80GHz High-Frequency Radar Level Meter

I. Product Definition

The Anhui Qidian QDYG80A 80GHz High-Frequency Intelligent Radar Level Transmitter is a non-contact industrial level measurement instrument based on FMCW (Frequency-Modulated Continuous Wave) radar technology. Designed specifically for continuous level monitoring in complex operating conditions, it represents a new generation of intelligent measurement equipment developed by Anhui Qidian Automation Technology Co., Ltd. for industries such as petroleum, chemicals, metallurgy, pharmaceuticals, and environmental protection.

Its core functions cover the following areas:

1. High-precision continuous level measurement: Utilizing 80GHz high-frequency microwave signals for non-contact measurement, it is not directly affected by medium temperature, pressure, viscosity, or corrosiveness, enabling continuous, real-time, and precise monitoring of levels in various media such as liquids, slurries, granules, and powders.

2. Adaptability to Multiple Operating Conditions: Supports various installation configurations (threaded, flanged, sanitary flanged), with optional high-temperature heat dissipation and purging anti-blocking structures. It is suitable for complex operating conditions ranging from ambient temperature and pressure to high heat, high pressure, dust, foam, steam, and highly corrosive environments.

3. Intelligent Signal Processing and Interference Suppression: Equipped with a built-in intelligent echo analysis algorithm, it automatically filters out interference signals such as tank agitation, eddy currents, false echoes, and tank wall reflections, ensuring stable measurement data output even under complex operating conditions.

4. Standard Industrial Signal Output and Communication: Standard 4–20 mA analog signal output is included, with optional HART protocol support. The device can be directly integrated into industrial control systems such as PLCs and DCSs to enable remote monitoring and data transmission.

5. Wide Measurement Range and High Stability: Offers multiple range options tailored to different media, with a maximum measurement distance of up to 80 meters. It features low power consumption and long-term drift-free performance, meeting the demands of continuous operation in industrial environments.

6. Maintenance-Free, Long-Life Design: The non-contact measurement method eliminates mechanical moving parts, minimizing the risk of wear and clogging. This significantly reduces on-site maintenance costs, with a service life of over 5 years.

7. Explosion-Proof and Industrial-Grade Protection: Supports intrinsically safe / flameproof explosion-proof certifications (optional) with IP67/IP68 protection ratings, ensuring safe operation in harsh industrial environments such as flammable and explosive atmospheres, humid conditions, and dusty environments.

II. Working Principle

2.1 Core Principle

You can think of this radar level transmitter as a “high-precision microwave rangefinder”: it emits a beam of high-frequency microwave signals with continuously varying frequencies (80 GHz, which is higher in frequency and narrower in beam width than standard radar signals) toward the surface of the measured medium. which is reflected back after hitting the surface of the measured medium. By calculating the frequency difference between the “transmitted signal” and the “reflected signal,” the instrument can precisely determine the round-trip time of the signal. Combined with the speed of microwave propagation, this allows the instrument to calculate the distance from the instrument to the surface of the medium, ultimately determining the liquid level or material level height.

2.2 Complete Workflow

1. Signal Transmission: The instrument’s internal microwave oscillator generates an 80 GHz high-frequency, frequency-modulated continuous wave (CW) signal, which is directed toward the surface of the measured medium via an antenna. Different antenna types (e.g., threaded, horn, sanitary) optimize the transmission angle and focusing effect to minimize interference.

2. Signal Propagation: The microwave signal propagates in a straight line through the air or the interior of the tank. The 80 GHz high-frequency signal has an extremely narrow beam angle (typically < 3°), offering strong resistance to interference and making it less susceptible to scattering by tank walls, agitators, steam, or dust.

3. Signal Reflection: When the microwave signal strikes the surface of the measured medium (liquid or solid particles), it is reflected; the higher the dielectric constant of the medium, the stronger the reflected signal and the more stable the measurement (measurements for low-dielectric-constant media can also be achieved through algorithm optimization).

4. Signal Reception and Processing: The instrument’s antenna receives the reflected echo signal. The internal circuitry compares the frequency difference between the transmitted and received signals, and a high-speed processor calculates the round-trip time to determine the distance from the instrument to the surface of the medium.

5. Data Calibration and Output: Based on preset tank height parameters, the instrument converts the distance value into liquid/material level height. It then uses intelligent algorithms to filter out false echoes (such as interference signals from tank walls, foam, or agitators), ultimately outputting a stable 4–20 mA signal or digital communication signal to the control system.

III. Industry Pain Points

1. Customer Challenges: Most sites currently use contact-type measurement devices such as float level gauges, hydrostatic level gauges, and submersible level transmitters, where the instrument probes are directly immersed in the material. When exposed to strong acids, strong alkalis, high-viscosity slurries, or media prone to crystallization, these probes are highly susceptible to corrosion, adhesion, and scaling. This results in high equipment failure rates, frequent replacements, and delays in production schedules.

Product Solution: The QDYG80A 80GHz High-Frequency Smart Radar Level Transmitter employs a fully non-contact measurement method. The instrument’s antenna maintains zero contact with the internal material throughout the process—it is neither immersed nor penetrates the medium—thereby eliminating equipment damage caused by corrosion, adhesion, crystallization, and sedimentation at the source.

Direct Benefits: Completely eliminates instrument damage caused by medium corrosion, significantly reduces equipment replacement frequency, minimizes on-site downtime for maintenance, effectively lowers equipment procurement and labor costs, and substantially extends equipment service life.

2. Customer Pain Points: Operating conditions in chemical reactors, sewage tanks, fermentation tanks, and storage silos often involve large amounts of water vapor, dense fog, steam, foam, and mist. Signals from conventional level instruments are easily obstructed or scattered, leading to data fluctuations, level drift, and inaccurate readings, making stable level monitoring impossible.

Product Solution: This device is equipped with an 80GHz ultra-high-frequency continuous-wave radar featuring an extremely narrow beam angle and exceptional signal penetration. It remains unaffected by on-site steam, mist, surface foam, or water vapor, and incorporates a built-in intelligent echo suppression algorithm to automatically filter out interference from mist and other noise.

Direct Benefits: Stable measurement is maintained even under harsh conditions such as heavy fog, full steam, and thick foam. Data shows no fluctuations or drift, providing real-time feedback of accurate liquid level values to ensure precise and controllable production process parameters.

3. Customer Pain Points: In dust-intensive storage environments such as raw material silos, fly ash silos, grain silos, and plastic pellet silos, dust particles are suspended in the air. Traditional level measurement

instruments are highly susceptible to probe obstruction by dust, leading to measurement failures and data interruptions; prolonged use often results in dust accumulation and instrument failure.
Product Solution: The 80GHz high-frequency radar microwave signal possesses exceptional penetration capabilities, easily penetrating suspended dust and dry particulates without being affected by dust concentration inside the silo. The instrument's external structure prevents dust accumulation from obstructing the detection surface, making it suitable for measuring in fully dust-sealed silos.
Direct Benefits: Enables stable, round-the-clock measurement in fully enclosed dust-filled silos without the need for frequent cleaning of the detection area. This facilitates unattended, automated monitoring of stored materials, enhancing the level of intelligent warehouse management.

4. Customer Pain Points: Industrial sites often feature high-temperature tanks, high-temperature thermal oil storage tanks, and high-temperature reaction vessels. The high ambient temperatures in these environments pose challenges for standard level transmitters, which have poor heat resistance. Internal components are prone to aging and failure in high-temperature conditions, leading to a rapid decline in measurement accuracy and the need for frequent calibration.
Product Solution: The QDYG80A high-frequency radar level gauge supports a custom high-temperature structure, equipped with dedicated high-temperature heat dissipation components. The entire unit utilizes high-temperature-resistant industrial electronic components, making it suitable for high-temperature media and harsh on-site environments. It offers robust high-temperature resistance and a wide temperature adaptability range.
Direct Benefits: Long-term, stable, and accurate measurement in high-temperature conditions eliminates the need for repeated on-site calibration. Components are less prone to aging and damage, ensuring reliable operation in high-temperature production scenarios such as thermal power, chemical processing, and high-temperature refining.

5. Customer Pain Points: Storage tanks and mixing tanks contain components such as agitators, baffles, and tank reinforcements. Equipment operation generates a large number of false reflection echoes. Conventional radar level transmitters cannot distinguish between true liquid surface echoes and echoes from tank debris, frequently resulting in measurement errors and false alarms.
Product Solution: The device features built-in intelligent echo recognition and false echo suppression capabilities. Users can manually lock out areas with invalid interference echoes, precisely filtering out excess reflection signals generated by agitators, tank walls, and tank supports, and identifying only the true liquid level echoes from the material surface.
Direct Benefits: Accurate and error-free measurement under dynamic conditions with agitation, eliminating false alarms and incorrect data uploads. This ensures the data collected by the central control system is authentic and valid, preventing production errors caused by data inaccuracies.

6. Customer Pain Points: Materials such as diesel, gasoline, light oils, and low-dielectric-constant powders produce weak reflection signals. Low-frequency radar level transmitters receive only faint echoes, resulting in short measurement ranges, poor accuracy, and even measurement blind spots where liquid levels cannot be detected.
Product Solution: The 80GHz ultra-high-frequency radar emits a highly concentrated signal with superior detection sensitivity. The signal reception module is optimized for low-dielectric-constant materials with weak reflections, significantly enhancing weak signal capture capabilities and enabling precise distance and level measurement for such materials with ease.
Direct Benefits: Stable and accurate measurement is achieved for all types of light oils and low-dielectric-constant granular materials, eliminating measurement blind spots associated with traditional level instruments and expanding the range of applicable measurement media on-site.

7. Customer Pain Points: Clean production industries such as food, pharmaceuticals, and personal care products impose strict hygiene requirements on field instruments. Conventional measurement instruments often have structural dead zones where material residues can accumulate, fostering bacterial growth and failing to meet sterile clean production standards, making cleaning difficult.
Product Solution: This model offers optional sanitary-grade flanges and clamp-style mounting structures. The entire unit features a smooth exterior with no dead corners for material buildup, supports on-site blow-down cleaning configurations, and boasts a simple, easy-to-rinse design that fully complies with sanitary production standards in the food and pharmaceutical industries.
Direct Benefits: Meets the sterile production requirements of cleanrooms; daily cleaning is simple and convenient; eliminates the risk of contamination from material residue; successfully passes industry hygiene inspections; and is compatible with automated production lines for clean fluids.

8. Customer Pain Points: In flammable and explosive hazardous areas such as petroleum, chemical, and oil/gas storage tanks, standard field instruments lack explosion-proof certification, posing significant safety risks and preventing normal installation and use within explosion-proof zones.
Product Solution: The QDYG80A high-frequency intelligent radar level transmitter is available in an explosion-proof version. The entire unit is designed and manufactured in strict accordance with industrial explosion-proof standards, featuring a high protection rating and a safe, stable circuit structure, making it suitable for direct application in various flammable and explosive hazardous environments.
Direct Benefits: Ensures compliant and safe use in hazardous chemical areas, eliminates on-site electrical safety hazards, meets plant safety production standards, and safeguards the overall operational safety of personnel and equipment within the facility.

9. Customer Pain Points: On-site instrument output signals are inconsistent, making it difficult to quickly integrate with PLCs, DCS systems, industrial control panels, and remote IoT control systems. Wiring is cumbersome, signal compatibility is poor, and achieving centralized automated control is challenging.
Product Solution: The device comes standard with a universal 4-20mA analog signal output and offers an optional HART digital communication protocol. Wiring is simple and convenient, signal transmission is stable, and it seamlessly integrates with all mainstream industrial automation control systems on the market.
Direct Benefits: Rapid integration into the plant-wide automation control system enables remote real-time monitoring of liquid level data, remote parameter tuning, and unattended automatic control, significantly improving the overall efficiency of plant automation management.

10. Customer Pain Points: Most on-site liquid level measurement devices have complex structures with numerous built-in mechanical transmission components. Long-term operation often leads to jamming, sticking, and mechanical failures, resulting in heavy daily maintenance workloads and significant consumption of manpower and resources.
Product Solution: The device contains no mechanical moving parts whatsoever, featuring a purely electronic signal detection structure. Its internal design is simple and stable, eliminating mechanical wear and jamming failures, and requiring virtually no disassembly for maintenance.
Direct Benefits: Truly maintenance-free operation is achieved, significantly reducing the workload of on-site operations and maintenance personnel and lowering long-term operational costs, making it suitable for large-scale, bulk installation.

11. Customer Pain Points: In long-distance measurement scenarios such as large oil storage tanks, large water reservoirs, and long-distance silos, conventional level gauges have insufficient measurement ranges and suffer from severe accuracy degradation over long distances, failing to meet the liquid level monitoring needs of large-scale sites.
Product Solution: The QDYG80A high-frequency radar level transmitter features a long measurement range and minimal signal attenuation over long distances, maintaining high-precision detection performance even during long-distance transmission. It is suitable for large-span measurement scenarios such as large storage tanks, large water reservoirs, and high-level silos.
Direct Benefits: A single instrument can perform comprehensive level monitoring across large-scale storage facilities and liquid storage sites, reducing the number of instruments required, simplifying on-site wiring layouts, and lowering overall project construction costs.

3.2 Summary of Core Product Value

1. High Precision and Stability: 80GHz high-frequency radar technology combined with intelligent algorithms achieves measurement accuracy of ±3mm with long-term drift-free performance, resolving measurement inaccuracies in complex operating conditions.

2. Adaptability to All Operating Conditions: Multiple mounting options (threaded / flanged / sanitary) + optional high-temperature / purging / explosion-proof configurations cover the vast majority of industrial scenarios, including ambient temperature and pressure, high temperature and pressure, dust and foam, strong corrosion, and low dielectric constant environments.

3. Maintenance-Free and Long Service Life: Non-contact design with no mechanical parts ensures no wear or clogging, resulting in extremely low maintenance costs and a service life far exceeding that of contact-type level transmitters.

4. Industrial-Grade Safety and Reliability: Explosion-proof certification and high protection ratings make it suitable for harsh industrial environments such as flammable and explosive atmospheres, as well as damp and dusty conditions, ensuring production safety.

5. Seamless Integration with Industrial Systems: Standard 4-20mA + HART protocols ensure compatibility with mainstream PLC/DCS systems, enabling remote monitoring and data transmission, and making it ideal for automated production lines.

IV. Key Product Parameters & Specifications

4.1 Basic Electrical Parameters

Radar Measurement Frequency: Standard 80 GHz UHF Frequency-Modulated Continuous Wave (FMCW)

Beam Angle: Narrow beam ≤3°, extremely strong anti-interference and anti-scattering capability

Standard Measurement Range: 0.3 m to 80 m (linear measurement across the entire range)

Minimum Blind Zone Distance: ≤0.3 m, no measurement dead zones at low liquid levels

Measurement Accuracy: ±2 mm under standard ambient conditions; ±3 mm stable accuracy across all operating conditions

Repeatability Error: ≤±1 mm, high data consistency

Response Output Speed: Standard 0.1 s–10 s, freely adjustable

Applicable Dielectric Constant: ≥1.5, compatible with most liquids, granules, and powders

Signal Output Type: Standard 4–20 mA DC analog output

Digital Communication Protocol: Optional built-in HART 7.0 protocol, supporting remote parameter read/write

Output Load Capacity: 4–20 mA, maximum load resistance ≥600 Ω

Calibration Methods: Local calibration via on-site buttons, remote calibration via handheld device, remote calibration via host computer

Fault Output Modes: Configurable upper limit overflow, lower limit overflow, and fixed current alarm output

4.2 Isolation Performance Parameters

Electrical Isolation Level: Full electrical isolation between input power supply and measurement signal output

Isolation Withstand Voltage: Insulation withstand voltage between power supply and signal terminals ≥1500 V AC

Insulation Resistance: Total insulation resistance ≥100 MΩ; resistant to leakage and crosstalk

Common-Mode Rejection Ratio (CMRR): Strong suppression of industrial common-mode interference; suitable for environments with strong electromagnetic fields near variable frequency drives and high-power motors

Signal Isolation Method: Built-in independent opto-isolator module; eliminates ground loop interference

Surge Protection Rating: Bidirectional surge protection for both power and signal terminals

EMI Resistance Rating: Complies with industrial EMC standards; immune to on-site frequency conversion interference and wireless signal interference

Intrinsically Safe Isolation Compatibility: Explosion-proof versions are compatible with standard industrial safety barriers; signal isolation without attenuation

4.3 Power Supply & Power Consumption Parameters

Standard Operating Supply Voltage: DC 18V–36V; typical rated supply: DC 24V

Recommended Stable Power Supply: DC 24V regulated industrial power supply

Total Unit Standby Power Consumption (No Load): ≤1.8W

Total Unit Maximum Operating Power Consumption (Full Load): ≤2.5W

Power Polarity Protection: Built-in automatic protection against positive/negative polarity reversal; device will not be damaged if power is connected incorrectly

Overvoltage Protection Range: Withstands up to 40V DC transient overvoltage without damage

Undervoltage protection threshold: Automatically enters low-voltage protection standby mode when voltage drops below DC 17V

Passive power distribution output: No external power distribution; pure two-wire circuit power supply with integrated signal transmission

Power connection method: Two-wire connection; simple wiring that saves on installation cable

Power supply ripple tolerance: Compatible with industrial unregulated DC power supplies; strong resistance to voltage fluctuations

4.4 Environmental Adaptation Parameters

Operating Temperature Range

Standard Version Medium Temperature: -40°C to +120°C

High-Temperature Custom Version Medium Temperature: -40°C to +200°C

Instrument Housing Operating Temperature: -30°C to +70°C

Equipment Storage Temperature: -45°C to +80°C

Humidity and Protection Rating

Operating environment relative humidity: 5% RH to 95% RH, long-term operation in non-condensing environments

Overall enclosure protection rating: IP67 (standard), optional upgrade to IP68 for deep-water sealing protection

Dust and water resistance: Fully dustproof, capable of short-term submersion, suitable for direct installation on outdoor open tanks

Pressure Range

Standard Atmospheric Pressure Measurement: -0.1 MPa to 1.6 MPa

Custom High-Pressure Flange Version: Supports tank pressures up to 4.0 MPa

Explosion-Proof Ratings and Accessories

Available Explosion-Proof Ratings: Intrinsically Safe Ex ia IIC T6 Ga; Flameproof Ex d IIC T6 Gb

Maximum Surface Temperature: T6 class, surface temperature ≤ 85°C

Compatible Safety Barriers: Supports commonly used intrinsic safety level signal safety barriers in China

Applicable Explosion-Proof Zones: Zones 0, 1, and 2 hazardous locations with flammable and explosive gases or liquids

Corrosion Resistance: Compatible with corrosive environments involving weak acids, weak alkalis, water vapor, and oil-gas mixtures

4.5 Physical and Structural Parameters

Mounting Methods

General Mounting: Threaded mounting (G1.5, M48, NPT1.5; multiple specifications available)

Industrial Flange Mounting: DN50, DN80, DN100 GB standard carbon steel / stainless steel flanges

Sanitary Mounting: Quick-release clamp-type mounting specifically for food and pharmaceutical applications

Optional Accessories: Can be equipped with a heat sink, dust cover, purge and anti-clogging assembly, and sun/rain shield

Dimensions

Instrument Head Dimensions: Length 135mm × Width 120mm × Height 85mm

Standard Horn Antenna Length: 110mm

Total Length of High-Temperature Extended Antenna: 185mm

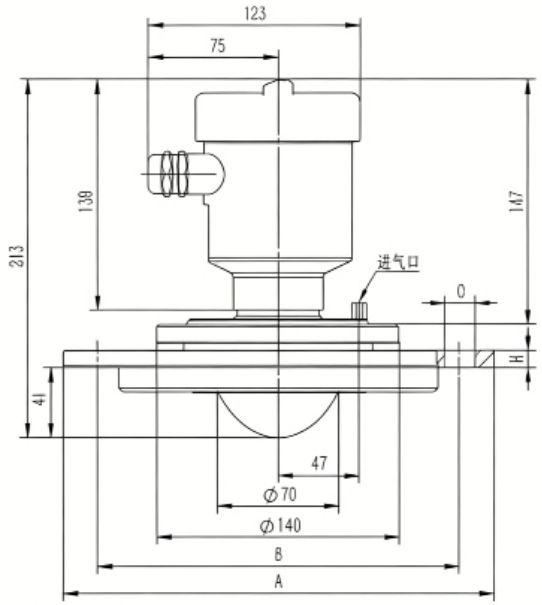
Sanitary-grade straight antenna length: 95 mm

Maximum outer diameter for integrated installation: ≤130mm

Cable entry specifications: M20×1.5 standard cable gland

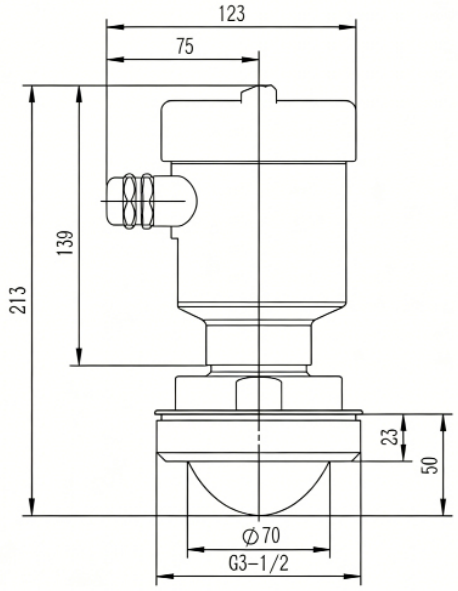
Total Weight
Net weight of standard threaded base model: approx. 0.85kg
Total weight of standard flange model: approx. 1.3kg
Total weight of high-temperature extended heat-dissipation model: approx. 1.6kg

Housing Material and Protection Details
Instrument Housing: One-piece die-cast aluminum alloy, with electrostatic powder coating for corrosion resistance
Antenna Body Material: 304 food-grade stainless steel, resistant to moisture, oil, and gas corrosion
High-Temperature Antenna: 316L stainless steel, resistant to high temperatures and oxidation
Internal Sealing Structure: Multi-layer high-temperature-resistant silicone rubber gaskets, preventing moisture ingress
Terminal Chamber Structure: Independent, sealed compartmentalized terminal chamber; measurement chamber and terminal chamber are completely isolated
Surface Treatment: Oil-resistant, dust-resistant, and resistant to outdoor UV aging
Vibration Resistance Rating: Meets the requirements for use in industrial environments with tank vibrations and equipment-induced vibrations
Wind Pressure Resistance Design: Designed for installation on top of outdoor tanks to withstand interference from strong wind vibrations

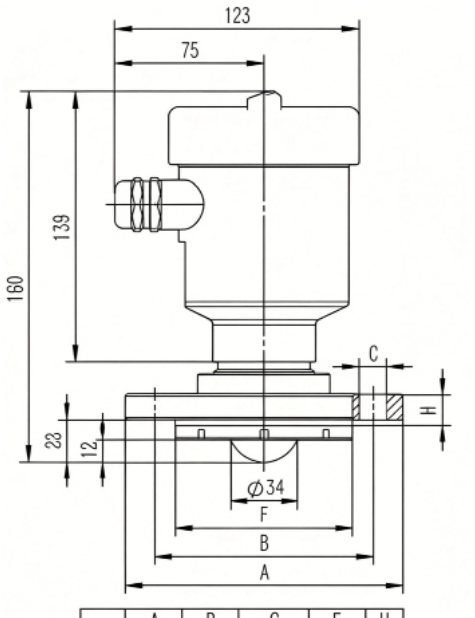


	A	B	C	H
DN80	ϕ190	ϕ150	4−ϕ18	15
DN100	ϕ210	ϕ170	4−ϕ18	15
DN125	ϕ240	ϕ200	3−ϕ18	17
DN150	ϕ265	ϕ225	3−ϕ18	17
DN200	ϕ320	ϕ280	8−ϕ18	19

Corrosion-resistant Model

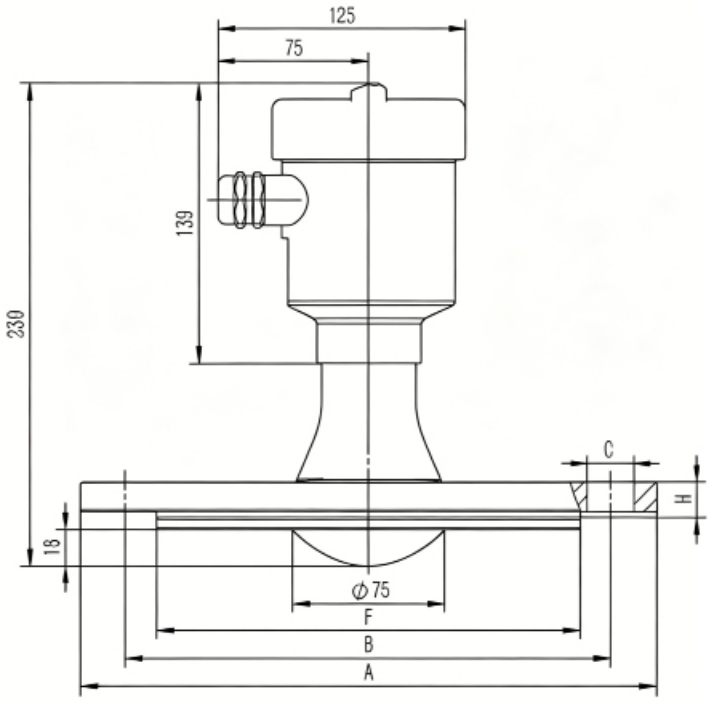


Pipe Thread Installation



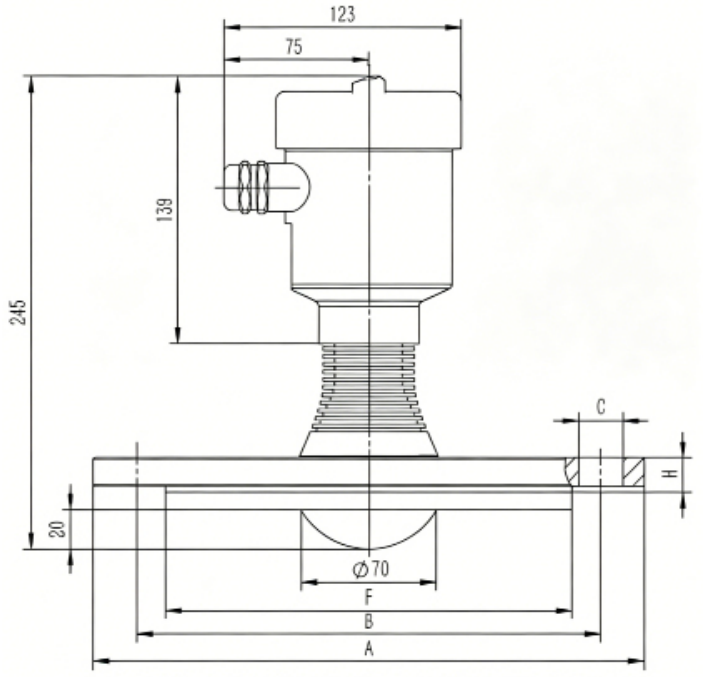
	A	B	C	F	H
DN50	ϕ140	ϕ110	4−ϕ14	ϕ90	16
DN65	ϕ160	ϕ130	4−ϕ14	ϕ100	16

Room-temperature flanged model



	A	B	C	F	H
DN80	ϕ190	ϕ150	4−ϕ13	ϕ128	18
DN100	ϕ210	ϕ170	4−ϕ18	ϕ148	18
DN125	ϕ240	ϕ200	8−ϕ18	ϕ178	20
DN150	ϕ255	ϕ225	8−ϕ18	ϕ202	20
DN200	ϕ320	ϕ280	8−ϕ18	ϕ258	22

Installation of High-Temperature Flanges



	A	B	C	F	H
DN80	ϕ200	ϕ160	8−ϕ18	ϕ138	20
DN100	ϕ220	ϕ180	8−ϕ18	ϕ158	22
DN125	ϕ250	ϕ210	8−ϕ18	ϕ188	22
DN150	ϕ265	ϕ240	6−ϕ22	ϕ212	24
DN200	ϕ340	ϕ295	12−ϕ22	ϕ268	26

High-Temperature Corrosion-Resistant Model

V. Application-Specific Selection Guide

5.1 Key Selection Criteria

1. Signal Type: The QDYG80A comes standard with a 4–20 mA analog signal, with an optional HART digital signal; it is compatible with mainstream control systems such as DCS and PLC. For media with low dielectric constants (≥1.5), the high-frequency signal mode is recommended to ensure stable echo reception.

2. Number of Channels: Standard single-channel design focuses on high-precision single-point measurement; for scenarios with multiple compartments or tank groups, customized multi-channel integrated solutions are available, enabling a single instrument to monitor multiple measurement points and reduce equipment costs.

3. Power Supply: Standard 18–36 V DC (typically 24 V DC) two-wire loop power supply; no additional power lines required, simplifying wiring; optional solar power modules are available for outdoor and remote locations, suitable for environments without mains power.
Explosion-Proof Requirements: For flammable and explosive environments (chemical, oil and gas, pharmaceutical), select intrinsically safe Ex ia IIC T6 or flameproof Ex d IIC T6; For non-explosive environments such as standard industrial facilities and water treatment plants, select the standard general-purpose model, which balances safety and cost.

4. Installation Environment: For standard indoor/outdoor use, select IP67 protection; for humid environments or brief immersion, select IP68; for high-temperature environments (medium >120°C), use a heat dissipation sleeve; for high-dust or crystallization-prone environments, add a purging anti-clogging component; for narrow tank openings, select a compact horn antenna.

5. Medium Characteristics: For highly corrosive media (acids, alkalis, organic solvents), select 316L stainless steel or PTFE-coated antennas; for high-viscosity or material-adhering media, select anti-adhesion antennas; for media with low dielectric constants (e.g., liquefied gas), prioritize 80 GHz high-frequency models to enhance signal reflection.

6. Range and Accuracy: For standard storage tanks, select the full range of 0.3–80 m, allowing for a 10%–20% margin; for trade settlement and precision reactors, select the high-precision model with ±2 mm accuracy; for low-level shallow tanks, prioritize models with a small blind zone of ≤0.3 m.

5.2 Industry-Specific Selection Recommendations

1. Chemical Industry

Standard acid/alkali storage tanks and solvent tanks: Select standard threaded (G1.5) models with 304 stainless steel antennas, IP67 rating, and 4–20 mA + HART output. Suitable for -40°C to 120°C and atmospheric pressure conditions; resistant to corrosion and steam interference.
High-temperature reactors and asphalt tanks: Select the high-temperature custom model with a 316L stainless steel antenna + heat sink, operating temperature range -40°C to 200°C, explosion-proof type Ex d IIC T6, designed for high-temperature, high-viscosity, and agitation-induced interference conditions.
Tanks for flammable and explosive raw materials (methanol, benzene compounds): Select the intrinsically safe model Ex ia IIC T6, equipped with a safety barrier, a PTFE-coated antenna, and IP68 rating. Suitable for Zone 0 and Zone 1 hazardous environments, providing leak and explosion protection.

2. Power Industry

Boiler drums, deaerator tanks: Select standard flange type (DN80) with anti-foam algorithm, capable of penetrating steam foam, accuracy ±2 mm, IP67, suitable for high-temperature, high-pressure, and high-steam conditions.
Desulfurization slurry tanks, wastewater tanks: Select anti-fouling antenna + purge assembly, IP68, resistant to corrosion, foam, and turbid media; 4–20 mA signal compatible with desulfurization control systems.
Ash silos, fly ash silos: Select parabolic antenna, 80 GHz high-frequency penetration through dust, anti-fouling, IP67, suitable for high-dust and dry material measurement scenarios.

3. Metallurgy Industry

Pickling tanks, alkali washing tanks: Select 316L stainless steel + PTFE-coated antennas, IP68, highly corrosion-resistant, suitable for acidic and alkaline corrosion and temperature fluctuations.
Recirculating water tanks, cooling water tanks: Select standard threaded models, IP67, resistant to scale and algae buildup, for stable level monitoring in outdoor and humid environments.
Molten metal cooling tanks: Select the high-temperature custom model with a ceramic antenna, rated for 200°C, explosion-proof design, to handle high temperatures, steam, and interference from metal dust.

4. Pharmaceutical Industry

Purified water tanks, water-for-injection tanks: Select sanitary chuck mounting with a polished 316L stainless steel antenna, compliant with 3A sanitary standards, IP67 rating, no blind spots, easy to clean, and prevents medium contamination.
Fermenters, Mixing Tanks: Select models with anti-foam algorithms to penetrate fermentation foam; feature sanitary seals suitable for sterile, constant-temperature, and agitated conditions.
Alcohol and Organic Solvent Storage Tanks: Select intrinsically safe models with PTFE-coated antennas; explosion-proof and corrosion-resistant, suitable for media with low dielectric constants and flammable/explosive properties.

5. Smart Manufacturing / General Industry

Small Storage Tanks, Intermediate Tanks: Select threaded models (M48) with a small blind zone ≤0.3 m. Compact design fits tight installation spaces and offers easy installation.
Outdoor Water Storage Tanks, Fire Water Tanks: Select IP68 protection with sunshade and rainproof components. UV-resistant and resistant to rain immersion, with 4–20 mA signal transmission, suitable for unattended scenarios.
Multi-bin silos, batching systems: Choose the multi-channel custom model; a single instrument monitors multiple silos, with HART communication integration into the central control system, reducing equipment and wiring costs.

5.3 Common Selection Misconceptions

1. Misconception: Ignoring isolation rating; selecting standard models for high-interference environments

In environments with strong electromagnetic interference—such as those containing variable frequency drives or high-power motors—selecting instruments without isolation design can lead to signal drift, data fluctuations, or even damage to the mainboard. The QDYG80A features built-in full electrical isolation with a withstand voltage of ≥1500

V AC and strong common-mode rejection, making it suitable for high-interference conditions and ensuring stable signal transmission.

2. Misconception: Selecting the wrong signal range and blindly pursuing a wide range
Selecting an 80m wide range when the actual range is only 5m will result in reduced measurement accuracy and an expanded blind zone; selecting a wide range for a shallow tank with a small range may lead to failure to detect low levels or overflow at high levels. The QDYG80A supports segmented calibration from 0.3 to 80m. Select a model based on the actual tank height plus a 10% margin to balance accuracy and range, avoiding resource waste.

3. Misconception: Neglecting load matching and connecting 4–20 mA to high loads
If the load on a 4–20 mA signal exceeds 600 Ω, it will cause signal attenuation and current distortion, resulting in abnormal data reception by the central control system. The QDYG80A has an output load of ≥600 Ω, compatible with standard DCS/PLC input impedance. Verify system load parameters during selection to avoid signal transmission failures.

4. Misconception: Selecting General-Purpose Models for Explosion-Proof Environments, Resulting in High Safety and Compliance Risks
In flammable and explosive environments such as Chemical Zone 0 and Zone 1, selecting non-explosion-proof general-purpose models can easily trigger explosions due to electrical sparks, violating safety regulations. The QDYG80A offers intrinsically safe and flameproof explosion-proof models. Select the appropriate model based on the hazardous area classification and pair it with a safety barrier to meet explosion-proof compliance requirements.

5. Misconception: Using standard 304 stainless steel antennas in highly corrosive environments results in short service life
In environments with highly corrosive media such as hydrochloric acid and caustic soda, standard 304 stainless steel antennas are prone to corrosion and perforation within 3–6 months, leading to instrument damage and media leakage. For highly corrosive environments, the QDYG80A offers 316L stainless steel or PTFE-coated antennas, extending service life by more than three times and reducing maintenance costs.

6. Misconception: Using low-frequency radar in high-steam/foam environments results in weak signals
In steam- or foam-covered environments such as reactors and sewage tanks, using 26 GHz low-frequency radar causes signals to be easily scattered, resulting in lost echoes. The QDYG80A operates at 80 GHz, featuring a narrow beam and strong penetration capabilities. It can penetrate foam layers over 1 m thick, resists steam interference, and provides stable measurements.

5.4 Customization Recommendations
1. Custom Signal Configuration
For RS485/Modbus communication: An integrated Modbus-RTU module supports long-distance transmission and is compatible with IoT remote monitoring platforms.
Requires Bluetooth Remote Debugging: Adds a Bluetooth module for on-site parameter configuration and troubleshooting via a mobile app, eliminating the need to disassemble the unit and suitable for high-altitude or confined installation environments.
Requires Dual Signal Output: Customizes 4-20mA + HART dual output to support both analog control and digital remote diagnostics, suitable for complex control systems.

2. Customization for Non-Standard Operating Conditions
Extreme High-Temperature Conditions (medium 200°C–400°C): Customized extended heat dissipation sleeve + ceramic antenna, 400°C temperature resistance, explosion-proof design, suitable for high-temperature kilns and melting tanks.
Extreme High-Pressure Conditions (>1.6 MPa): Customized high-pressure flange (PN40), thickened housing, reinforced sealing, suitable for high-pressure reactors and pressure vessels.
Highly Corrosive + Vacuum Conditions: Custom Hastelloy antenna + perfluoroether seal, suitable for vacuum distillation tanks and strong acid storage tanks, offering corrosion resistance and negative pressure tolerance.
Internal Floating Roof Tanks: Custom algorithm for internal floating roofs to avoid interference from the floating roof and enhance signal strength, suitable for light hydrocarbon and crude oil internal floating roof tanks.

3. Multi-Channel Integrated Customization
Multi-Tank Group Monitoring: Custom multi-channel modules allow a single instrument to connect to 4–8 measurement points, collecting liquid levels from each tank at different times. HART communication aggregates data, reducing equipment costs by over 30%.
Centralized Tank Farm Monitoring: Custom explosion-proof multi-channel enclosures integrate signal isolation, lightning protection, and communication conversion, suitable for explosion-proof environments in chemical tank farms. Features simple wiring and convenient maintenance.
Multi-Parameter Interlocking: Customized level + temperature integrated models simultaneously measure liquid level and medium temperature, with dual signal outputs, suitable for reactors and storage tanks requiring temperature-level interlocked control.

4. Installation and Protection Customization
Narrow Tank Openings (<100 mm): Customized compact transmitters with short antennas, compatible with small-diameter threaded (G1) installations, without affecting internal tank structures.
High-Dust / Crystallization Environments: Custom automatic purge assembly (0.4 MPa) that periodically clears dust and crystallization from the antenna, reducing manual maintenance and making it suitable for cement silos and salt tanks.
Extreme Outdoor Environments: Custom stainless steel rain shield with UV-resistant coating, withstanding extreme temperatures from -40°C to 70°C and resisting heavy rain, intense sunlight, and strong winds to extend outdoor service life.

VI: Installation and Commissioning Guidelines
Applicable to the full range of models, including threaded, flanged, high-temperature, sanitary, and explosion-proof variants. We provide step-by-step on-site installation guidance throughout the entire process, following a standardized procedure from preliminary preparation to final commissioning. This effectively minimizes installation errors, reduces on-site malfunctions, and increases the success rate of first-time startup.

6.1 Pre-Installation Preparations
1. Verification of Complete Accessories
After unpacking, carefully inventory and verify all components of the unit one by one to ensure there are no missing parts, dents, or visible damage. Verify that the product model, measurement range, explosion-proof rating, and medium temperature resistance specifications match the procurement requirements. Standard configuration includes the radar level transmitter main unit, installation gaskets, mounting hardware, cable gland, and user manual; For custom models, additionally verify that optional accessories such as heat dissipation components, purge devices, sanitary clamps, and explosion-proof sealing assemblies are complete and in good condition.

2. On-site Environmental Conditions Inspection
Confirm that the dimensions of the opening at the top of the tank match the instrument's mounting interface specifications. Clean debris, dust, and oil residue from the area around the mounting opening in advance; Verify that the actual on-site medium temperature, tank pressure, ambient humidity, dust concentration, and vapor concentration are all within the instrument's rated operating range; in flammable and explosive areas, confirm the on-site explosion-proof zone classification in advance and ensure the installation location complies with explosion-proof construction standards; keep the instrument away from areas with strong electromagnetic radiation, such as large variable frequency drives, high-power motors, and high-frequency control cabinets, and reserve sufficient space for signal transmission.

3. List of Essential On-Site Installation Tools
Prepare basic installation tools such as wrenches, Allen wrenches, Phillips screwdrivers, multimeters, insulated voltage testers, signal calibrators, waterproof electrical tape, high-temperature-resistant cables, shielded communication cables, flat grounding bars, wire terminals, and marker pens; for installations at heights, set up a safe work platform in advance and provide safety protective equipment.

4. Preliminary Safety Precautions
Before tank construction, ensure the equipment is shut down and depressurized, and that all flammable, explosive, and corrosive media have been completely removed from the tank. Implement the on-site power disconnection, tagging, and locking procedures. For equipment operating under high-temperature conditions, allow it to cool naturally before entering the site for installation. Open flames are strictly prohibited in explosion-proof zones, and the explosion-proof sealing structures must not be disassembled or modified without authorization; outdoor installation work must be suspended during rainy, foggy, or high-humidity conditions to prevent water ingress and short circuits; workers must wear appropriate protective gear for the specific working conditions and strictly adhere to the site's safety management regulations.

6.2 Standard Installation Procedures
1. Equipment Mounting Procedure
First, clean the tank mounting surface to ensure it is flat, level, and free of unevenness or deformation. Place the supplied gasket evenly over the mounting interface, align the instrument antenna vertically and center it, then lower it to ensure the antenna points vertically downward toward the liquid surface; installation at an angle is strictly prohibited. For threaded models, tighten the bolts clockwise with moderate force to avoid stripping the threads; For flanged models, align the flange holes and tighten the bolts diagonally and evenly to ensure a tight seal with no leakage; handle high-temperature extended antennas and sanitary-grade antennas with care throughout the installation process; do not squeeze or bump the antenna sensing surface; after installation of all models, ensure the entire unit is stable and free of wobbling; for outdoor installations, a rainproof and sunshade mounting bracket may be added.

2. Internal Wiring Specifications
This unit employs an industrial-standard two-wire wiring configuration, strictly separating power polarity from signal transmission lines, with standardized wiring definitions.
Power supply lines must be connected exclusively to the instrument's power terminals, strictly adhering to the DC24V standard; ensure correct polarity and do not reverse the positive and negative terminals. The 4–20 mA analog output lines must be directly connected to the analog input terminals of the central control PLC or DCS system. Models equipped with HART communication functionality must have dedicated communication signal lines routed separately to avoid sharing conduits with power cables. All wiring terminals must be firmly crimped and secured, with no loose connections, no loose wires, and no exposed copper strands. After wiring is complete, organize the cables neatly.

3. Mandatory Requirements for Instrument Grounding
The instrument housing must be reliably and safely grounded, with grounding resistance strictly controlled within 4 ohms; Explosion-proof models and models operating in high-interference environments must have a separate, independent ground connection; sharing the ground with the equipment's power ground is prohibited; the outer shield of shielded cables must be grounded at a single end—specifically at the central control cabinet—while the shield at the instrument's field end must remain floating (ungrounded) to effectively eliminate loop current interference; in humid environments or outdoor installations, grounding protection must be reinforced to further enhance equipment operational stability and lightning/static protection capabilities.

6.3 Standard Wiring Diagrams for All Models
1. General Standard Wiring Specifications
The instrument is equipped with standardized terminal blocks that clearly distinguish between the power supply positive terminal, power supply negative terminal, and signal output terminals. The two-wire system uses a common loop for simultaneous transmission of power and signals; External power cables must be oil-resistant, flame-retardant industrial cables; shielded twisted-pair cables are recommended for signal output to minimize transmission interference. Cables must be crimped and secured after passing through the sealing gland, and the cable entry points must be waterproofed to prevent moisture and dust from entering the wiring compartment.

2. Dedicated Wiring Specifications for Explosion-Proof Models
For explosion-proof models, it is strictly prohibited to alter the wiring compartment structure without authorization. All cable entry points must use original manufacturer-supplied explosion-proof cable glands. After wiring is complete, tighten the explosion-proof gland cover immediately to ensure the compartment is completely sealed. Wiring in explosion-proof zones must be routed entirely through sealed explosion-proof conduit, with explosion-proof sealing applied at all connection points, strictly adhering to explosion-proof electrical installation standards.

3. Proper Handling of Shielded Cables
Connect the inner signal conductors of shielded cables to the signal terminals as normal. The outer metal shielding mesh should be grounded at only one end. At the field instrument end, trim the shielding layer, gather it, and wrap it with insulating tape; do not ground it. Centralize grounding at the central control room to effectively filter out external electromagnetic interference.

4. Common Correct and Incorrect Wiring Practices
Correct practices: Strictly distinguish between positive and negative terminals; ensure tight connections with no loose or faulty connections; seal cable entry points tightly; ground the shielding at a single point; and route power and signal lines separately.
Incorrect Practices: Reversed polarity, loose or loose connections, unsealed cable glands allowing water ingress, shielding grounded at both ends, and mixing power and signal lines. Any of these wiring errors can cause equipment failure to start, signal disruption, data fluctuations, or instrument burnout.

6.4 Complete Power-On and Commissioning Procedure
1. Initial No-Load Power-On Testing
After all wiring and installation work is complete, thoroughly re-inspect the wiring polarity, grounding connections, and installation security to ensure there are no errors. Only after confirming there are no safety hazards on-site should power be slowly applied. Observe the instrument's power-up response immediately upon energization to confirm that it lights up and starts normally, with no abnormal noises, overheating, or smoke. Allow the equipment to stand idle for three minutes under no-load conditions to allow the internal circuitry to complete its self-test and initialization.

2. Basic Signal Status Verification
Use a multimeter to measure the stable supply voltage and confirm it is within the standard range of 18V to 36V DC. Measure the no-load value of the 4-20mA output current to verify it falls within the normal reference range, and check for any open circuits or short circuits in the wiring. For communication-enabled models, use a debugger to read the device's initial address, model number, and factory parameters to confirm that the communication link is clear and stable.

3. Identification of Device Operating Status
After power-up and completion of the self-test, the device enters normal measurement mode with stable operation and no error alerts. On-site personnel can use the local buttons to view device operating parameters, echo status, ambient temperature, and real-time distance readings. If an error code appears, immediately power down the device to troubleshoot the fault; do not allow the device to operate for extended periods while faulty.

4. On-Site Accuracy Calibration
First, configure the instrument's internal settings with the actual total tank height, low-level dead zone value, and upper and lower limits of the measurement range. Clear invalid or false echoes from the site and manually mask interference echo areas such as tank walls, supports, and agitators. Perform zero-point and full-scale calibrations based on the actual on-site liquid level. Compare the actual on-site liquid level with the instrument's display values at multiple points and on multiple occasions, making repeated fine adjustments until measurement accuracy meets standards. After calibration is complete, lock the on-site parameters to prevent accidental changes to the settings.

6.5 Strict Prohibitions for On-Site Installation
1. Never exceed the rated voltage range when supplying power. Do not connect to high-voltage AC power, do not use power supplies with instantaneous voltages exceeding 40 V DC for extended periods, and do

not use voltages below 17 V for prolonged periods to avoid power supply abnormalities that could damage the internal mainboard circuitry.

2. Keep the instrument strictly away from high-interference equipment such as high-voltage power lines, variable frequency drives, and large contactors. Do not install the instrument in locations subject to extreme vibration, to prevent parameter drift and loosening of internal components caused by vibration.

3. When installing in damp, underwater, or high-humidity enclosed tanks, ensure comprehensive waterproofing of all wiring, sealing of the terminal compartment, and leak-proofing of all interfaces to prevent moisture ingress that could cause short circuits or corrosion and damage to circuit boards.

4. Do not arbitrarily modify the instrument's original factory structure, disassemble the explosion-proof housing without authorization, alter the antenna configuration, or cut original wiring. Equipment failures or safety hazards resulting from unauthorized modifications are not covered by the warranty.

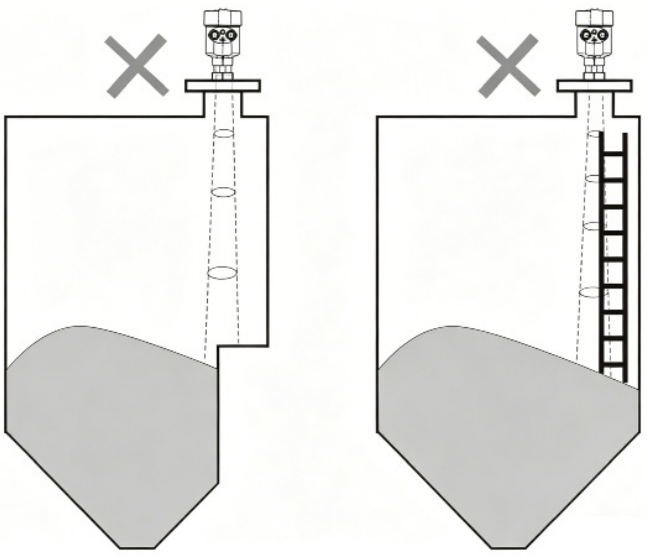
5. Do not install the instrument directly opposite the tank's inlet or outlet, or in a position where liquid flows directly onto the liquid surface. This prevents material impact on the liquid surface from causing frequent fluctuations in measurement data, which could affect stable monitoring performance.

6. For media with low dielectric constants or conditions involving thick foam, do not simply apply standard parameters during commissioning. You must specifically enable dedicated measurement algorithms; otherwise, measurement inaccuracies and lost echoes are highly likely to occur.

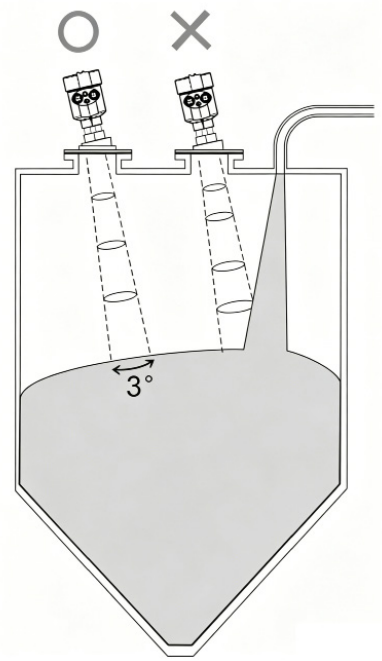
7. Do not affix obstructing objects, apply protective coatings, or allow stubborn material stains to accumulate on the instrument's antenna detection surface. Keep the detection surface clean and unobstructed to ensure normal transmission and reception of microwave signals.

Installation Details:

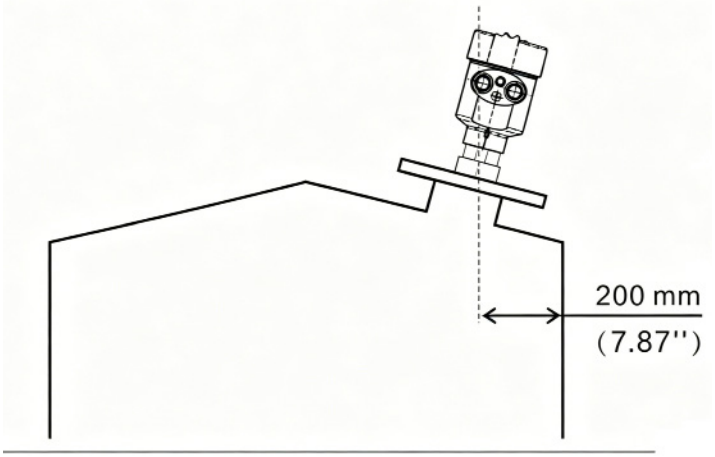
Two points to note during installation:
(1) Align the sensor with the target material level, ensuring a vertical angle of incidence as much as possible;
(2) Avoid false echoes. Refer to the following points for typical operating conditions.
Ensure there are no obstructions within the beam path, such as ladders or steps.



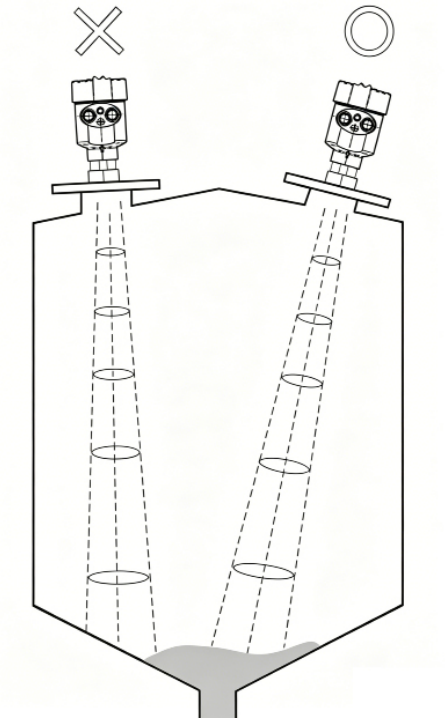
When installing the instrument, ensure that the antenna beam does not point toward the feed inlet, as shown in the figure.



The instrument must be installed at least 20 cm away from the container wall; otherwise, incorrect readings are likely to occur.

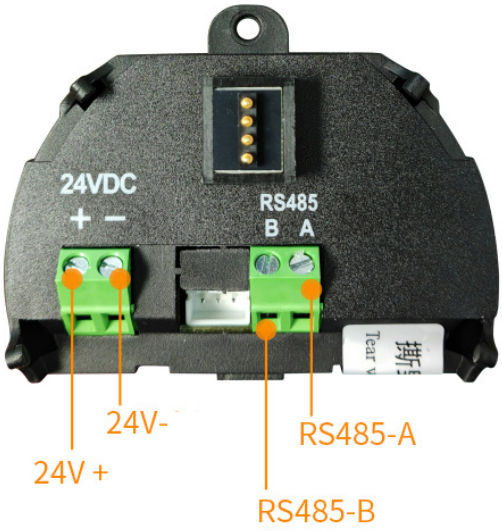


For conical vessels, ensure that the beam is directed straight at the bottom of the tank as much as possible; otherwise, the measurement results at the bottom of the tank may be inaccurate.



Wire





Single-chamber housing: Wiring diagram for 24 VDC-powered four-wire products
In four-wire applications, in addition to the 24 VDC power supply terminals, the 4–20 mA analog output uses two separate terminals. The four-wire configuration also provides a 485 output terminal.

VII. Recommendations for Daily Use & Operation and Maintenance
This module establishes standardized daily inspection, periodic maintenance, and long-term care plans based on the structural characteristics and operational adaptability of the entire QDYG80A series (Standard / High-Temperature / Explosion-Proof / Sanitary). These plans ensure long-term stable operation of the equipment, extend its service life, and reduce the failure rate, meeting the operation and maintenance needs of various industries such as chemicals, power, metallurgy, pharmaceuticals, and smart manufacturing.

7.1 Key Points for Daily Inspections (Mandatory daily/per-shift checks; takes 5–10 minutes to complete)
1. Inspection of Equipment Appearance and Installation Status
Check the instrument housing for cracks, deformation, corrosion, or peeling paint; ensure the explosion-proof housing has no damage and that sealing surfaces show no leakage;
Confirm that flange/threaded connections are secure, mounting brackets are not loose and do not exhibit abnormal vibration or noise, and bolts are free of rust and missing parts;
Ensure the antenna surface is free of material buildup, crystallization, oil stains, water marks, or dust accumulation, and shows no physical deformation, scratches, or damage;
Verify that cable gland seals are fully tightened with no looseness or signs of water ingress, and that the enclosure maintains an IP67/IP68 protection rating.

2. Signal Stability Monitoring
Observe that on-site display values are stable, with no frequent fluctuations, unexplained drift, or stuttering; ensure remote communication data synchronization is free of delays or disconnections;
View the echo curve using local buttons or a HART handheld communicator; ensure there are no noise interferences, weak echoes, or echo loss alarms, and that signal strength meets specifications;
Investigate false echo interference and confirm that tank walls, supports, agitators, and other components do not cause abnormal reflected signals that affect measurements.

3. Temperature, Humidity, and Environmental Compatibility Check
Ensure the instrument's operating environment temperature is within the range of -40°C to +80°C (the high-temperature model supports up to +200°C) and humidity is ≤95% RH (non-condensing);
Under high-temperature conditions, the instrument housing does not overheat abnormally, and the heat dissipation components (optional) operate normally;
Keep the instrument away from strong sources of electromagnetic interference (such as variable frequency drives and high-power motors), and ensure the surrounding area is free from severe vibration, highly corrosive gases, and dust accumulation.

4. Electrical and Grounding Safety Inspection
Verify that the measured supply voltage is stable between 18 V DC and 36 V DC, with no overvoltage or undervoltage fluctuations, and that the power indicator light is illuminated normally;
Terminal blocks show no loosening, oxidation, or burn marks; cables show no aging, damage, or crushing; shielding is properly grounded at one end;
Ground resistance ≤ 4Ω; explosion-proof models have reliable independent grounding with no loose connections or broken wires.

7.2. Periodic Maintenance Plan (Implemented according to operating conditions and documented in maintenance records)
1. Cleaning Frequency and Standards (Core Maintenance Items)
General Clean Conditions (Clean Water, Dust-Free): Once per quarter; wipe the antenna and housing with a soft, lint-free cloth;
Dust / Steam / Minor Crystallization Conditions: Once per month; wipe the antenna with a neutral detergent to remove dust and condensation;
Heavy Adhesion / Prone to Crystallization / Highly Corrosive Conditions (Chemical, Metallurgy): Once a week; clean after shutdown and pressure relief to prevent material buildup;
Sanitary Grade (Pharmaceutical, Food): Once every two weeks; wipe with food-grade detergent; suitable for sterile environments;
High-Temperature Models: Must be cooled to a safe temperature before cleaning; do not wipe while hot to prevent damage to the antenna coating.

2. Wiring and Fastening Inspection (Once a month)
Thoroughly tighten power, signal, and ground terminals to eliminate loose connections;
Inspect the integrity of shielded cables for damage or breaks, and ensure the shielding layer is properly grounded;
For explosion-proof models, inspect explosion-proof sealing components; ensure gland heads and gland nuts are securely tightened, and that sealing gaskets show no signs of aging;
For outdoor/humid environments, focus on checking the waterproofing of the wiring compartment to ensure no water ingress or condensation.

3. Accuracy Retesting and Parameter Calibration (Once every six months; mandatory after major repairs)
Empty/Full Tank Calibration: Recalibrate the zero point and measurement range to match the actual tank height;
Signal Comparison: Compare with manual measurement and magnetic flip-plate level gauges; an error of ≤±1 mm is considered acceptable;
Echo Optimization: Filter out new interference echoes and adjust filter parameters to adapt to changing operating conditions;
Communication Verification: Test HART/4-20mA signals to ensure linear and stable output.

4. Replacement of Sealing and Protective Components (Once a year; replace prematurely if aged)
Replace flange gaskets and cable seals to prevent aging and leakage;

Inspect the antenna's anti-corrosion coating; if peeling, apply specialized anti-corrosion paint;
For explosion-proof models, verify explosion-proof performance; immediately replace aged seals to eliminate safety hazards.

7.3 Long-Term Maintenance Tips (Adapted for Extreme Conditions, Extending Equipment Lifespan)
1. Dust and Moisture Protection Optimization (Applicable to All Operating Conditions)
Dusty environments: Install dust covers and regularly clean dust from the housing to prevent blockage of ventilation holes;
Humid / outdoor environments: Place desiccant in the terminal chamber and apply a waterproof coating to the housing to prevent condensation and water ingress;
High-humidity sealed tanks: Install a purging system at the antenna (clean nitrogen or air, pressure 0.1–0.2 MPa) to prevent condensation and material buildup.

2. Enhanced Anti-Interference Measures (Strong Electromagnetic / Vibration Conditions)
Separation of power and signal lines: Route signal and power lines separately, maintaining a distance of ≥30 cm, and avoid running them through the same conduit;
Optimized shielding: Ground the shielding layer at a single point (central control end), while leaving the instrument end floating to eliminate loop current interference;
Vibration environments: Install vibration-damping brackets and apply anti-loosening treatment to bolts to prevent parameter drift and component loosening;
Near variable-frequency equipment: Install signal isolators to filter electromagnetic noise and stabilize signal transmission.

3. Specialized Protection for Extreme Operating Conditions
High-Temperature Conditions (≥150°C): Use extended high-temperature antennas and install heat dissipation tubes to prevent heat conduction from damaging the electronic chamber;
Low-Temperature Conditions (≤-20°C): Install thermal insulation sleeves on the housing to prevent ice formation and condensation, ensuring normal circuit operation;
Explosion-proof environments: Unauthorized modifications are strictly prohibited; regularly verify explosion-proof performance; immediately replace aging sealing components;
Corrosive environments (acidic or alkaline media): Use PP or PTFE corrosion-resistant antennas; apply a corrosion-resistant coating to the housing; regularly inspect for corrosion.

4. Parameter and Record Management
Fixed operating parameters: Lock parameters after calibration; prohibit unauthorized personnel from making changes to prevent operational errors;
Maintenance records: Document information from every inspection, cleaning, calibration, and repair to track equipment operating status;
Spare parts inventory: Keep spare critical components (sealing gaskets, gland nuts, antennas) on hand for rapid replacement in case of failure.

7.4 Key Differences in Operation and Maintenance by Model
Standard Model: Focus on dust protection and electromagnetic interference (EMI) prevention; perform regular accuracy calibration;
High-Temperature Model: Strictly control heat dissipation and monitor temperature; ensure the unit has cooled down before cleaning;
Explosion-Proof Model: Prioritize inspection of explosion-proof seals; strictly prohibit unauthorized disassembly or modification; ensure independent grounding;
Sanitary Model: Increase cleaning frequency; ensure compliance with sterile requirements; prevent cross-contamination.

VIII. Troubleshooting & Emergency Response Manual
This module compiles common on-site equipment failure types, root causes, step-by-step troubleshooting procedures, and quick-fix methods. It also outlines emergency response protocols and standard after-sales repair procedures to help on-site personnel troubleshoot independently and quickly, thereby reducing downtime and minimizing production losses. These guidelines apply to all standard, high-temperature, explosion-proof, and sanitary models.

8.1. Complete List of Common Faults
Instrument does not respond when powered on; no display, no current output
Abnormal 4-20mA signal output: no output, full-scale output, or constant current
Measured values drift frequently, fluctuate, or are unstable
Abnormal instrument indicator lights: constantly on, flashing, or off with no status indication
Device triggers built-in fault alarms, on-site error pop-ups, or central control system alarm notifications
Distorted measurement echoes; unable to identify actual liquid level; false liquid level readings
Communication anomalies: HART communication failure; inability to read or write parameters remotely
Measurement failure under high or low temperature conditions; severe accuracy deviation
Severe measurement inaccuracies under agitation or foaming conditions
Intermittent operational failures in outdoor rain or humid environments

8.2 Analysis of Core Causes for Various Faults
1. Wiring-related causes
Reversed polarity of power supply, loose or intermittent signal connections, double grounding of shielding wires at both ends, cable open circuits or short circuits, inadequate sealing of wiring in explosion-proof enclosures, and poor contact due to terminal oxidation.

2. Power Supply Issues
On-site supply voltage exceeds the standard range of DC 18–36 V; excessive voltage fluctuations; high power supply ripple; excessive line voltage drop; insufficient power supply capacity; low-voltage under-voltage protection triggered.

3. Load Mismatch Issues
Excessive load resistance connected to the 4–20 mA output, exceeding the instrument's maximum load capacity, resulting in signal attenuation, current distortion, and transmission failure.

4. Environmental Interference Causes
Excessive proximity to variable frequency drives, high-power motors, or high-voltage power lines; strong electromagnetic radiation interference at the site; excessive tank vibration; steam or dust at the site obstructing the antenna; or excessive structural components inside the tank creating significant interference echoes.

5. Operating Conditions
Measurement algorithms not adjusted for the on-site medium; lack of heat dissipation structures in high-temperature environments; failure to use corrosion-resistant antennas in corrosive environments; installation tilt causing detection angle deviation.

6. Equipment Damage
Long-term aging due to high temperatures; water ingress and moisture causing circuit board corrosion; antenna deformation from physical impact; aging and failure of internal components; seal failure leading to water ingress and short circuits.

7. Parameter Settings
Incorrect range settings; misaligned zero and full-scale calibration; failure to suppress false echoes; and unreasonable filter parameter settings leading to abnormal responses.

8.3. Step-by-Step Troubleshooting Methods for Corresponding Faults
1. Instrument has no display or output when powered on
Troubleshooting steps: First, disconnect the power supply and use a multimeter to verify that the on-site supply voltage is within the rated range; check the power cord for breaks and ensure terminals are secure; verify the correct polarity of the power connections; inspect the cable gland for water ingress causing internal short circuits; confirm whether the on-site circuit breaker or circuit fuses have tripped or blown.
Remedial Actions: Reverse the polarity of the power supply, tighten all terminal connections, replace damaged or aged cables, remove accumulated water and moisture from the terminal compartment, restore normal and stable power supply, and retest after powering on.

Emergency Plan: Temporarily replace with a DC power supply of the same specifications to prioritize basic power supply and quickly restore equipment startup and operation.

2. Abnormal 4-20mA Signal Output Fault
Troubleshooting Steps: Disconnect the load from the downstream control system and measure the instrument's native output current separately to determine whether the fault lies with the instrument or the downstream circuit; verify the on-site load resistance value to confirm if it exceeds the rated range; Check whether signal lines are routed in the same conduit as power cables, causing interference.
Remedial Actions: Reduce the resistance of the downstream connected load; reroute the signal shielded cable separately; recalibrate the zero-point and full-scale current; restore linear standard current output.
Contingency Plan: Temporarily switch to reading level values locally on-site; manually record data to replace the remote transmission signal; perform a comprehensive line inspection during idle periods.

3. Level value drift and unstable data fluctuations
Troubleshooting steps: Check the antenna surface for dust, oil, or crystallized material; observe whether there is vigorous agitation or violent liquid fluctuations inside the tank; check if the instrument is installed at an angle; retrieve the internal echo curve to check for the number of spurious echoes.
Remedial Actions: Clean the antenna detection surface to keep it clean and free of debris; adjust the instrument's installation angle to ensure it points vertically downward; manually mask invalid interference echoes from tank supports, tank walls, agitators, etc., within the instrument system; moderately increase signal filtering parameters to stabilize measurement values.
Contingency Plan: Temporarily lock the measurement values to meet basic production monitoring needs; recalibrate and debug the system once operating conditions stabilize.

4. Abnormal Indicator Light Status
Troubleshooting Steps: If the power indicator is off, diagnose a power supply circuit fault; if the operation indicator flashes frequently, diagnose abnormal signal reception or lost echoes; if the alarm indicator remains lit, diagnose out-of-range, over-temperature, or hardware faults.
Remedial Actions: Investigate the power supply, operating environment, and installation location based on the fault category; eliminate external interference factors; restore the equipment to normal operation, and the abnormal indicator lights will return to normal.

5. Frequent Alarm Triggering
Troubleshooting Steps: Check the instrument's alarm codes to distinguish between out-of-range alarms, temperature limit alarms, signal loss alarms, and hardware failure alarms; verify whether the actual on-site liquid level exceeds the set measurement range.
Remedial Actions: Re-configure a reasonable measurement range, adjust the high and low liquid level alarm thresholds, improve the on-site ambient temperature, remove obstructions to restore normal signal reception, and clear the alarm alerts.

6. Fault: Distorted Echoes, Unable to Identify Actual Liquid Level
Troubleshooting Steps: Verify whether the medium's dielectric constant is too low and whether the thickness of on-site foam or mist is excessive; confirm whether the instrument is installed directly opposite the inlet or outlet.
Remedial Actions: Enable the instrument's dedicated measurement mode for low-dielectric-constant media; activate the foam suppression algorithm; relocate the instrument to an unobstructed installation point; utilize the strong penetration capability of 80 GHz high-frequency signals to re-capture the true liquid level echo.

7. Communication Read/Write Failure
Troubleshooting Steps: Check whether the HART communication wiring is correct; verify that the communication terminal addresses match; inspect the communication cables for damage or interference.
Remedial Actions: Reconnect the communication terminals, standardize device communication addresses, route communication lines away from areas with strong interference, and restart the instrument to re-establish the communication connection.

8.4 General Emergency Response Procedures
When on-site sudden failures cannot be immediately resolved, prioritize the use of backup measurement methods such as manual gauging or magnetic flip-plate level gauges to ensure the normal operation of production processes.
In scenarios involving unified monitoring of multiple tank farms, temporarily switch to independent monitoring of individual points without affecting the overall basic control of the plant.
Under severe weather conditions or high-temperature, high-pressure emergency situations, prioritize the safe isolation of equipment by cutting off power to prevent secondary failures caused by operating faulty equipment.
If multiple instruments in the same circuit exhibit abnormal signals, prioritize troubleshooting the main power supply and main lines; there is no need to disassemble and inspect each instrument individually.

8.5. Comprehensive Guide to After-Sales Service Requests
1. Criteria for Formal Failure Reporting
1) After conducting a full set of self-troubleshooting, rewiring inspections, parameter recalibration, and environmental optimization, the equipment still fails to start or measure normally;
2) Physical hardware damage to the instrument, such as a cracked housing, water ingress, burned-out circuit boards, or broken antennas;
3) The device's measurement accuracy exceeds the rated error range, and standard accuracy cannot be restored even after multiple calibrations;
4) The explosion-proof structure is damaged or the sealing structure has failed, rendering the device unsuitable for safe on-site use;
5) Internal functional programs are corrupted, display garbled characters, or all function keys are unresponsive.

2. Standard Repair Process
Step 1: Compile complete device information, including the product model QDYG80A, purchase date, operating conditions, on-site installation environment, specific fault symptoms, and the time the fault occurred;
Step 2: Take clear photos or short videos of the device's overall appearance, wiring connections, and the fault display screen;
Step 3: Contact the company's after-sales technical support and accurately describe the entire fault process and troubleshooting steps already taken;
Step 4: The technician will provide remote guidance for further troubleshooting; if the issue cannot be resolved online, a specific after-sales solution will be determined;
Step 5: Confirm the appropriate solution (repair, replacement, or on-site service) and complete the after-sales process according to the procedure.

3. Official Warranty Service Coverage
Brand-new, factory-sealed QDYG80A 80GHz high-frequency radar level transmitters are covered by a standard free warranty. During the warranty period, all non-human-induced failures are eligible for free repair and replacement of parts;
The warranty covers core components included in the standard factory configuration, such as the instrument mainboard, measurement module, display module, communication module, and original antenna;
Performance and functional failures arising from proper installation and standard use under normal operating conditions are fully covered by the warranty.

4. Exclusions from Free Warranty Coverage
Damage resulting from unauthorized disassembly or modification, unauthorized alteration of internal wiring, or damage to the explosion-proof sealing structure;
Physical damage caused by incorrect on-site voltage connection, connection to high-voltage power sources, water immersion, or impact from external force or dropping;
Accelerated aging and damage resulting from failure to follow installation specifications or use in harsh conditions without any protective measures;
Small consumable parts such as sealing gaskets and waterproof O-rings that wear out naturally during daily use;
Equipment damage caused by force majeure, natural disasters, or accidents at the facility.

5. Daily After-Sales Technical Support
We provide 24/7 online technical guidance, installation guidance,

parameter tuning, product selection consultation, and remote troubleshooting services. We are available at any time to coordinate new project drawings and confirm technical agreement parameters, ensuring the stable operation of the equipment throughout its entire lifecycle.