersed in liquid, with cable secured along tank or well walls;
Bracket/Flange Mounting (Optional): Suitable for large storage tanks and deep well installations.
2. Dimensions (Probe)
Diameter: Φ28 mm;
Length: 120 mm (excluding cable);
Cable Specifications: Φ7 mm waterproof polyurethane cable (customizable lengths from 10 to 500 m).
3. Weight
Probe: Approx. 0.5 kg;
Cable: Approx. 0.1 kg/m (increases with length).
4. Housing Material and Protection Details
Probe Housing: 304 stainless steel (standard) / 316L stainless steel (corrosion-resistant, custom);
Diaphragm: 316L stainless steel (corrosion-resistant, clog-resistant);
Seal Ring: Nitrile rubber (standard) / Fluorocarbon rubber (customized for acid and alkali resistance);
Cable Sheath: Polyurethane (PU), oil-resistant, aging-resistant, waterproof;
Pressure Equalization Structure: Built-in breathable membrane + pressure-equalizing cable, balances atmospheric pressure to prevent static pressure errors;
Sealing Process: Laser welding + multi-layer sealing, IP68 waterproof rating,





V. Application-Specific Selection Guide

5.1 Key Selection Criteria

1. Signal Type Selection

When used with conventional on-site automation control systems, PLCs, DCSs, or standard digital display instruments, the standard 4–20 mA analog current signal is the preferred choice. It offers broad compatibility, strong interference resistance, and simple wiring, making it the top choice for the vast majority of general industrial applications.

For applications requiring long-distance data transmission, multi-device networking, or integration with IoT systems or centralized configuration and monitoring via a host computer, the RS485 digital signal version is recommended. It supports the Modbus communication protocol, enabling parallel communication among multiple instruments and precise data transmission.

For legacy equipment or secondary instruments that only support voltage input, select voltage output types such as 0–5 V, 1–5 V, or 0–10 V to adapt to traditional analog receiving devices and meet compatibility requirements for retrofitting older field systems.

2. Power Supply Selection

In industrial settings with standard 24V DC regulated power supplies or built-in power distribution in control cabinets, the standard two-wire 24V DC power supply version can be directly selected. This offers simple wiring and eliminates the need for additional power supply modules, making it compatible with the power distribution environments of most factories.

For outdoor unattended, solar-powered, or low-voltage, low-power consumption scenarios, the wide-voltage power supply model is recommended. It supports a wide input voltage range from 12V DC to 32V DC, making it compatible with solar panels and battery power systems, and ensuring stable operation even within voltage fluctuation ranges.

For operating conditions with significant power line interference and frequent voltage fluctuations, prioritize the standard version equipped with reverse polarity protection and overvoltage current limiting protection. No additional voltage stabilizers are required, as the built-in circuit protection can withstand abnormal on-site voltage fluctuations.

3. Selection Based on Explosion-Proof Requirements

For general non-hazardous areas, clear water tanks, domestic water supply, non-explosion-proof sections of wastewater treatment plants, and civilian water supply and drainage applications, the QDY30A general-purpose model is sufficient. It meets standard liquid level measurement requirements and offers better value for money.

In hazardous areas such as chemical industrial parks, oil and gas storage tanks, pharmaceutical workshops handling flammable and explosive materials, and sealed tanks where combustible gases or volatile media are present, the QDY30A-B explosion-proof model with Exia II CT4 intrinsic safety certification must be selected. This model must be used in conjunction with a compatible isolating or Zener barrier to comply with explosion-proof regulations and ensure on-site safety.

4. Selection Based on Installation Environment / Operating Conditions

For standard clean water, tap water, ordinary surface water, and water free of corrosion and impurities, the standard version with a 304 stainless steel housing is sufficient. It is fully capable of withstanding long-term immersion and offers corrosion resistance and aging resistance suitable for typical water environments.

For sewage, industrial wastewater, liquids with mild acid or alkali corrosion, or oily media, we recommend upgrading to the version with a 316L stainless steel diaphragm and housing, paired with fluororubber seals. This enhances corrosion resistance, oil resistance, and anti-scaling capabilities, preventing corrosion and damage to the probe.

For deep wells, high-head water intake, and ultra-long-distance signal transmission scenarios, select the QDY30A-B extended-cable custom model, which can be paired with a dedicated 100-meter waterproof and breathable cable, suitable for long-term level monitoring in deep wells and deep water.

For outdoor, open-air environments, areas with high humidity and condensation, or locations near pump tanks subject to significant vibration, prioritize models with IP68 fully sealed protection and built-in anti-vibration and shock-resistant structures. These models withstand temperature and humidity fluctuations as well as mechanical vibrations, ensuring data stability and reliable operation.

5.2 Industry Application Recommendations

1. Chemical Industry: Various reaction kettles, storage tanks, sewage tanks, and acid/alkali waste liquid tanks. Since the media often exhibit mild corrosiveness and some areas require explosion-proof measures, the standard corrosion-resistant QDY30A model is used in non-explosive sections, while the intrinsically safe QDY30A-B model is uniformly selected for flammable and explosive zones. Paired with 316L stainless steel to withstand corrosive media, it meets continuous level monitoring and safety production standards.

2. In the power industry, for level monitoring in power plant circulating water tanks, condensate towers, wastewater treatment stations, and industrial water storage tanks, where conditions primarily involve clean water and ordinary industrial water with no strong corrosion or explosion-proof requirements, the standard QDY30A model is typically selected. It features simple installation, is maintenance-free, and is compatible with power plant automation control systems, ensuring stable and reliable long-term operation.

3. Level measurement in steelmaking circulating water, cooling water tanks, and metallurgical wastewater tanks in the metallurgical industry. Given the high-dust, high-vibration on-site environment and water containing minor impurities, the QDY30A reinforced protection version is recommended. It features built-in anti-vibration and anti-clogging structures, and its all-stainless-steel housing withstands harsh on-site conditions, preventing measurement anomalies caused by dust and vibration.

4. For the pharmaceutical industry—specifically purified water tanks, ingredient storage tanks, and wastewater treatment sections—where high cleanliness standards are required and some workshops are classified as flammable and explosive environments: use the QDY30A sanitary version for standard purified water and clean tanks; use the QDY30A-B explosion-proof version for explosion-proof workshops and sealed pharmaceutical liquid storage tanks. These models feature corrosion-resistant materials with no leaching, meeting the pharmaceutical industry's cleanliness and safety standards.

5. In the smart manufacturing industry, for storage tanks on automated production lines, circulating water supply systems, and water supply/drainage tanks in smart warehouses—which require integration with PLCs and centralized IoT monitoring—the QDY30A model with RS485 communication is the preferred choice. It enables multi-site level monitoring networks and remote data upload, meeting the centralized control requirements of smart manufacturing automation.

5.3 Common Selection Pitfalls

1. Neglecting Isolation Levels

Many users focus solely on accuracy and measurement range during selection, overlooking issues such as on-site electromagnetic interference and ground potential differences. Failure to select models with built-in isolation protection can lead to phenomena such as level data fluctuations, unstable readings, and interference-induced garbled data. In areas near industrial variable-frequency drives, high-power motors, or densely packed distribution cabinets, it is essential to prioritize instrument isolation and anti-interference performance. Standard models equipped with built-in signal isolation, lightning protection, and reverse polarity protection should be selected to prevent interference issues at the source.

2. Incorrect Signal Range Selection

Selecting a range based solely on the container height without allowing for a safety margin can lead to issues such as full-tank over-range conditions or insufficient measurement accuracy at low liquid levels; Additionally, some users confuse liquid height with medium density, failing to match the measurement range to the actual operating conditions of the medium. When selecting a model, a 10%–20% margin should be reserved based on the actual maximum liquid level to avoid long-term full-scale operation. At the same time, the measurement range must be confirmed based on the different densities of media such as clean water, wastewater, and oils to ensure measurement accuracy.

3. Neglecting Load Matching

Failure to consider the transmitter's load-carrying capacity leads to direct long-distance wiring or the series connection of too many secondary

instruments, exceeding the product's rated load resistance. This results in signal attenuation, inaccurate level display, and communication failures. In current-output applications, the total resistance of the downstream load must be kept within the rated range. For long-distance wiring, use appropriate cables and strictly match load parameters to prevent measurement failures caused by non-compliant loads.

4. Incorrect Selection of General-Purpose Models in Explosion-Proof Environments
In flammable and explosive hazardous areas, some users opt for the standard general-purpose QDY30A model to reduce costs, failing to select the QDY30A-B explosion-proof model as required by regulations or to install safety barriers, creating significant safety hazards. Conversely, some users in non-explosion-proof areas unnecessarily select explosion-proof models, resulting in wasted costs. Strictly distinguish between hazardous and non-hazardous areas. In hazardous areas, always select explosion-proof models and install safety barriers; in non-hazardous areas, use standard general-purpose models to balance safety and cost-effectiveness.

5.4 Customization Recommendations
1. Customized Special Signals
When existing on-site equipment is incompatible with standard 4-20mA, standard voltage, or RS485 signals, we support the customization of special non-standard signals to adapt to proprietary secondary instruments or the unique signal protocols of legacy industrial control equipment. Additionally, we offer versions with multi-signal synchronous output to meet the requirement of a single transmitter simultaneously interfacing with both a PLC and a digital display meter for dual data acquisition.

2. Customization for Non-Standard Operating Conditions
For special operating conditions such as high-temperature media, strong acid/alkali corrosion, and high-viscosity liquids prone to scaling, we can customize upgrades including 316L all-stainless steel construction, Hastelloy diaphragms, and high-temperature-resistant sealing components. Non-standard ultra-short or ultra-deep level measurement ranges can be customized, and we also support the customization of extended vent cables and special low-temperature-resistant cables to accommodate extreme cold, high heat, and highly corrosive on-site conditions.

3. Multi-Channel Integration Customization
For projects requiring centralized monitoring of multiple tanks or reservoirs within the same facility, we offer customized multi-channel level data acquisition solutions. These solutions utilize multi-channel signal aggregation modules to consolidate signals from multiple QDY30A/QDY30A-B level transmitters into a single control system. This simplifies wiring and facilitates centralized configuration management, meeting the requirements of integrated projects such as comprehensive factory automation upgrades and smart water management centralized monitoring systems.

VI. Installation and Commissioning Specifications
6.1 Pre-installation Preparation
1. Verification of Accessories
After unpacking, first inspect the exterior of the unit to ensure there are no dents or deformations and that the sealing interfaces are intact; verify that the submersible probe, vented cable, product certificate of conformity, and factory calibration parameter sheet are complete and accurate.
Optional accessories such as flanges, mounting eyes, installation brackets, and waterproof junction boxes must match the model and specifications. Ensure that small components such as sealing gaskets, mounting clips, and waterproof connectors are complete and not missing. Confirm the model is either the QDY30A standard type or the QDY30A-B explosion-proof type, and verify that the measurement range, output signal, and material version match the procurement specifications to prevent incorrect installation.

2. Environmental Inspection
Conduct a preliminary survey of the installation site to ensure that the interior of the level tank, deep well, or storage tank is free of large debris, silt buildup, and sharp or hard objects to prevent scratching the diaphragm or crushing the sensor unit when lowering the probe.
Select an installation location away from areas with strong electromagnetic radiation, such as high-power variable frequency drives, high-voltage switchgear, and large motors. Keep the unit away from high-temperature heat sources, open flames, and areas exposed to direct streams of highly corrosive gases.
For outdoor installations, verify the absence of water accumulation, direct rain exposure, or high risk of lightning strikes, and plan cable routing and waterproofing measures in advance. In explosion-proof zones, confirm the on-site hazard classification and strictly ensure that the QDY30A-B explosion-proof model and associated safety barrier installation conditions are properly matched.

3. Tool List
Prepare a Phillips screwdriver, wire strippers, crimp terminals, electrical tape, cable ties, a spirit level, a multimeter, and a portable signal calibrator. For outdoor and high-altitude work, ensure you have safety ropes, ladders, cable clamps, waterproof junction boxes, and other necessary construction materials.

4. Safety Precautions
All installation and wiring work must be performed with the power disconnected. It is strictly prohibited to disconnect or connect wires while the system is energized.
When working in explosion-proof zones, strictly adhere to explosion-proof construction regulations. Do not disassemble the transmitter housing or modify the internal circuitry without authorization.
When lowering the probe into deep wells or large tanks, lower the cable slowly to prevent impact damage to the probe diaphragm caused by free fall. Do not forcefully pull or kink the cable to avoid damaging the internal air-permeable structure.
When working in damp or waterlogged environments, ensure proper insulation protection to prevent electric shock and short-circuit failures.

6.2 Standard Installation Steps
1. Layout and Mounting Methods
This product features a submersible design and does not require a mounting rail; it is installed using a suspended drop method. Gently lower the level probe to the bottom of the measured liquid or to the specified measurement height, ensuring the probe hangs vertically and naturally. Do not place it on its side, at an angle, or against the tank or tank wall.
Route the signal cable along the walls of the well, tank, or pool, securing it firmly in sections with cable ties or mounting clips. Allow a small amount of slack to prevent the probe and cable from being pulled by water movement.
For fixed-position installation, optional dedicated mounting brackets or flange structures are available. Secure the upper end of the cable at the tank, well, or pool opening to ensure the probe remains centered and stable over the long term, unaffected by water flow or impact.

2. Wiring Specifications and Terminal Identification
The unit features a two-wire architecture with a single integrated terminal for the power positive and signal negative; there are no additional input terminals.
The power and signal lines share the same two-wire circuit, compatible with standard 24 VDC industrial power supply, while simultaneously transmitting a standard 4–20 mA signal.
When wiring, identify the cable core colors and connect them strictly according to the terminal definitions to the power distribution and data acquisition modules within the control cabinet to prevent reverse polarity.

3. Grounding Requirements
The transmitter's shield must be reliably grounded at a single point, with grounding performed at only one location inside the control cabinet. Grounding at both ends is prohibited to prevent ground loops that could introduce interference.
Metal tanks, steel structures of water tanks, and mounting brackets at the field site must be protected by grounding. The grounding resistance must comply with industrial standards to effectively shield against external electromagnetic interference and ensure stable, non-fluctuating level signals.
For the explosion-proof model QDY30A-B, installation must strictly adhere to explosion-proof grounding specifications. Grounding lines must be secure, free of loose connections, and without breaks, to meet intrinsic safety requirements.

6.3, Wiring Diagram Text Specifications

1. QDY30A Standard Model Wiring Instructions

Two-wire 4-20mA output: Connect the positive terminal of the 24V DC power supply to the positive terminal of the transmitter's signal line. Connect the negative terminal of the power supply to the transmitter's negative terminal via a series connection with the signal input terminal of the PLC or secondary instrument, forming a complete current loop.

The outer metal shield of the shielded cable must be routed separately and connected to the control cabinet's grounding busbar. The shield at the probe end must remain floating (ungrounded) and undergo single-ended grounding only.

2. QDY30A-B Explosion-Proof Type Dedicated Wiring Specifications

Must be used in conjunction with an isolation-type or Zener-type safety barrier. Connect the transmitter's intrinsically safe side cable to the safety barrier's intrinsically safe terminals, and connect the power supply and industrial control equipment to the safety barrier's non-intrinsically safe side.

It is strictly prohibited to arbitrarily add connection points in explosion-proof circuits. All joints must be sealed using explosion-proof and waterproof junction boxes, and cable entry points must be sealed to prevent the ingress of flammable and explosive gases.

3. Standard Handling of Shielded Cables

Strip the shield to an appropriate length without damaging the inner conductors; after gathering the shield, ground it separately. Do not connect it to power or signal lines.

In damp or outdoor environments, all terminal blocks must be insulated and waterproofed to prevent short circuits or signal drift caused by condensation or water ingress.

4. Comparison of Correct and Incorrect Wiring Methods

Correct Wiring: Distinguish between positive and negative terminals, ensure a complete circuit, ground the shield at a single point, seal wiring junctions to be waterproof, and install a safety barrier for explosion-proof models.

Incorrect Wiring: Reversed polarity, shield grounded at both ends, power and signal cables routed in the same conduit, omission of safety barriers in explosion-proof zones, and exposed terminal blocks without waterproof insulation. Any of these issues may result in equipment damage, signal interference, or safety hazards.

6.4 Power-On Commissioning Procedure

1. No-Load Test

After all wiring is complete and verified, slowly apply power while keeping the probe in a no-load state in the air. Observe that the entire unit shows no overheating, abnormal noises, or short circuits.

Use a multimeter to measure the supply voltage and confirm it is stable within the normal range of 12V to 32V DC, with no abnormal fluctuations such as excessively high or low voltage.

2. Signal Calibration

With the probe in a no-load state (corresponding to the liquid level zero point), the theoretical output should be a standard 4mA current signal. Use a signal calibrator or the PLC backend to read the value and verify that the zero-point output is within the allowable error range.

Slowly lower the probe into the water to different liquid levels, corresponding to low, medium, and high levels, respectively. Read the corresponding 4–20 mA values one by one to verify that the signal follows the linear change without jumps or stuttering.

3. Status Assessment

This series does not have external indicator lights; use the values displayed on the backend instrument or PLC as the basis for determining operational status: stable, linear changes indicate normal operation; If the value remains static, fluctuates erratically, or does not return to zero at full scale, this indicates wiring errors, poor shielding, or interference at the installation location.

4. Calibration Method

The unit has been precisely calibrated at the factory and does not require recalibration under normal field conditions; if minor deviations occur on-site, zero-point fine-tuning and span correction can be performed via the 配套 secondary instrument or PLC backend.

Under no circumstances should the transmitter housing be opened to adjust internal potentiometers; unauthorized disassembly will void the warranty and compromise explosion-proof and sealing protection.

6.5 Installation Precautions

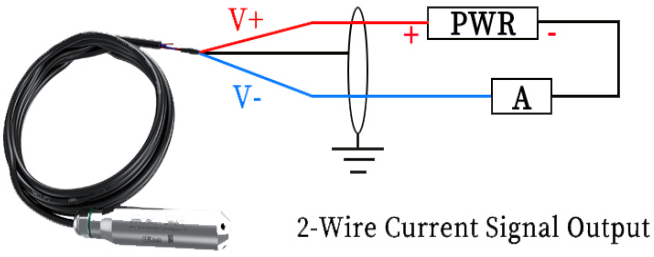
1. Overvoltage supply is strictly prohibited; do not connect to a power supply voltage higher than 32 V DC. Prolonged overvoltage will directly burn out the internal sensing circuitry and signal conditioning module.

2. Strictly avoid routing the transmitter alongside high-voltage power cables in the same conduit or cable tray. Keep it away from strong interference sources such as variable frequency drives, medium-frequency furnaces, and high-power motors to prevent electromagnetic interference from causing fluctuations or erratic jumps in level readings.

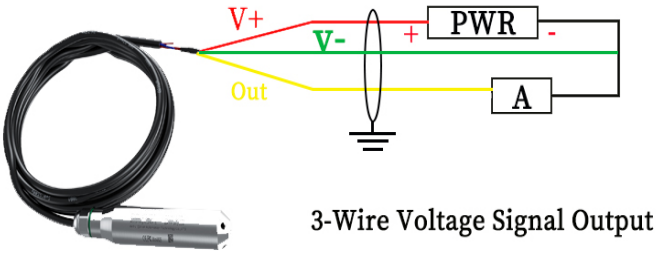
3. In damp, underground, or outdoor environments, terminal blocks must not be left exposed. Waterproof junction boxes and insulated sealing must be used to prevent condensation or rainwater from entering, which could cause circuit corrosion, short circuits, or measurement drift.

4. Do not arbitrarily cut the length of the original factory-supplied vented cable or damage its venting structure. Do not subject the cable to heavy pressure, sharp bends, or dragging and pulling, as this will disrupt the atmospheric pressure balance and result in permanent measurement errors.

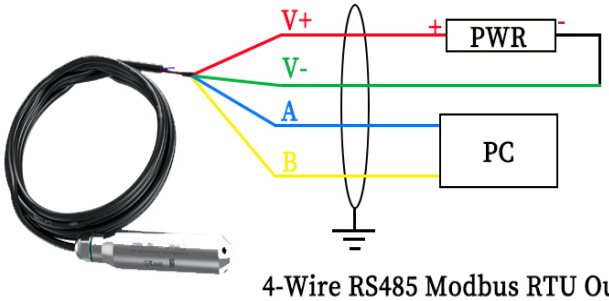
5. In explosion-proof zones, it is strictly prohibited to substitute the standard QDY30A model for the explosion-proof QDY30A-B model. It is also strictly prohibited to bypass the safety barrier and connect the device directly; this must be avoided to prevent safety hazards.



2-Wire Current Signal Output



3-Wire Voltage Signal Output



4-Wire RS485 Modbus RTU Output

VII. Recommendations for Daily Use & Operation and Maintenance

7.1 Key Points for Daily Inspections

Daily inspections focus on visual checks, data monitoring, and environmental inspections. These follow a unified standard applicable to both the standard QDY30A model and the explosion-proof QDY30A-B model. No complex professional operations are required, and even novices can perform them properly.

First, focus on monitoring signal stability. Continuously observe the real-time liquid level readings on the accompanying digital display and the PLC host system to ensure readings remain stable without frequent fluctuations, unexplained resets to zero, or persistent full-scale lockups. If readings fluctuate erratically or intermittent disconnections occur, immediately investigate potential line interference, grounding status, and whether the probe has shifted from its intended position.

Second, monitor on-site temperature and humidity conditions. Continuously monitor whether the ambient temperature in the installation area exceeds the product's normal operating range, and avoid prolonged exposure to extremely high or low temperatures. Simultaneously, inspect on-site air humidity and condensation levels. At outdoor wellheads, underground reservoirs, and damp pump rooms, pay close attention to junction boxes and cable terminals for signs of water ingress, condensation, or moisture-induced whitening to prevent moisture intrusion that could cause circuit aging and signal drift.

Third, visual inspection of appearance and installation status. Check whether submersible probes are hanging vertically and naturally; inspect for tilting caused by water flow impact, entanglement with debris, or membrane burial by silt; examine the outer cable sheath for wear, cracks, deformation from compression, or kinks. For the explosion-proof model QDY30A-B, additionally verify that the explosion-proof junction box seal is intact and that the sealing plug is secure; failure of the seal or unauthorized opening of the cover is strictly prohibited.

Fourth, routine inspection of power supply conditions. Periodically check whether the control cabinet's supply voltage remains stable within the normal range of 12V–32V DC, ensuring there are no sudden voltage surges or drops, or poor contact issues, to guarantee long-term stable power supply to the transmitter.

7.2. Regular Maintenance Plan

1. Cleaning Frequency Guidelines

For standard clean water, tap water, and circulating water applications, clean the exterior of the probe every 3 to 6 months to remove scale, algae, and minor impurities adhering to the diaphragm surface, ensuring the pressure-sensing surface remains unobstructed and sensitive.

For applications involving sewage, industrial wastewater, oily contaminants, or high levels of suspended solids, perform regular cleaning every 1–3 months to prevent the accumulation of impurities that could block pressure-transmitting components or coat the pressure-sensing diaphragm, leading to low readings or delayed response.

For chemical and pharmaceutical applications involving mildly corrosive media, establish a fixed cleaning schedule based on the on-site scaling rate of the medium. The maintenance standard is to ensure the surface is free of visible deposits and the diaphragm remains clean and smooth.

2. Wiring Tightness Inspection

Conduct a comprehensive re-inspection of all terminal connections every six months. Check the terminals inside the control cabinet and the internal wire ends in the waterproof junction box for looseness, oxidation, discoloration, or poor contact. Re-crimp the terminals and treat oxidized or discolored wire ends to prevent signal interruptions or value fluctuations caused by poor contact.

Pay special attention to ensuring that the shield grounding terminals are secure and free from detachment. For explosion-proof models (QDY30A-B), simultaneously inspect the safety barrier wiring, as well as the sealing and tightness of the explosion-proof circuit nodes, to eliminate potential hazards.

3. Recommendations for Accuracy Recalibration

Under normal operating conditions, perform an annual accuracy recalibration and zero-point verification. Use the system backend or a portable calibrator to compare the actual liquid level with the instrument's displayed value to confirm that the error is within the permissible range.

For production lines and water supply control systems with significant operational fluctuations, complex media, and high measurement accuracy requirements, a simplified quarterly re-calibration is recommended. If minor deviations are detected, fine-tune the calibration via secondary instruments or the system interface; under no circumstances should the transmitter housing be opened to adjust internal components.

7.3 Long-Term Maintenance Tips

1. Long-Term Dust and Moisture Protection

In all outdoor, underground, or damp pump room environments, cable joints and connection points must be fully sealed and protected using waterproof junction boxes. Terminals should be insulated and sealed to prevent rainwater, condensation, and moisture from entering the connection points.

Cable routing should avoid low-lying areas prone to water accumulation and areas with heavy dust accumulation. Cables should be neatly arranged and secured to prevent dust and dirt from accumulating on exposed, suspended sections. During periods of long-term inactivity, store sensors in a dry, well-ventilated environment. Wipe off any surface moisture and ensure they are properly wrapped and stored to prevent dust accumulation.

2. Anti-Interference Optimization and Maintenance

In daily operations, ensure signal cables and high-voltage power lines are routed separately and installed on different cable trays. Do not run them through the same conduit or lay them parallel over long distances. Keep them away from strong interference sources such as variable frequency drives, high-power motors, and high-voltage switchgear.

Always ensure the shielding layer is reliably grounded at one end; do not ground both ends. Ensure that on-site metal brackets, tanks, and pool steel structures are properly grounded to maintain long-term electromagnetic shielding effectiveness, thereby preventing signal fluctuations and value drift at the source.

3. Specialized Protection for Extreme Environments

In low-temperature outdoor conditions during winter or in deep well environments, prioritize protecting cable joints and junction boxes. Implement anti-freeze and insulation measures to prevent sealing gaskets and cable jackets from hardening and cracking due to low temperatures, which could lead to water ingress and failure.

In high-temperature, direct sunlight environments during summer, provide shade protection for cable exit points at wellheads and tank openings to reduce accelerated cable aging caused by prolonged exposure. For long-term use in corrosive environments, prioritize the use of 316L stainless steel probes and fluorocarbon rubber seals. Regularly inspect for corrosion and wear to predict replacement cycles in advance.

In explosion-proof zones, the QDY30A-B model must maintain its explosion-proof integrity at all times. Do not arbitrarily replace non-original accessories or compromise the sealing structure. Strictly adhere to explosion-proof operation and maintenance standards over the long term to ensure safe and stable operation in hazardous areas.

VIII. Troubleshooting & Emergency Response

8.1 List of Common Faults

The transmitter produces no signal output; the host instrument and PLC display no values and show no response whatsoever.

The level signal drifts continuously; readings slowly shift up and down, with the actual level remaining unchanged but the displayed value fluctuating on its own.

The level reading is locked at full scale, with the zero point fixed and unable to track actual level changes.

Irregular signal fluctuations occur on-site, with readings jumping erratically and fluctuating wildly, resulting in extremely poor stability.

The system frequently triggers false high/low level alarms; alarms persist even when the actual level has not reached the alarm threshold.

After prolonged use, measurement sensitivity decreases, causing delayed response to level changes and sluggish readings.

After connecting the explosion-proof model QDY30A-B, the downstream circuit malfunctions, the safety barrier reports an error, and normal communication cannot be established.

8.2 Analysis of Fault Causes

1. Wiring errors: Reversed power supply polarity, signal line short circuits or open circuits, shielding grounded at both ends, incorrect wiring sequence in the explosion-proof circuit, or loose or faulty terminal connections.

2. Power Supply Abnormalities: Supply voltage below the rated lower limit or excessively high; high power supply ripple; unstable power distribution; or insufficient power supply due to excessive line voltage drop.

3. Signal Overload and Load Mismatch: Too many instruments connected downstream; load resistance exceeding the transmitter's permissible range; or signal attenuation caused by long-distance cabling.

4. Environmental Electromagnetic Interference: Signal cables are routed in the same conduit or cable tray as high-voltage power lines; proximity to variable frequency drives, high-power motors, or high-voltage distribution cabinets; ground potential differences causing interference and distortion.

5. Installation and operating conditions: Probe diaphragms clogged by silt, debris, or oil; sharp kinks in cables; damage to the manufacturer's original venting structure; moisture ingress or condensation seeping into terminal blocks in outdoor environments.

6. Damage to the device itself: Aging of the sensing chip; corrosion of internal circuits due to moisture; damage to internal structures caused by prolonged overpressure shocks or mechanical impact; unauthorized disassembly of explosion-proof models, compromising seals and intrinsic safety performance.

8.3 Step-by-Step Troubleshooting

1. Troubleshooting and Repair for No Output

First, disconnect the on-site power supply. Thoroughly inspect the terminal blocks for loose connections, disconnections, or blackened oxidation, and retighten all connection points.

Use a multimeter to measure the input supply voltage and confirm it falls within the standard range of 12V to 32V DC to rule out issues such as undervoltage, power failure, or open circuits.

Verify the wiring sequence of the two-wire system's positive and negative terminals. Correct any errors such as reversed polarity or signal line short circuits, and ensure the shielding layer is strictly grounded at a single point.

Inspect the submersible cable for signs of pulling, fraying, or internal breaks. If the cable is damaged or broken, replace it immediately with a dedicated waterproof and breathable cable.

If no abnormalities are found after the above checks and there is still no output, determine that the internal circuitry or sensor unit is damaged, and initiate the after-sales repair process.

2. Troubleshooting and Repair for Signal Drift and Spontaneous Value Shifts

Inspect the probe's mounting position to ensure it is suspended vertically, not touching the wall, buried in silt, or with the pressure-sensing diaphragm covered by debris. Promptly clean the surface of scale, moss, and suspended impurities.

Verify the stability of the power supply and replace it with a regulated power supply with lower ripple to prevent zero-point drift caused by voltage fluctuations.

Re-optimize the grounding method by retaining only single-end grounding at the control cabinet end, eliminating ground loop interference caused by grounding the shield at both ends.

Keep the device away from high-voltage power lines and variable frequency drives. Adjust the cable routing to separate them into distinct cable trays to reduce electromagnetic coupling interference.

Perform zero-point verification under clean, no-load conditions. Fine-tune the zero-point deviation via secondary instruments or the PLC backend without disassembling the transmitter body.

3. Troubleshooting and Repair for Stuck Readings or Failure to Track Level Changes

Check for out-of-range operation where the actual level exceeds the transmitter's rated range, and promptly replace with a model matching the required range.

Check whether the downstream load exceeds specifications; reduce the number of secondary instruments in series to keep the load resistance within the permissible range.

Inspect the cable for severe kinks or crushing deformation that may have damaged the internal gas-balancing structure; replace with an original manufacturer's dedicated cable if damaged.

Clear any blockages from the probe's pressure-sensing surface to restore the sensitivity of the pressure-sensing diaphragm and eliminate sensing failures caused by medium scaling.

4. Troubleshooting and Repair for Signal Fluctuations and Interference Distortion

Immediately route signal cables separately from power cables; do not run them in the same conduit, cable tray, or in close parallel proximity.

Enhance overall equipment grounding and shield grounding. Verify that the metal tank and mounting brackets are reliably grounded, and ensure grounding resistance meets industrial standards.

Install power filters and surge protection devices at the power supply end to mitigate electromagnetic interference from on-site variable frequency drives and high-power equipment.

Inspect junction boxes and cable connectors for moisture or water ingress; reapply waterproof seals and insulation wrapping to prevent signal fluctuations caused by condensation or electrical leakage.

5. Troubleshooting and Resolution of False Alarms and Sensitivity Lag

Recalibrate the system's high and low liquid level alarm thresholds to eliminate false triggers caused by improper parameter settings.

Clean heavy deposits and oil residues from the probe diaphragm surface to restore pressure sensing sensitivity.

Check whether excessively long cable runs are causing signal attenuation; optimize the wiring or install signal repeaters as needed to support long-distance transmission.

For explosion-proof models, verify that the safety barrier model is compatible and wiring is compliant; promptly replace faulty safety barriers with isolating or Zener-type barriers of the same specification.

6. Emergency Replacement Solutions

If a sudden on-site failure cannot be repaired immediately, temporarily replace the unit with a spare QDY30A or QDY30A-B model of the same measurement range and signal type. Simply swap the units in place while retaining the existing wiring to quickly resume level monitoring and minimize production line downtime.

If no spare instrument is available, temporarily switch to manual on-site level inspection and record-keeping, and suspend automatic interlock control. Resume fully automatic operation once the fault has been repaired.

8.4 After-Sales Repair Guidelines

1. Criteria for Determining a Malfunction and Reporting a Repair

If, after performing routine operations such as rewiring, voltage testing, grounding optimization, probe cleaning, and circuit troubleshooting, the device still cannot resume normal measurement, continues to have no output, displays severely abnormal readings, has water ingress or physical damage, or exhibits damage to the explosion-proof structure, it can be determined that the product itself is faulty, and an after-sales repair request must be submitted.

2. Information Required for Service Requests

When submitting a service request, please provide the complete product model (QDY30A Standard Type / QDY30A-B Explosion-Proof Type), measurement range, output signal type, industry and operating conditions, a description of the fault symptoms, duration of use, on-site power supply specifications, and models of associated equipment to facilitate rapid troubleshooting by our technical staff.

3. Repair Process

First, contact our sales representative or technical support. Provide a written description of the fault symptoms and on-site installation conditions; if necessary, include photos of the on-site wiring and the equipment nameplate. Our technicians will provide remote guidance for a thorough troubleshooting. If the issue cannot be resolved remotely, we will proceed with the repair, replacement, or on-site technical support process.

4. Warranty Coverage

The QDY30A / QDY30A-B submersible level transmitter is covered by a standard warranty. Under normal, proper installation and compliant operating conditions, failures resulting from non-human damage, unauthorized disassembly, non-compliant overpressure use, or severe external impact are covered under the free warranty for repair or replacement.

Damage resulting from unauthorized disassembly of the transmitter body, unauthorized modification of internal circuitry, improper modification in explosion-proof zones, operation under excessive pressure, temperature, or load, intentional pulling or cutting of cables, or forced use in harsh environments without proper protection is not covered by the free warranty. Paid repair services are available for such cases.