Battery-powered Portable Level Gauge

I. Product Definition

The QDY30A-80 battery-powered portable level gauge is an integrated, submersible smart level measurement device developed by Anhui Qidian Automation Technology Co., Ltd. Designed specifically for scenarios without external power sources and for rapid on-site level monitoring, it integrates a submersible level sensor probe, a dedicated signal cable, and a battery-powered smart digital display. It allows for direct reading of liquid level height / pressure values directly, without the need for additional power sources, transmitters, or display devices, achieving "plug-and-play, on-site direct reading" for liquid level measurement.

Its core functions cover the following aspects:

1. Real-time liquid level / depth direct reading: The submersible probe continuously captures liquid hydrostatic pressure signals, and the display unit directly shows data such as liquid level height (in meters) and percentage level (0–100%), supporting multiple unit conversions to meet on-site rapid reading needs.

2. Battery-Powered Standalone Operation: The built-in battery design eliminates the need for an external 220V/24V power supply, enabling independent operation in power-deficient environments such as outdoor, underground, and temporary monitoring sites, and accommodating portable operational needs.

3. High-precision hydrostatic measurement: Utilizes the principle of liquid hydrostatic pressure for level measurement, suitable for non-corrosive liquids such as water and oil. It offers high measurement accuracy and strong stability, capable of handling most industrial and civilian liquid level monitoring scenarios.

4. Zero calibration and data correction: Supports one-touch ZERO calibration to eliminate installation errors and environmental zero drift, ensuring measurement accuracy and adaptability to various installation conditions.

5. Versatility Across Multiple Scenarios: The probe features a stainless steel protective housing and is equipped with oil- and corrosion-resistant cables, allowing it to be submerged directly in liquids. It is suitable for liquid level monitoring in various scenarios, including pools, water tanks, wells, storage tanks, and rivers.

6. Portable, Lightweight Design: The digital display and probe are designed as separate units, with cable lengths available in various options. The compact overall structure requires no complex wiring, making it easy to carry, move, and set up temporarily. It can be put into use quickly without the need for fixed installation.

II. Working Principle

Layman's Explanation

We can break down this liquid level gauge into two core components: the "probe" and the "digital display." Its operation can be understood using the logic of "underwater weighing":

Core Physical Principle: The pressure within a liquid increases with depth, and the magnitude of the pressure is directly proportional to the liquid depth (Formula:

$P = \rho gh$

, where P is pressure, ρ is liquid density, g is gravitational acceleration, and h is liquid depth). In other words, the deeper the probe is submerged in the liquid, the greater the pressure it senses.

1. Signal Acquisition by the Probe: A high-precision pressure sensor is built into the bottom of the submersible level probe. When the probe is submerged in the liquid, the hydrostatic pressure acts on the sensor's diaphragm, and the sensor converts the detected pressure signal into a faint electrical signal.

2. Signal Transmission and Processing: The electrical signal is transmitted via a dedicated cable to the smart digital display meter above. The meter's built-in processing chip amplifies, filters, and calculates the signal. Combined with preset liquid density parameters, it converts the pressure signal into corresponding liquid level height data.

3. Data Display and Calibration: The processed liquid level data is displayed directly on the meter's digital screen. The system supports one-touch zero calibration (ZERO) to eliminate initial installation errors. The MODE and UNIT buttons allow users to switch between display units and data modes, enabling intuitive visualization of liquid level height and percentage.

4. Standalone Operation: The digital display meter is powered by a built-in battery, eliminating the need for an external power source. It can complete the entire process of signal acquisition, processing, and display, enabling independent operation in environments without external power.

Workflow (Simplified Version)

Immerse the probe in the liquid → Collect the liquid hydrostatic pressure signal → Convert to an electrical signal and transmit → The instrument's chip calculates the liquid level data → The screen displays the liquid level height / percentage → One-touch calibration corrects errors, enabling continuous and stable monitoring.

III. Core Value and Solutions to Pain Points

Core Value

Solves the challenge of liquid level monitoring in power-deficient scenarios: Without the need for an external power source, battery power enables liquid level measurement in outdoor, temporary monitoring points, and underground environments, freeing users from power constraints and meeting the needs of portable operations.

Eliminates Complex Barriers to Rapid On-Site Measurement: With an integrated design requiring no additional wiring or debugging, the probe provides readings as soon as it is immersed in the liquid. Even novices can get started quickly, significantly lowering the technical barriers and preparation time for on-site measurements.

Delivering Stable, Reliable, and High-Precision Data: Equipped with industrial-grade pressure sensors and digital signal processing technology, the system offers high measurement accuracy and strong anti-interference capabilities. It eliminates the impact of environmental factors on measurement results, providing reliable data support for field operations.

Flexible for diverse application scenarios: The corrosion-resistant stainless steel probe is durable, and cable lengths can be customized as needed. It can be directly submerged in various environments such as pools, water tanks, storage tanks, and rivers, supporting both temporary monitoring and long-term unattended monitoring.

Reduces on-site operational costs and complexity: No additional equipment such as transmitters or control cabinets is required, and no fixed installation is needed, reducing equipment procurement and construction costs. Additionally, the portable design minimizes the workload associated with equipment transport and deployment.

Key Pain Points and Solutions

1. Pain Point: No external power supply on-site, making conventional level gauges unusable

Description: In outdoor, underground, temporary monitoring sites, and remote storage tanks—where 220V/24V power is unavailable—conventional wired level sensors cannot be deployed, making level measurement impossible.

Solution: The device features a built-in battery for independent power supply, enabling operation without any external power source. It provides stable power for probe signal acquisition, data processing, and digital display, completely eliminating reliance on on-site power conditions.

Direct Benefits: No need for additional power supply equipment such as generators or portable power banks; measurement operations can be conducted directly even in environments without power, significantly reducing equipment costs and on-site preparation efforts.

2. Pain Point: Temporary liquid level monitoring is complex to set up, time-consuming, and difficult to master

Description of the Pain Point: Conventional liquid level gauges require transmitters, control cabinets, and wiring/debugging. Setting up temporary monitoring involves a long preparation period and requires operation by professional technicians, making it difficult for novices to get started quickly.
Solution: Utilizes an integrated design where the probe, dedicated cable, and digital display are directly connected. No additional wiring, programming, or debugging is required; simply submerge the probe in the liquid to begin reading, truly achieving "plug-and-play" functionality.
Direct Benefits: On-site setup time is reduced from hours to minutes. Personnel without specialized technical backgrounds can independently complete measurement tasks, significantly improving the operational efficiency of temporary monitoring.

3. Pain Point: Measurement inaccuracies caused by installation errors and environmental drift
Description: Deviations in the initial installation position of the level gauge and environmental factors such as temperature changes can cause zero-point drift. Conventional equipment cannot quickly correct this, and data deviations can affect on-site decision-making.
Solution: The instrument features a one-touch ZERO calibration function that quickly eliminates initial installation errors and environmental zero-point drift, ensuring the accuracy and stability of measurement data.
Direct Benefits: The reliability of measurement data is significantly improved, preventing operational misjudgments caused by data errors, ensuring the accuracy of on-site decisions, and reducing additional losses resulting from inaccurate data.

4. Pain Point: Different scenarios require different data formats, making conversions cumbersome
Description: Different operational scenarios have varying requirements for level data (e.g., on-site readings require meters, while management reports require percentages). Conventional devices support only a single display format, necessitating manual conversion—a process that is inefficient and prone to errors.
Solution: The instrument supports multi-unit and multi-mode switching. Users can directly switch between display modes—such as liquid level height (m) and percentage level (0–100%)—using the UNIT and MODE buttons, eliminating the need for manual conversion.
Direct Benefits: Meets the reading requirements of various operational scenarios, allowing on-site access to target data. This avoids errors and time wasted on manual conversion, improving the efficiency of data retrieval and utilization.

5. Pain Point: Liquid environments corrode probes, resulting in poor equipment durability and short service life
Description: Liquids in environments such as storage tanks and sewage pits are corrosive. Conventional probe materials lack sufficient protection, making them susceptible to corrosion and damage, which shortens equipment lifespan and increases replacement costs.
Solution: The probe features a stainless steel protective housing paired with oil- and corrosion-resistant cables, making it suitable for most non-corrosive industrial and domestic liquids and enhancing overall equipment durability.
Direct Benefits: Reduces the risk of probe corrosion and damage, lowers equipment replacement frequency and maintenance costs, extends equipment lifespan, and ensures the stability of long-term monitoring operations.

6. Pain Point: Equipment is bulky, fixed installation is complex, and it cannot meet mobile operation requirements
Description: Conventional level gauges are typically designed for fixed installation. They are large and heavy, making them difficult to transport and unsuitable for mobile operations such as temporary monitoring and multi-scenario inspections.
Solution: A lightweight, portable design is adopted, featuring a modular layout with the probe and digital display separated. The compact overall structure requires no fixed installation, making it easy to carry and quickly deploy in various locations.
Direct Benefits: Equipment handling and deployment are more convenient, accommodating the mobility needs of temporary monitoring and inspection operations across multiple scenarios, significantly enhancing operational flexibility and equipment utilization.

IV. Key Product Parameters & Specifications

4.1 Basic Electrical Parameters
Measurement Range: 0–80 m liquid level (full-range static pressure measurement)
Measured Media: Clean water, wastewater, light oils, non-corrosive industrial liquids
Measurement Principle: Diffused silicon static pressure level measurement
Accuracy Class: Two options available: ±0.25% FS and ±0.5% FS
Resolution: 0.01 m high-precision display
Response Time: ≤200 ms
Signal Acquisition Method: Integrated submersible probe with built-in pressure sensor chip
Display Type: High-definition LCD digital real-time display
Display Content: Liquid level height (m), liquid level percentage (0–100%)
Operating Functions: One-button zero calibration, unit switching, mode switching, data lock

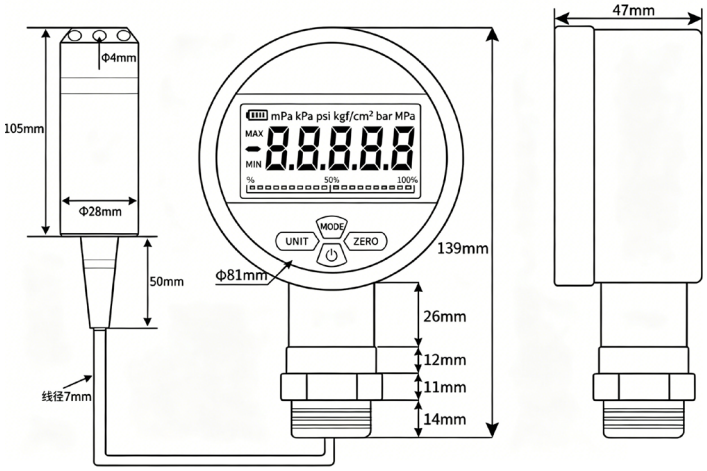
4.2 Isolation Performance Parameters
Internal Electrical Isolation: Complete electrical isolation between the sensing unit and the display mainboard
Anti-Interference Isolation: Common-mode interference suppression, isolation from power-frequency electromagnetic interference
Insulation Resistance: ≥100 MΩ (under normal conditions at room temperature)
Isolation Withstand Voltage: Withstand voltage between input and housing: AC 1000 V/1 min without breakdown
Signal Drift Resistance: Temperature drift ≤0.02% FS/°C, extremely low long-term zero drift
Cable Isolation: Dedicated shielded signal cable, resistant to electromagnetic interference from on-site inverters and motors

4.3. Power Supply & Power Consumption Parameters
Power Supply: Powered by a built-in high-capacity lithium battery; no external 24V/220V power required
Optional External Power Adapter: Compatible with external DC 24V power supply
Standby Power Consumption: Ultra-low power consumption design
Operating Power Consumption: Extremely low power consumption under normal measurement conditions
Battery Life: Up to 12–24 months of continuous normal use (based on daily routine start-stop measurements)
Power Output: This model is a portable, on-site direct-reading device with no additional analog outputs or power outputs; it features pure local display
Low Battery Alert: The instrument includes a low battery icon alert to prompt timely battery replacement

4.4 Environmental Specifications
Operating Temperature: Probe -20°C to +60°C; Meter -10°C to +50°C
Storage Temperature: -30°C to +70°C
Operating Humidity: 5% RH to 95% RH (non-condensing)
Protection Rating:
Level Probe: IP68 Fully waterproof, suitable for long-term immersion
Display Meter: IP65 – Dustproof and rainproof
Explosion-Proof Rating: Intrinsically safe design; explosion-proof models available for industrial flammable and explosive environments
Suitable Applications: Water wells, water tanks, reservoirs, sewage tanks, rivers, liquid storage tanks, and temporary monitoring scenarios in remote locations without power supply
Media Compatibility: Suitable for fresh water, sewage, and non-corrosive industrial liquids; resistant to water pressure and aging from prolonged immersion

4.5. Physical Parameters
Installation Method: Portable submersible design; no rail mounting or wall-mounted installation required; simply submerge in liquid for measurement; can be held in hand or placed freely
Housing Material:
Probe Body: Fully enclosed 304 stainless steel structure; corrosion- and rust-resistant; pressure- and impact-resistant
Display Housing: Flame-retardant engineering ABS material; drop-

-resistant, aging-resistant, and industrial-grade durable
Signal Cable: Dedicated oil-resistant, water-resistant, and tensile-resistant shielded cable; length customizable
Dimensions:
Level Probe: Standard cylindrical industrial probe dimensions
Handheld Display: Compact, standard handheld dimensions; small, easy to grip and carry
Total Weight: Lightweight design; easily held, carried, and moved for inspection by a single person
Structural Protection Details:
Probe features a fully sealed potting process, providing protection against water, seepage, and sand/dirt ingress
Instrument buttons are sealed with waterproof silicone, preventing water ingress during outdoor rain exposure
Cable and probe connectors feature reinforced, tensile-resistant design to prevent breakage and detachment
No exposed terminal blocks throughout the unit; dustproof and moisture-resistant, suitable for harsh outdoor field environments



V. Application-Specific Selection Guide

5.1 Key Selection Criteria

1. Signal Type: This product is a static pressure-type liquid level measurement device. Its core signal is an integrated pressure/liquid level acquisition signal. No additional analog or digital output modules are required; it supports only local digital display on the instrument. When selecting this product, ensure that the application requires only on-site direct reading of data and does not require remote signal transmission.

2. Number of Channels: This model is a single-channel liquid level measurement device; one unit corresponds to one liquid level monitoring point. When selecting a model, configure the required number of units based on the number of monitoring points at the site; a single instrument cannot be used to monitor multiple channels.

3. Power Supply: This product features a portable design powered by a built-in battery, eliminating the need for an external 24V DC or 220V AC power source. When selecting this model, ensure the site is a temporary monitoring scenario without a fixed power supply; for long-term, fixed monitoring scenarios, additionally confirm whether an upgrade to the external power supply version is required.

4. Explosion-Proof Requirements: The default model is non-explosion-proof. If the application involves flammable or explosive conditions, explosion-proof customization must be specified in advance to comply with intrinsically safe standards. It is strictly prohibited to use the standard model directly in explosion-proof environments.

4. Installation Environment: When selecting a model, confirm the key parameters of the on-site installation environment: ① Liquid medium type (clean water / wastewater / mildly corrosive liquids); ensure the probe material and protection rating are compatible; ② Liquid depth range: Ensure the selected measurement range covers the actual maximum liquid level, with a 20% safety margin; ③ On-site ambient temperature: Ensure the operating temperature falls within the compatible range for both the instrument and the probe; ④ Installation method: This product features a submersible, portable design. When selecting a model, confirm that the probe can be submerged on-site and that the instrument can be placed in a safe, dry area.

6. Cable Length Requirements: When selecting a model, customize the signal cable length based on the distance between the on-site liquid level monitoring point and the instrument's placement location. Ensure the cable length meets installation requirements to avoid installation issues caused by insufficient cable length.

5.2. Industry Application Selection Guidelines

1. Chemical Industry Application Selection: In the chemical industry, this product is suitable for temporary level inspections and emergency monitoring in clear water storage tanks, circulating water tanks, and wastewater treatment tanks containing non-highly corrosive media. The standard 304 stainless steel probe model is recommended. If mildly corrosive media are involved, upgrade to the custom anti-corrosion coated version. For flammable and explosive chemical storage tanks, the intrinsically safe explosion-proof version must be customized in advance; the general-purpose model is strictly prohibited.

2. Selection for Power Industry Applications: In the power industry, this product is suitable for temporary level verification, troubleshooting, and level monitoring in areas without power supply in power plant cooling towers, fresh water tanks, and cooling water tanks. We recommend the IP68 high-protection probe with standard cable length, which is suitable for outdoor, open-air, and humid environments; In scenarios where remote signal transmission is unnecessary and on-site direct data reading is sufficient, this product can fully replace traditional fixed-installation level gauges, enabling rapid deployment and measurement.

3. Metallurgy Industry Application Selection: In the metallurgy industry, this product is suitable for temporary liquid level monitoring and equipment maintenance calibration in circulating cooling water systems, wastewater treatment tanks, and standby water tanks. We recommend the version with high-interference-resistant shielded cables to counter electromagnetic interference from on-site motors and variable frequency drives, ensuring stable measurement data. In high-temperature operating conditions, verify the probe's temperature compatibility and select a custom high-temperature-resistant version if necessary.

4. Selection for Pharmaceutical Industry Applications: In the pharmaceutical industry, this product is suitable for temporary level spot checks and equipment commissioning in purified water storage tanks, process water tanks, and wastewater collection tanks. We recommend selecting the sanitary-grade 304 stainless steel probe model to ensure no impurities leach from the probe's contact surface with the medium, thereby meeting pharmaceutical hygiene requirements. For explosion-proof cleanroom environments, a customized explosion-proof cleanroom version is required to comply with workshop safety regulations.

5. Selection for Smart Manufacturing Applications: In the smart manufacturing sector, this product is suitable for temporary level monitoring, equipment commissioning, and routine inspections of equipment-associated water tanks, cooling systems, and wastewater collection units. We recommend the standard accuracy model with multi-unit display to accommodate the level data reading requirements of various equipment. For temporary installation points on automated production lines without a fixed power supply, this product can be deployed quickly without the need for additional power supply or signal transmission equipment.

5.3 Common Selection Pitfalls

Pitfall 1: Neglecting Isolation Level Selection

Some users fail to consider the device's electrical isolation performance during selection, deploying non-isolated models in industrial environments with severe electromagnetic interference. This leads to measurement data drift and display anomalies. While this product features built-in electrical isolation designed to withstand conventional electromagnetic interference, users must still verify the intensity of on-site interference during selection. For high-interference environments, a custom reinforced isolation model must be selected.

Misconception 2: Selecting the Wrong Signal Range
Some users select models based solely on typical on-site liquid levels without allowing for a safety margin. When the liquid level exceeds the device's measurement range, this can result in probe damage and data failure. When selecting a model, use the maximum on-site liquid level as the baseline and allow for a measurement range margin of at least 20% to prevent liquid level fluctuations from exceeding the device's measurement range.

Misconception 3: Neglecting Installation Environment and Load Compatibility
Some users fail to verify the corrosiveness of the on-site medium or the ambient temperature, directly deploying standard models in highly corrosive or high-temperature conditions, resulting in rapid probe failure. Additionally, they overlook the compatibility between cable length and on-site installation distances, preventing proper installation and operation. When selecting a model, comprehensively evaluate installation environment parameters to ensure the device meets operational requirements.

Misconception 4: Incorrectly Selecting General-Purpose Models for Explosion-Proof Applications
Some users deploy general-purpose, non-explosion-proof models directly in flammable and explosive chemical or pharmaceutical environments, creating serious safety hazards and violating industry safety regulations. When selecting equipment for explosion-proof applications, explosion-proof customization requirements must be specified in advance, and a customized version with the corresponding explosion-proof rating must be selected; the direct use of general-purpose models is strictly prohibited.

Misconception 5: Incorrectly Using Portable Devices for Long-Term Fixed Monitoring
Some users fail to distinguish the intended application of the equipment and use this portable, battery-powered level gauge in long-term, unattended fixed monitoring scenarios. Due to battery life limitations, this results in equipment shutdowns and data interruptions later on. This product is primarily designed for temporary or patrol-style level measurement; for long-term fixed monitoring scenarios, conventional level gauges with external power supplies must be selected.

5.4 Customization Recommendations
1. Customized Solutions for Special Signals/Functions: For scenarios requiring specific data formats, the instrument display interface can be customized to include custom units and upper/lower level alarm alerts. For long-term temporary monitoring in power-deficient environments, the device can be upgraded to a rechargeable lithium-ion battery version, supporting repeated charging to extend the device's operational lifespan.

2. Custom Solutions for Non-Standard Operating Conditions: For special media conditions, probe materials can be upgraded (e.g., 316L stainless steel, anti-corrosion coatings) to accommodate mildly corrosive liquids. For high-temperature and high-pressure conditions, custom probes resistant to high temperatures and pressures can be selected to ensure stable operation under extreme conditions. For outdoor environments with strong interference, shielded cables and anti-interference treatments can be implemented to enhance the device's electromagnetic compatibility.

3. Multi-Scenario Adaptation Solutions: To meet specific installation requirements, we can customize probe dimensions and mounting interfaces to accommodate submersible installations in confined spaces or tanks with non-standard diameters. For applications requiring frequent switching between scenarios, we offer quick-connect cable designs that enable rapid disassembly and replacement of probes and instruments, enhancing operational flexibility.

4. Industry-Specific Custom Solutions: To meet compliance requirements in industries such as chemicals and pharmaceuticals, explosion-proof and sanitary-grade certified versions can be customized, complete with comprehensive certification documentation to satisfy industry standards. For high-interference environments in the power and metallurgy sectors, enhanced anti-interference versions can be customized, featuring optimized signal processing algorithms to improve data stability.

VI. Installation and Commissioning Guidelines
These guidelines are formatted to match the product manual, featuring standardized text and step-by-step on-site installation instructions. They are designed for novice installers, after-sales installation technicians, and customers performing self-commissioning, helping to prevent installation failures and operational errors.
6.1 Pre-Installation Preparation
1. Verification of Accessories
After unpacking, carefully check all standard components one by one: QDY30A-80 portable digital display meter, submersible level probe, dedicated shielded signal cable, sealed waterproof connector, user manual, and certificate of conformity. Inspect the instrument housing for dents or cracks, the probe diaphragm for scratches or deformation, the cable sheath for damage or broken wires, and the connector terminals for integrity (no oxidation or chipped corners). Installation may proceed only if all accessories are complete and in good condition.

2. Environmental Inspection
Confirm that the liquid medium at the measurement site is clean water, wastewater, or non-corrosive standard industrial liquids; verify that the maximum liquid depth does not exceed the product's 0–80 m measurement range; ensure that the on-site operating temperature and humidity fall within the equipment's rated operating range; avoid areas with strong variable frequency drives, high-power motors, or high-voltage cables in close proximity; the meter must be placed in a dry, well-ventilated location, protected from prolonged exposure to rain or water immersion, and shielded from direct sunlight.

3. Tool List
Prepare standard installation tools: insulated gloves, tape measure, cable ties, waterproof tape, wire cutters, mounting straps, and a portable insulated multimeter. No additional power distribution control cabinets or rail mounting accessories are required; this model is portable and does not require a fixed mounting base.

4. Safety Precautions
Insulated protective gloves must be worn during on-site operations; do not touch the instrument or probe connectors with wet hands. Do not conduct power-on tests in enclosed spaces with flammable or explosive atmospheres; for explosion-proof applications, use the explosion-proof version of this model. Before submerging the probe in liquid, verify that the cable has no damage or potential electrical leakage. Do not disassemble the instrument's internal components or damage the factory-sealed potting; doing so will void the protection and warranty. When performing liquid level measurements at heights, in deep wells, or underground, ensure proper personal safety precautions are taken to prevent the risk of falling or drowning.

6.2 Standard Installation Steps
This model features a battery-powered, portable submersible design that requires no mounting rails or wall-mounted enclosures. The specific installation steps are as follows:
1. Organize the signal cables, ensuring they are untangled and free of sharp kinks, and allow sufficient slack to accommodate the liquid depth.
Slowly lower the level probe vertically to the bottom of the liquid or the specified measurement level. Keep the probe upright and stationary; do not lay it horizontally, tilt it, or allow it to rest against debris on the tank wall.
2. Place the instrument on a dry, level, and safe surface such as the ground or a platform, away from standing water, oil, and high-temperature heat sources.
Route the cables neatly along walls or guardrails and secure them with cable ties to prevent them from hanging loosely, being pulled, or being crushed or stepped on by heavy objects.
The unit is powered by a built-in battery and requires no external power connection; there are no power terminals or analog input/output terminals to connect.

3. The outer shielding layer of the shielded cable must be grounded at a single point in accordance with specifications to reduce on-site electromagnetic interference.
Verify that the entire setup is secure, with no loose or dangling probes and no cables that are taut or under tension, to complete the physical installation.

6.3 Specifications for the Wiring Diagram
1. Terminal and Polarity Specifications
The QDY30A-80 battery-powered portable model has no external power supply terminals, no 4–20 mA output terminals, and no power distribution output terminals; it features an integrated, wiring-free, direct-reading design.
The probe and meter connect via a factory-sealed aviation connector; no on-site wire stripping or splitting is required, and there is no need to distinguish between positive and negative terminals.

2. Shielded Cable Grounding Specifications
Signal shielded cables must be grounded at only one end: the shield on the meter side must be reliably grounded, while the shield on the probe side must remain floating (ungrounded). Grounding both ends simultaneously is prohibited to prevent loop current interference, which can cause data drift and value fluctuations.

3. Dedicated Wiring Specifications for Isolated Models
This product features a built-in electrical isolation design. The isolation circuit has been pre-configured at the factory; no additional isolation modules need to be installed on-site, and no changes to the wiring method are required. In environments with strong electromagnetic interference, simply ensure single-point grounding of the shielded cable and route it parallel to high-voltage power lines while keeping a safe distance.

4. Comparison of Correct and Incorrect Wiring Practices
Correct Practice: Directly connect the original factory aviation connectors; ensure cables are neatly arranged without sharp kinks; ground the shielding wire at a single point; keep the instrument away from high-voltage equipment.
Incorrect Practice: Cutting the original factory aviation connectors to create custom connections; grounding the shielding wire at both ends; routing cables through the same conduit as high-voltage cables; forcibly bending the base of the probe leads.

6.4 Power-On and Commissioning Procedure
1. No-Load Test
After installation, do not immerse the probe in liquid yet. Power on the unit and observe whether the instrument's LCD screen lights up normally without distortion or a black screen. Verify that the button functions (zero calibration, mode switching, unit switching) respond normally to confirm that the entire unit powers on without faults.

2. Initial Signal Verification
Place the probe in the air and let it rest. Observe whether the initial liquid level reading returns to zero or is close to zero. If an initial deviation is present, proceed to the calibration process.

3. Indicator Status Assessment
The unit has no complex external indicators; only the screen displays a low-battery indicator and operational status indicator. A steady screen display indicates the unit is ready for operation; a lit low-battery icon indicates that the internal battery needs to be replaced promptly; a flashing screen or erratic readings indicate interference or improper wiring.

4. Calibration Method
Press and hold the zero calibration button to perform a one-touch zero calibration, eliminating zero drift caused by installation position or ambient temperature. After filling with liquid, compare the actual manually measured liquid level with the instrument's display to confirm accuracy. If a slight deviation exists, repeat the zero calibration until the data precisely matches the actual on-site liquid level.

6.5 Installation Prohibitions (Strictly Prohibited Operations)
1. It is strictly prohibited to connect external high-voltage or over-voltage power sources to force power to the instrument. This model is designed for battery-only operation; external voltage can easily burn out the mainboard and sensor chip.

2. Avoid running wiring in close proximity to high-power inverters, motors, or high-voltage power cables to prevent strong electromagnetic interference from causing value drift or unstable readings.

3. In humid, open-air, or rainy environments, never place the instrument directly in standing water or expose it to rain. Proper shielding and protection must be provided to keep the instrument housing dry.

4. Never immerse the probe in highly corrosive, strong acid, or strong alkali liquids of unknown composition. Exceeding the material's tolerance range will rapidly corrode the diaphragm, causing permanent damage.

5. Do not violently pull or bend the leads at the base of the probe. Do not allow heavy objects to crush the signal cables, as this may cause internal wire breaks, seal failure, and water ingress.

6. In explosion-hazardous areas, do not use standard non-explosion-proof models. Do not disassemble the device or modify the circuitry without authorization to eliminate safety hazards.

7. Do not use this portable, temporary measurement device as a long-term, fixed, online monitoring device for continuous, round-the-clock operation. This will prevent battery depletion and shutdown, as well as avoid shortening the device's lifespan.

VII. Recommendations for Daily Use & Maintenance
7.1 Key Points for Daily Inspections
1. Inspection of Overall Operating Status
Before daily use or during on-site inspections, check that the instrument's LCD display lights up normally, with no black screen, distorted display, or stuttering or skipping readings. Verify that the buttons are responsive and that zero calibration, unit switching, and mode switching can be triggered normally, with no malfunctioning buttons.

2. Signal Stability Monitoring
Check whether the liquid level display value is stable, without frequent fluctuations or significant drifting; if the value fluctuates erratically or jumps for no apparent reason, immediately inspect the cable routing, shielding grounding, and nearby sources of high-voltage interference to promptly identify and resolve the cause.

3. On-Site Temperature and Humidity Monitoring
During inspections, pay attention to the ambient temperature and humidity in the instrument's placement area to ensure the operating environment remains within the device's rated temperature and humidity range; Avoid exposing the instrument to prolonged high temperatures, direct sunlight, freezing temperatures, or high humidity with condensation to prevent moisture damage and aging of internal circuits.

4. Visual Inspection of Probes and Cables
Check the surface of the submersible probes for accumulated mud, oil, or debris, and ensure the diaphragm shows no scratches, deformation, or signs of corrosion; verify that the outer sheath of signal cables has no damage, cracks, or signs of aging, and that connection points show no water leakage, looseness, or oxidation.

5. Battery Level Inspection
Pay attention to the instrument's low battery indicator. Replace or recharge the battery promptly when the low battery icon appears to avoid measurement inaccuracies, automatic shutdown, or data loss caused by insufficient power.

7.2. Regular Maintenance Plan
1. Unit Cleaning Schedule
Under normal operating conditions, perform a thorough cleaning every 1 to 3 months; in environments with sewage, high dust levels, or harsh outdoor conditions, clean once a month. Use a soft, dry cloth to wipe the instrument housing and button areas. Gently rinse the probe surface with clean water to remove mud and debris. Do not use strong acids, strong alkalis, or high-pressure water jets to directly spray the probe's sensing membrane.

2. Cable and Connector Tightness Inspection
Inspect the probe-to-instrument connector, cable tie fasteners, and cable routing quarterly. Check for loose connectors and ensure waterproof seals are intact. Retighten any loose tie points to prevent pulling, dangling, or fraying of the cable.

3. Recommendations for Accuracy Retesting and Calibration
Conduct accuracy retesting and zero-point recalibration every six months. Compare the instrument's displayed value with the actual liquid level measured manually. If a deviation exists, perform a one-button zero-point calibration to restore measurement accuracy. In environments with frequent changes in operating conditions or significant temperature fluctuations, it is recommended to shorten the retest interval to every three months.

4. Shield Grounding and Interference Suppression Review
Review the single-point grounding status of the shielding cable every six months to ensure there is no double grounding, no loose grounding connections, and no loose ground wires. Re-route the cables to keep them away from variable frequency drives, high-power motors, and high-voltage power lines to maintain a low-interference working environment.

7.3 Long-Term Maintenance Tips
1. Dust and Moisture Protection
When not in use, store the instrument, probes, and cables in a dry, dust-proof case. When temporarily placed on-site, avoid areas with standing water or condensation in wall corners; promptly retrieve them when not in use to prevent prolonged exposure to rain or dust accumulation that could clog button gaps. Keep the instrument housing sealed and intact; do not disassemble the unit arbitrarily, as this may compromise the original factory waterproof and dustproof structure.

2. Long-Term Interference Mitigation
When routing cables, ensure signal cables are kept separate from high-voltage power cables; do not run them in the same conduit or lay them parallel at close distances. Adhere to the standard practice of grounding shielded cables at a single point; do not alter this configuration arbitrarily. When new variable-frequency drives or high-power electrical equipment are installed in the vicinity, promptly reposition the instrument and adjust cable routes to minimize the impact of electromagnetic interference.

3. Special Protection for Extreme Environments
During hot summer months, avoid prolonged direct sunlight on the instrument; use shade or barriers for protection. Before outdoor use in cold winter conditions, allow the instrument to acclimate to room temperature in advance to prevent circuit malfunctions caused by sudden temperature changes. During humid or rainy seasons, periodically open the cover for ventilation (without compromising the seal) and store the instrument in a dry environment to prevent internal condensation and oxidation. After use in environments with mildly corrosive media, promptly rinse the probe with clean water, dry it thoroughly, and store it properly to extend the service life of the sensor probe.

4. Long-Term Battery Maintenance
When the device is not in use for an extended period, remove the built-in battery or store it with a 50% charge to prevent battery aging and swelling caused by prolonged discharge. In scenarios involving frequent field inspections, keep spare batteries on hand and rotate their use to ensure the device is always ready for operation.

VIII. Troubleshooting & Emergency Procedures
8.1 List of Common Faults
The meter screen is black and does not light up; the device cannot be turned on
Liquid level reading remains static; no response to changes
Measurement signal drift; reading fluctuates slowly up and down
Display reading fluctuates erratically; distorted or random jumps
Low battery icon stays on; battery life significantly shortened
Zero calibration failure; unable to reset to zero
Reading is significantly inaccurate after probe is immersed in liquid; large deviation
Buttons unresponsive; no reaction to mode/unit switching

8.2. Analysis of Fault Causes
1. Power Supply Issues
Discharged, aged, or poorly contacting internal lithium battery; battery cell failure due to prolonged storage with a discharged battery; circuit damage caused by unauthorized connection to an external power source with incompatible voltage.

2. Connection and Wiring Issues
Loose or water-damaged/oxidized aviation connectors between the probe and the meter; kinked, damaged, or internally broken signal cables; improper shield grounding or ground loops at both ends causing interference.

3. Environmental and Interference Factors
Proximity to variable frequency drives, high-power motors, or high-voltage cables causing strong electromagnetic interference; temperature and humidity exceeding the equipment's operating range; exposure to rain or moisture leading to condensation and circuit malfunction.

4. Improper Installation and Operating Conditions
Probe mounted at an angle against a wall, or sensing diaphragm covered or compressed by debris or silt; selection of a measurement range that does not match the actual liquid level; exposure to highly corrosive media causing damage to the sensor diaphragm.

5. Damage to the Instrument Body
Scratches, corrosion, or overpressure on the sensor diaphragm; moisture in the instrument's internal circuitry or aging components; internal wire breaks caused by prolonged, forceful tugging on the cable.

8.3 Step-by-Step Troubleshooting
Fault 1: Instrument screen remains black and will not power on
Troubleshooting Steps
First, determine if the battery is completely drained; check if the instrument has been unused for an extended period or if a low battery was not replaced in a timely manner.
Check whether the contact springs in the instrument's battery compartment are loose, oxidized, or rusted.
Rule out damage to internal circuits caused by accidental drops or water ingress.
Remedial Measures
Replace with a new lithium battery of the same specification; clean oxidation and dirt from the battery contacts; securely fasten the battery compartment cover to ensure good contact.
Temporary Workaround
If no spare battery is available on-site, temporarily reduce the duration of each use and turn off the device immediately after use to conserve power; obtain a replacement battery as soon as possible for rotation.

Fault 2: Liquid level reading remains static; no response to changes
Troubleshooting Steps
Check if the probe is clogged with silt or debris, causing the diaphragm to jam.
Check if the aviation connector is loose or has a poor connection.
Check the cable for kinks or internal breaks.
Remedial Actions
Remove the probe and rinse the surface with clean water to remove mud and debris; clean any deposits from the sensing diaphragm; reinsert and securely lock the aviation connector; if the cable is damaged, replace the entire section with a dedicated shielded cable.
Temporary Workaround
Temporarily replace the probe and cable assembly with a spare set to ensure on-site measurements can continue; return the faulty cable to the factory for repair later.

Fault 3: Signal Drift, Slow Value Shift
Troubleshooting Steps
Sudden changes in ambient temperature or excessive temperature differentials cause temperature drift.
Improper grounding of shielded cables or routing near sources of high-voltage electrical interference.
Cumulative natural zero-point drift due to prolonged lack of zero-point calibration.
Remedial Measures
Perform one-button zero-point recalibration; reposition the instrument away from variable-frequency drives, motors, and high-voltage lines; Strictly enforce single-end grounding of shielded cables; do not ground both ends to the same point.
Emergency Workaround
Perform multiple small-scale on-site calibrations, record the drift patterns, manually correct readings, and rewire according to standards afterward.

Fault 4: Erratic readings, interference, and distortion
Troubleshooting Steps
Signal cables are routed in the same conduit as power cables or run parallel at close proximity.
New high-power electrical equipment installed on-site generates electromagnetic radiation.
The instrument is damp or has moisture/condensation inside.
Remedial Measures
Reorganize the wiring; route signal cables separately from high-voltage power lines and maintain a safe distance; move the instrument to a dry, well-ventilated location and ensure it is protected from rain and moisture; check that the housing seal is intact.
Emergency Workaround
Temporarily hold the instrument away from the equipment site and suspend it to reduce ground coupling interference; stabilize the readings first to complete the inspection record.

Fault 5: Low battery icon remains lit; battery life drops sharply
Troubleshooting Steps
Battery aging and capacity degradation; frequent power cycling; prolonged screen-on standby.
Low ambient temperatures causing reduced lithium battery activity.
Remedial Measures
Replace directly with a brand-new industrial-grade lithium battery; minimize unnecessary power cycling and shut down promptly when not in use; allow the device to warm up before use during winter outdoor operations.
Emergency Workaround
Keep a spare battery on hand for rotation; replace it on-site at any time to avoid interrupting inspection and measurement.

Fault 6: Zero-point calibration failure; unable to zero
Troubleshooting Steps
Probe diaphragm deformed due to stress or permanently damaged.
Circuit drift exceeds the self-calibration range.
Excessive on-site interference prevents calibration from locking the zero point.
Remedial Measures
Clean the probe, align it vertically, let it rest, and recalibrate; If still ineffective, the sensor is likely damaged and must be returned to the factory for inspection and replacement.
Emergency Workaround
Record the fixed offset value, manually adjust the reading by adding or subtracting the offset, use as a temporary solution, and return the unit for repair afterward.

Fault 7: Significant Level Measurement Deviation, Inaccurate Readings
Troubleshooting Steps
The probe was not lowered vertically and is leaning against the tank wall, causing abnormal stress.
The medium has a special density, exceeding the standard calibration range for clean water.
The selected measurement range is too narrow; operating near full scale causes nonlinear deviation.
Remedial Measures
Re-suspend the probe vertically, away from the tank wall and debris; special media require custom calibration; reserve at least 20% of the measurement range for the actual maximum liquid level.
Temporary Workaround
Use manual tape measure readings as a reference, record a fixed correction value, and temporarily continue using the data.

Fault 8: Buttons Unresponsive, No Response When Switching
Troubleshooting Steps
Dust accumulation or moisture-induced oxidation in the button gaps.
Excessive force during pressing has damaged the button mechanism.
Remedial Measures
Gently wipe dust from the button surfaces in a dry environment; avoid pressing with excessive force; if water has entered or the unit is damp, allow it to dry completely before testing.
Emergency Workaround
Lock the current display mode in place; only read existing data; avoid frequent button switching; await after-sales repair.

8.4 After-Sales Service Guide
1. Criteria for Reporting Faults
If any of the following conditions occur, it is recommended to directly request after-sales service; do not attempt to disassemble the unit yourself:
Water ingress, damage from dropping, or cracked casing;
Deformed, corroded, or damaged sensor diaphragm, resulting in complete calibration failure;
Internal cable breakage, or failure to power on even after repeated battery replacements;
Severe display anomalies that cannot be resolved after ruling out environmental or installation factors;
Complete button failure, screen distortion, or incomplete display.

2. Repair Process
Record the product model: QDY30A-80 Battery-Powered Portable Level Gauge, purchase date, and a detailed description of the fault.
Take photos of the instrument display, probe appearance, and the on-site installation environment.
Contact your account manager or official after-sales customer service to submit a fault report along with the photos.
Follow the instructions for the repair or replacement process, and await inspection, repair, or replacement with a new unit.

3. Warranty Coverage
Under normal operating conditions, provided there is no human-caused damage or unauthorized disassembly/modification, the product is covered by the standard manufacturer’s warranty.
The warranty covers: circuit failures, natural sensor failure, and issues with factory seals or manufacturing defects, with free repair or replacement.
Exclusions: Damage caused by accidental drops, water ingress, unauthorized disassembly, misuse of highly corrosive substances, or forceful pulling of cables.

4. Usage Guidelines
Do not open the instrument housing or damage the factory-sealed encapsulation. Unauthorized disassembly will automatically void the warranty. Troubleshooting is limited to external operations only; do not disassemble or modify the internal circuitry yourself.