Intelligent Pressure Switch

I. Product Definition

The PCM710-QD Digital Pressure Controller is an industrial-grade intelligent pressure control device that integrates pressure measurement, digital display, dual-channel switching control, and signal feedback. It is specifically designed for pressure monitoring and automatic control in industrial fluid and gas systems, with core functions covering the following areas:

1. High-precision real-time pressure monitoring and digital display

Equipped with a built-in high-precision pressure sensor, it supports pressure signal acquisition in the 0–10 bar range (expandable to other ranges). The current pressure value is displayed in real time in an intuitive digital format via a 4-digit LED display, with support for unit conversion (bar/MPa/psi, etc., depending on configuration), ensuring clear and accurate readings.

2. Compatibility with Multiple Media: Compatible with non-corrosive gases and liquids, meeting pressure monitoring needs across various industrial applications such as hydraulics, pneumatics, water treatment, and lubrication systems.

3. Dual Independent Switch Control (SP1/SP2 Dual Outputs)

Supports two independent digital outputs (SP1 and SP2). Each channel can be individually configured with upper and lower pressure limits and hysteresis (delay values), enabling dual-threshold control (e.g., high-pressure alarm + low-pressure shutdown, or dual-channel equipment interlock control).

The output type is digital (NPN/PNP selectable, compatible with PLC/relay control), capable of directly driving small loads or serving as a control signal for industrial control systems.

4. Intelligent Parameter Configuration and Custom Adjustment

The device features built-in "Mode/▲/▼" control buttons, allowing parameter settings to be completed without an external programmer. Settings include range calibration, switch point configuration, hysteresis adjustment, output mode switching (NO/NC), unit selection, and more. It supports on-site debugging and modification to adapt to various operating conditions.

Equipped with a power-off parameter retention function, configured thresholds and mode parameters are not lost after a power outage. Settings are automatically restored upon restart, eliminating the need for repeated debugging.

5. Status Indication and Fault Feedback

The panel is equipped with SP1/SP2 indicator lights that display the real-time operating status (triggered/not triggered) of both channels, providing intuitive feedback on the control status and facilitating quick troubleshooting.

Supports alarm feedback for abnormal conditions such as overpressure, underpressure, and sensor failure. Some models can trigger alarm devices via output signals to proactively mitigate risks associated with abnormal system pressure.

6. Industrial-Grade Protection and Adaptability Design

Features an IP65-rated enclosure that is dustproof and splash-proof, capable of withstanding harsh industrial environments (dust, humidity, and light splashing). The enclosure is constructed from engineering plastic and stainless steel, offering corrosion resistance and impact resistance.

Features M12 aviation connectors for convenient, secure wiring. Equipped with standard external threaded pressure ports (compatible with common industrial pipe specifications), it offers flexible installation options and supports direct mounting in hydraulic or pneumatic lines.

7. Wide Voltage Supply and Compatibility

Supports industrial-standard wide voltage supply (DC 12–30 V), compatible with common industrial power sources. No additional custom power modules are required; it can be directly connected to the power supply circuit of a PLC or industrial control cabinet.

II. Working Principle

2.1. Core Operating Logic

The operational workflow of the PCM710-QD digital pressure controller can be divided into four steps: "Signal Acquisition → Data Processing → Logical Evaluation → Output Control." In simple terms, this is a closed-loop process of "measure pressure → calculate value → compare with threshold → issue command":

Pressure Signal Acquisition: Once the stainless steel pressure port at the front of the device is connected to the pipeline, the internal pressure sensor (piezoresistive or ceramic capacitive) converts the medium pressure within the pipeline into a weak electrical signal (voltage or current signal). The higher the pressure, the stronger the output electrical signal.

1. Data Conversion and Display: The built-in signal conditioning circuit amplifies and filters the weak electrical signal output by the sensor before transmitting it to the microcontroller (MCU). The MCU converts the electrical signal into the corresponding pressure value and displays it in real time via an LED display. Simultaneously, it performs data calibration and error correction to ensure display accuracy.

2. Parameter Comparison and Logical Judgment: The MCU continuously compares the current pressure value with the two pre-set switch thresholds (upper/lower limits) SP1 and SP2. It then performs logical judgments based on the configured hysteresis (hysteresis value) and output mode (normally open/normally closed):

3. When the pressure reaches the set trigger threshold, the MCU sends a trigger command to the corresponding output circuit;

When the pressure drops back into the range of the threshold plus the hysteresis, the MCU sends a reset command, thereby achieving automatic start-stop control of the switch and preventing frequent false operations caused by pressure fluctuations.

4. Switch Output and Status Feedback: The MCU's commands are converted into digital signals via the output circuit and transmitted to downstream devices (such as relays, PLCs, or solenoid valves) through the corresponding pins (SP1/SP2) of the M12 aviation connector. Simultaneously, the SP1/SP2 indicator lights on the panel illuminate to indicate the current operating status of the switch, completing a control loop.

2.2. Typical Operating Scenario Flow (Using a Hydraulic System as an Example)

The user pre-sets SP1 as the low-pressure shutdown threshold (2 bar, normally closed mode) and SP2 as the high-pressure alarm threshold (8 bar, normally open mode), with both hysteresis values set to 0.5 bar;

After the device is powered on, the sensor continuously monitors the pressure in the hydraulic lines and displays it on the digital display;

When the pressure drops below 2 bar, the SP1 circuit opens, triggering the downstream relay to shut down the hydraulic pump; when the pressure rises to 2.5 bar (2 bar + 0.5 bar hysteresis), the SP1 circuit resets, and the hydraulic pump restarts;

When the pressure exceeds 8 bar, the SP2 circuit closes, triggering an alarm light or buzzer to indicate system overpressure; when the pressure drops to 7.5 bar (8 bar minus 0.5 bar hysteresis), the alarm is cleared.

III. Core Value and Pain Point Solutions

1. Pain Points in Pressure Monitoring

Q: Traditional analog pressure gauges can only display pressure and cannot perform automatic control, resulting in high costs associated with manual monitoring. How can this be resolved?

A: The PCM710-QD digital pressure controller integrates dual "monitoring + control" functions, enabling automatic pressure start/stop and alarm control without manual supervision. Additionally, its digital display offers far greater accuracy than analog gauges, eliminating visual reading errors. This significantly reduces manual inspection costs and prevents equipment failures caused by human misjudgment.

Q: On-site pressure fluctuates widely, causing ordinary switches to malfunction frequently. This leads to repeated triggering of equipment start/stop and alarms, which affects equipment lifespan. How can this be resolved?

A: The device supports customizable hysteresis (hysteresis value) settings. You can adjust the hysteresis based on on-site pressure fluctuations to prevent frequent switching caused by minor pressure fluctuations near the threshold. This reduces the number of equipment start/stop cycles and extends the service life of downstream equipment (pumps, solenoid valves, alarm devices).

2. Control Adaptability Pain Points
Q: Field conditions are complex, and different equipment requires different control logic. A single-channel switch controller cannot meet the demand for dual-device interlocked control. How can this be resolved?
A: The PCM710-QD is equipped with dual independent switch outputs (SP1 and SP2). Each channel can be configured with different thresholds and modes, supporting interlocked control of two devices (e.g., low-pressure pump start + high-pressure relief valve activation, or main circuit control + backup alarm). A single unit can fulfill dual-channel control requirements, eliminating the need to purchase multiple controllers and reducing equipment costs.

Q: On-site commissioning is cumbersome; modifying parameters requires disassembling the device or using specialized tools, making quick on-site adjustments impossible. How can this be resolved?
A: The device features built-in panel buttons (Mode/▲/▼), eliminating the need for external tools. Threshold settings, mode switching, unit conversion, and other operations can be completed on-site. The commissioning process is visual, with the digital display showing real-time parameter settings, allowing even novices to complete configuration quickly and significantly improving on-site commissioning efficiency.

3. Environmental and Stability Challenges
Q: Industrial sites often involve dusty and humid environments. Standard digital displays are prone to water and dust ingress, leading to frequent failures. How can this be addressed?
A: The device features an IP65-rated design with a dust- and splash-proof housing, making it suitable for dusty and humid industrial environments. Additionally, it uses anti-loosening M12 aviation connectors to prevent loose connections caused by on-site vibrations, thereby enhancing operational stability in harsh conditions.

Q: Power supply voltage fluctuates significantly in industrial settings, and standard equipment is prone to damage due to voltage instability. How is this addressed?
A: The device supports a wide DC voltage range of 12–30 V, making it compatible with common industrial PLC power supplies and switching power supplies. It exhibits strong adaptability to voltage fluctuations. Additionally, it features built-in overvoltage and reverse connection protection circuits to prevent equipment damage caused by power supply abnormalities, thereby reducing failure rates.

4. Maintenance and Cost Challenges
Q: On-site faults make it difficult to quickly determine whether the issue is abnormal pressure or a controller malfunction, making troubleshooting challenging. How can this be resolved?
A: The SP1/SP2 indicator lights on the device panel provide real-time feedback on the switch's operational status. Combined with the real-time pressure display on the digital readout, this allows for quick determination of whether the pressure has reached the threshold or if there is a device malfunction, significantly reducing troubleshooting time and minimizing downtime maintenance costs.

Q: Different scenarios require controllers with different measurement ranges and parameters, resulting in poor equipment versatility and high procurement and inventory costs. How can this be resolved?
A: The equipment supports multiple selectable measurement ranges (e.g., 0–10 bar, 0–25 bar, 0–40 bar, etc.), and parameters can be customized. A single model can be adapted to different operating conditions by modifying parameters, eliminating the need to purchase specialized models for different scenarios. This reduces procurement and inventory costs while enhancing equipment versatility.

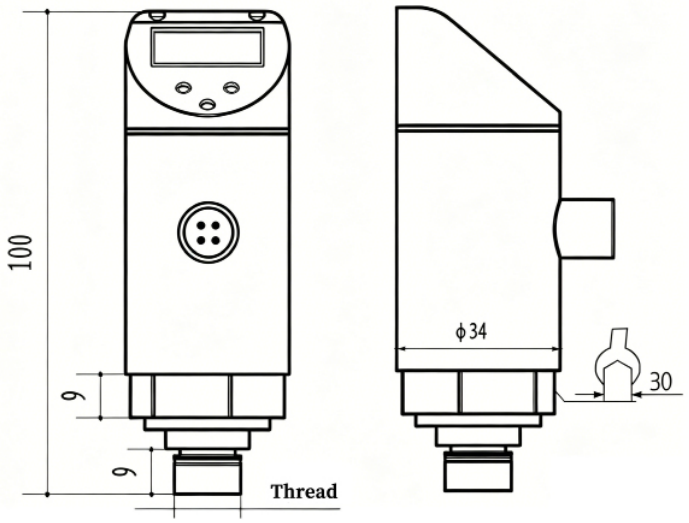
IV. Key Product Parameters & Specifications
4.1 Basic Electrical Parameters
Pressure Range: 0–10 kPa … 100 MPa (Common ranges: 0–10 bar, 0–25 bar, 0–40 bar, etc.; negative pressure and composite ranges available upon request)
Accuracy Class: Class 0.2 / Class 0.5 (Default: Class 0.5; Class 0.2 available as an option for higher precision)
Control Accuracy: ≤±0.5% FS (Same as display accuracy)
Repeatability: ≤±0.1% FS
Hysteresis: ≤±0.2% FS (User-configurable via menu)
Response time: ≤20 ms (software-adjustable delay: 0–9.9 s)
Display: 4-digit OLED (high-definition, 180° rotatable)
Display units: bar / MPa / kPa / psi / kgf/cm² (multi-key switching)
Output configuration
2 independent digital outputs: SP1, SP2 (NPN/PNP software-switchable)
1 analog channel: 4–20 mA (optional; standard on some models)
Digital I/O load capacity: ≤24 VDC, 1.2 A (resistive load)
Analog load: 4–20 mA, maximum load ≤500 Ω
Sensor type: Silicon piezoresistive / Ceramic capacitive (diaphragm compatible with 316L)

4.2. Isolation Performance Parameters
Insulation Resistance: ≥100 MΩ @ 250 VDC (between power supply, output, and housing)
Dielectric Withstand Voltage: 500 VAC / 1 min (power supply–housing, output–housing, no breakdown)
Immunity Rating: Complies with CE certification; industrial field EFT/surge immunity
Isolation Method: Electrical isolation between power supply–signal and digital–analog signals; ground loop suppression
Reverse Connection / Short-Circuit Protection: Reverse connection protection on power supply side, short-circuit protection on output side, self-resetting fuse

4.3 Power Supply & Power Consumption Parameters
Supply Voltage: DC 12–30 V (industrial standard, typically 24 VDC)
Recommended Supply: 24 VDC ±10%, ripple < 100 mV
Full-Load Power Consumption: ≤15mA (excluding external load; approx. 0.36W at 24V)
Standby Power Consumption: ≤8mA (display only, no output activity)
Power Distribution Output: No built-in power distribution; powered directly by external 24V supply
Power Polarity: M12 aviation connector 1=VCC (+), 3=GND (−)

4.4 Environmental Adaptation Parameters
Operating Temperature: −25°C to +80°C (compensated temperature range: −10°C to 70°C)
Storage Temperature: −40°C to +100°C
Relative Humidity: ≤80% RH (non-condensing)
Protection Rating: IP65 (dust-tight and splash-proof; suitable for outdoor use or wet/dusty workshops)
Explosion-proof rating: Intrinsically safe Ex ia IIC T4 Ga (optional safety barrier available for chemical/oil and gas hazardous areas)
Vibration resistance: 10–2000 Hz, 0.1 mm amplitude, fault-free
Media compatibility: Air, water, hydraulic oil, lubricating oil, non-corrosive gases/liquids; wetted parts made of 316L stainless steel

4.5, Physical Parameters
1. Installation Method
Direct pipeline installation: Standard male threaded pressure connection
Connection specifications: Default G1/4"; optional G1/2", M20×1.5, NPT1/4"
Instrument body: Rotates 330°, allowing for easy adjustment of display and button orientation
2. Dimensions: Unit: mm,
Total length (including connector): Approx. 100 mm
Housing Diameter: Φ38 mm
Display Head Width: Approx. 25 mm
Pressure Connection Length: Approx. 28 mm
Aviation Connector Cable Length: Approx. 22 mm
Dimensional Diagram (with text annotations):



3. Weight
Net weight: Approx. 420 g (excluding cables, connectors, and accessories)
4. Housing Material and Protection Details
Housing body: 304 stainless steel, corrosion-resistant and impact-resistant
Wetted diaphragm: 316L stainless steel, acid and alkali resistant, rust-proof
Display cover: High-strength PC scratch-resistant glass, waterproof sealing gasket
Wiring method: M12×1 waterproof aviation connector, 5-pin, anti-loosening, shock-resistant, dust and water-resistant
Sealing rating: Housing gasket made of fluororubber, suitable for −25 to 120°C, oil-resistant and age-resistant

V. Application-Specific Selection Guide
5.1 Key Selection Criteria
1. Signal Type Selection
If only on/off control is required (e.g., pump start/stop, alarm linkage), prioritize models with dual digital outputs (SP1+SP2). These are compatible with PLCs, relays, and solenoid valve control circuits, meeting basic control requirements.
If both monitoring and control are required (e.g., uploading pressure data to a central control system), select a model with dual outputs (digital + 4-20mA analog). This enables both local control and the transmission of real-time pressure data to DCS/PLC systems.
If RS485 networking is required (for centralized monitoring of multiple devices), a custom Modbus-RTU communication version is available. This integrates with industrial IoT systems to enable remote parameter configuration and data acquisition.

2. Channel Selection
Basic single-device control (e.g., single-pump start/stop, single-pressure-point alarm): Select the single-channel digital output model for lower cost and to meet basic requirements.
Dual-threshold interlocked control (e.g., low-pressure pump start + high-pressure overflow, main-line control + standby alarm): Select the standard dual-channel SP1+SP2 output model to achieve dual-channel control with a single unit, eliminating the need to purchase multiple devices.
Multi-device interlocking / multi-pressure point monitoring: Customizable multi-channel expansion versions are available to meet the requirements of complex operating conditions involving coordinated control of multiple devices.

3. Power Supply Selection
General industrial applications (control cabinets, fixed workshop equipment): Prioritize models with 12–30 VDC wide-voltage power supply. Typically powered by 24 VDC, these models are compatible with standard industrial switching power supplies and PLC power circuits, offering strong compatibility.
Mobile Equipment / Vehicle-Mounted Hydraulic Systems: Select dedicated 12 VDC models designed for vehicle power systems to prevent equipment failures caused by voltage fluctuations.
Explosion-Proof / Hazardous Chemical Environments: Use 24 VDC intrinsically safe models in conjunction with intrinsically safe barriers to meet power supply specifications for explosion-proof certification.

4. Selection Based on Explosion-Proof Requirements
General industrial environments (no flammable or explosive media, non-hazardous areas): Select the standard IP65-rated model to meet dust and splash protection requirements.
Chemical / Oil & Gas / Pharmaceutical explosion-proof environments (Zone 1/2 hazardous areas): Select the intrinsically safe Ex ia IIC T4 Ga certified model and use it with a safety barrier of the corresponding rating to comply with explosion-proof safety standards.
Dust-explosion-proof environments (metallurgy, building materials dust workshops): Customized dust-explosion-proof certified versions are available to meet safety protection requirements in dusty environments.

5. Selection Based on Installation Environment
Standard workshops / equipment installation (indoor, no strong corrosion, normal temperature and humidity): Select models with standard G1/4 external threaded connections for direct piping installation, suitable for the vast majority of general applications.
Damp / Harsh Dust Environments (Outdoors, Water Treatment Facilities, Metallurgical Sites): Prioritize models with IP65 high protection rating, paired with waterproof aviation connectors, to prevent moisture and dust ingress that could affect equipment lifespan.
Highly Corrosive Media Applications (Chemical Acid/Alkali Piping): Select custom models featuring 316L stainless steel for all wetted parts and anti-corrosion coatings to meet the long-term usage requirements of corrosive media.
High-temperature media applications (steam, high-temperature hydraulic oil lines): Select high-temperature-resistant extended models paired with heat-dissipating connectors to accommodate operating conditions with media temperatures up to 120°C.

5.2. Industry Application Selection Recommendations
1. Chemical Industry Applications: For chemical fluid transfer and reactor pressure monitoring applications, we recommend the PCM710-QD intrinsically safe explosion-proof version. Equipped with dual digital outputs and 4-20mA analog output, it supports pressure monitoring and interlock control for flammable and explosive media, meeting both explosion-proof requirements and data transmission needs at chemical sites. The default wetted material is 316L stainless steel, and a corrosion-resistant coating can be customized for acid and alkali media.

2. Power Industry Applications: For pressure monitoring in power plant hydraulic oil systems and cooling water systems, we recommend the PCM710-QD wide-temperature model. It supports 24V DC power supply and dual-channel digital control, making it suitable for the wide temperature fluctuations typical of power plant workshops. It enables interlocked control for low-pressure startup of hydraulic pumps and high-pressure alarms, while the 4-20mA signal can be transmitted to the DCS system, meeting the power industry's requirements for stable operation and data monitoring.

3. Metallurgy Industry Applications: For high-pressure and dusty environments in metallurgical hydraulic stations and lubrication systems, we recommend the PCM710-QD high-protection IP65 model. Featuring a stainless steel housing and waterproof aviation connectors, it withstands the harsh conditions of metallurgical sites, including dust, vibration, and high temperatures. It supports customizable hysteresis settings to prevent frequent pump start-stops caused by pressure fluctuations, thereby extending equipment lifespan.

4. Pharmaceutical Industry Scenarios: For pressure monitoring in pharmaceutical purified water and clean fluid piping systems, we recommend the PCM710-QD sanitary-grade custom model. Featuring sanitary-grade wetted materials and polished finishes, it meets clean piping installation requirements. Additionally, dual digital I/O channels enable pressure anomaly alarms and pipeline pressure interlock protection, ensuring compliance with pharmaceutical industry cleanliness and regulatory standards.

5. Smart Manufacturing Applications: For pressure closed-loop control in automated production lines and pneumatic/hydraulic equipment, we recommend the PCM710-QD custom model with RS485 communication. Supporting the Modbus-RTU protocol, it can be integrated into industrial IoT systems to enable remote parameter configuration, pressure data acquisition, and equipment interlock control, meeting the digital

monitoring needs of smart manufacturing.

6. Water Treatment Industry Scenarios: For pressure monitoring in water supply pump stations and wastewater treatment systems, we recommend the PCM710-QD general-purpose IP65 model. It supports dual-channel control for low-pressure protection and high-pressure overflow, making it suitable for the humid and water-splash-prone environments of water treatment sites. It enables automatic start/stop control of water supply pumps, reducing manual inspection costs.

5.3 Common Selection Pitfalls

1. Neglecting Isolation Level Selection

Common Mistake: In industrial environments with strong electromagnetic interference (e.g., near variable frequency drives or motors), selecting a basic model without electrical isolation leads to signal interference, resulting in pressure display fluctuations and erroneous switch triggering.

Correct Selection: Prioritize the PCM710-QD standard model with power-to-signal electrical isolation. This model features resistance to EFT and surge interference, making it suitable for industrial environments with strong electromagnetic interference and preventing control abnormalities caused by signal interference.

2. Incorrect Signal Range Selection

Common Mistake: Selecting a range based solely on the system's rated pressure without considering the system's peak pressure, causing the device to operate continuously near the upper limit of its range, which affects accuracy and service life; or selecting a range that is too wide, resulting in insufficient display accuracy in the low-pressure range.

Correct Selection: Select a range that is 1.2 to 1.5 times the system's peak pressure. For example, if the system's rated pressure is 8 bar and the peak pressure is 10 bar, choose a 0–16 bar model. This ensures the device does not exceed its pressure limit while maintaining display and control accuracy in the low-pressure range.

3. Neglecting Load Matching During Selection

Common Mistake: Failing to calculate the downstream load current and directly using digital outputs to drive high-power loads (such as large solenoid valves or contactors), resulting in the burnout of the output circuit and equipment damage.

Correct Selection: The PCM710-QD has a maximum digital output load of 1.2A. When driving high-power loads, an intermediate relay must be used to avoid direct driving. Additionally, select the appropriate output model based on the load type (NPN/PNP) to ensure compatibility between the load and the output circuit.

4. Selecting General-Purpose Models for Explosion-Proof Applications

Common Mistake: In hazardous explosion-proof zones such as chemical and oil & gas facilities, selecting general-purpose IP65-rated models instead of explosion-proof certified equipment creates safety hazards and fails to meet on-site safety acceptance requirements.

Correct Selection: For explosion-proof applications, the PCM710-QD intrinsically safe (IS) certified model must be selected and used with a safety barrier of the appropriate rating to meet safety regulations for explosion-proof zones. Additionally, an explosion-proof certificate must be provided to ensure on-site compliance and acceptance.

5.4 Customization Recommendations

1. Custom Solutions for Special Signals

For special signal requirements not covered by standard models, we support customization of RS485 Modbus communication output, 0-10V voltage output, and HART protocol communication versions to meet the special signal integration needs of industrial IoT and DCS systems. Additionally, dual-channel analog output can be customized to enable simultaneous acquisition of two sets of pressure data.

2. Custom Solutions for Non-Standard Operating Conditions

For special operating conditions, we support the following non-standard versions:

Ultra-High Pressure / Negative Pressure Range Customization: Supports non-standard pressure ranges from -1 bar to 100 MPa, meeting pressure monitoring requirements for high-pressure hydraulic and vacuum piping systems;

High/Low Temperature Medium Customization: Extended models resistant to high temperatures (up to 120°C) and low temperatures (down to -40°C), suitable for steam and cryogenic refrigerant piping;

Customization for Highly Corrosive Media: Utilizes Hastelloy and titanium alloy wetted parts to support long-term use with highly corrosive media such as strong acids and alkalis;

Customization for Special Installation Interfaces: Includes sanitary quick-connect fittings, flange connections, and non-standard threaded connections to meet the clean piping installation requirements of the pharmaceutical and food industries.

3. Multi-Channel Integrated Custom Solutions

For complex operating conditions involving multi-device coordination and monitoring of multiple pressure points, we support the customization of multi-channel pressure controllers. These controllers enable a single unit to simultaneously monitor 2–4 pressure signals, providing independent switching control and data acquisition for multiple channels. This solution meets the centralized control requirements of hydraulic systems with multiple circuits and pump groups, reducing the number of devices required and lowering wiring costs.

VI. Installation and Commissioning Guidelines

6.1. Pre-installation Preparation (Components / Environment / Tools / Safety)

1. Component Checklist

Verify that the equipment model, range, and output type match the order, and confirm that the parameters on the nameplate (e.g., 0–10 bar, SP1+SP2 output, IP65) are correct;

Inspect the device's exterior: Ensure the housing is undamaged, threaded ports are free of dents, and the M12 aviation connector is intact and undistorted;

Confirm all included accessories are present: including the M12 waterproof aviation connector, mounting nuts (if applicable), installation gaskets, and user manual;

Inspect the cables: Verify that the length of the supplied cables and the wire colors correspond to the pin definitions (brown = VCC, white = GND, blue = SP1, black = SP2), and ensure there are no broken wires or damaged insulation.

2. Installation Environment Check

Confirm that the installation location is free of highly corrosive gases and flammable or explosive substances (for explosion-proof environments, additionally verify the area classification);

The ambient temperature must be within the device's operating range (-25°C to +80°C); avoid direct sunlight and proximity to heat sources;

Ensure the installation location is free of strong electromagnetic interference sources (such as variable frequency drives or high-power motors); maintain a distance of ≥0.5 m from interference sources; install a metal shielding enclosure if necessary;

For damp or outdoor installations, ensure IP65 protection is met; avoid prolonged submersion of the equipment in water or direct exposure to high-pressure water jets.

3. Tool List

Installation tools: Adjustable wrench (compatible with pressure port thread specifications), PTFE tape / thread sealant, Allen wrench (if mounting brackets are used);

Wiring tools: Wire strippers, crimping pliers, multimeter (DC voltage range, continuity test), electrical tape;

Commissioning tools: Pressure calibrator / standard pressure gauge, screwdriver (for commissioning buttons).

4. Safety Precautions

Before installation, the pressure in the pipeline and the device's power supply must be shut off; installation under pressure or while energized is strictly prohibited;

When wrapping Teflon tape around pipe threaded connections, prevent Teflon tape debris from entering the pipeline to avoid clogging the pressure sensor;

Installation in explosion-proof environments must strictly comply with explosion-proof regulations; the equipment housing must be reliably grounded, and the accompanying safety barrier must meet intrinsic safety requirements;

Do not strike or drop the equipment during installation to prevent damage to the sensor diaphragm, which could cause accuracy deviations or failure.

6.2 Standard Installation Procedures

1. Pipeline Installation Steps

Clean the threaded connections of the installation pipeline, removing burrs, oil, and contaminants to ensure the connections are clean and undamaged;

Apply Teflon tape (or a small amount of thread sealant) to the external threads of the device's pressure connection. Wind the tape in the same direction as the tightening of the threads to prevent Teflon tape from entering the pipeline;

Use a wrench to screw the device into the pipe connection, applying moderate tightening force (recommended torque ≤ 20 N·m). Do not apply excessive force, as this may cause stripped threads or deformation of the device housing;

After installation, adjust the orientation of the device's display panel for easy on-site viewing and button operation; the main body supports 330° rotation;

If the installation location is subject to vibration, install anti-loosening washers or mounting brackets to prevent the device from becoming loose due to prolonged vibration.

2. Wiring Specifications (Terminal / Pin Identification)

Based on the pin definitions of the device's M12 aviation connector, wiring must strictly follow the color-to-pin correspondence:

Pin 1 (brown wire): VCC (positive power supply), connect to the positive terminal of a 12–30 V DC power supply (typically 24 V DC);

Pin 2 (white wire): GND (negative power supply / common ground), connect to the negative terminal of the power supply and the system ground;

Pin 3 (blue wire): SP1 digital output, connect to the downstream control circuit (PLC input point / relay coil);

Pin 4 (black wire): SP2 digital output, connect to the downstream control circuit (PLC input point / relay coil);

Shielding Wiring: Ground the cable shield at one end only—connect it to ground at the control cabinet side, leaving it floating at the device end—to prevent ground loops that could cause signal interference.

3. Grounding Requirements

The device enclosure must be reliably connected to the system protective ground via a grounding terminal, with a grounding resistance ≤4Ω;

The power supply negative terminal (GND) must be shared with the system ground to prevent signal drift or interference caused by floating ground;

In explosion-proof environments, device grounding must comply with intrinsically safe explosion-proof standards; the cross-sectional area of the grounding conductor must be ≥1.5 mm² to ensure reliable grounding.

6.3, Wiring Diagram Notes

1. Basic Dual-Channel Digital Output Wiring (NPN Type)

Power Supply Circuit: DC24V+ (brown wire) → Device Pin 1, DC24V- (white wire) → Device Pin 2;

Output Circuit: Connect the PLC input common terminal to DC24V+, and connect the PLC input points to SP1 (blue wire) and SP2 (black wire), respectively; the device outputs a low level to trigger;

Shielding: Ground the cable shield only on the control cabinet side; do not connect it to any terminals on the device side.

2. Wiring with 4-20mA Analog Output (Optional Model)

Power Circuit: Same as the basic wiring; connect the brown wire to 24V+, and the white wire to 24V-;

Analog Circuit: Connect the analog output wire (usually green) to the PLC/instrument's AI input +, and connect the AI input - to 24V-, forming a closed loop;

Note: The analog circuit must be routed separately from the digital circuit to prevent high-voltage interference from affecting signal accuracy.

3. Comparison of Common Wiring Errors and Correct Practices

1. Power Supply Positive and Negative Terminal Wiring

Incorrect Practice: Arbitrarily reversing the power supply polarity—connecting the brown wire to the negative terminal and the white wire to the positive terminal—without following the pin definitions.

Correct Procedure: Strictly follow the pin definitions; connect the brown wire to the positive terminal of the 24V DC power supply and the white wire to the negative terminal, maintaining a consistent positive-to-negative wiring sequence.

Impact: Reversing the polarity will trigger the device's reverse connection protection, preventing it from powering on and functioning normally. Prolonged incorrect wiring may also short-circuit internal circuits, causing permanent damage.

2. Digital Output Load Wiring

Incorrect Practice: Directly using the SP1 and SP2 digital output terminals to drive high-current loads such as high-power solenoid valves or AC contactors without an intermediate relay.

Correct Procedure: The PCM710-QD's digital outputs are only suitable for driving low-current loads. High-power loads must first be connected to an intermediate relay, which then drives the high-power equipment at the output end, serving as an isolation relay.

Consequences: Directly driving high-current loads will exceed the contact rating of the relays, making it highly likely to burn out the internal output circuits, resulting in relay failure and no signal output.

3. Shield Grounding Procedures

Incorrect Practice: Grounding the cable shield at both ends; making ground connections at both the equipment end and the control cabinet end.

Correct Practice: Ground the shield at only one end; ensure a reliable ground connection inside the control cabinet only. Leave the shield at the equipment end floating—do not connect it or ground it.

Impact: Grounding at both ends can easily create ground loop interference, causing pressure readings to fluctuate and switches to trigger erratically, severely affecting control stability.

4. Wiring Arrangement for High- and Low-Voltage Circuits

Incorrect Practice: Running equipment signal control wires in parallel with power supply lines for inverters, motors, and other high-voltage components within the same conduit or cable tray, or routing them in close proximity.

Correct Practice: Route signal wires through separate conduits, maintaining a safe distance from high-voltage power lines. Keep them as far as possible from high-interference equipment such as inverters and high-power motors.

Impact: Running high- and low-voltage lines in the same cable tray easily introduces electromagnetic interference, causing pressure display drift, disrupted switch thresholds, and control system malfunctions.

5. Analog Circuit Wiring

Incorrect Practice: Mixing analog signal wires with digital output wires in the same multi-core cable, and arbitrarily grounding the negative terminal of the analog signal to the nearest ground point.

Correct Practice: Use dedicated shielded cables exclusively for 4–20 mA analog signals. Connect the negative terminals of all analog signals to the system's common ground; do not arbitrarily ground them to nearby points.

Impact: Mixed wiring and improper grounding cause signal attenuation and value drift, resulting in inaccurate pressure data acquisition by the central control system and preventing precise monitoring of operating conditions.

6. Grounding Wiring in Explosion-Proof Environments

Incorrect Practice: During on-site installation of explosion-proof models, the enclosure grounding is omitted, or the grounding wire is too thin, and the connection points are loose or faulty.

Correct Practice: Explosion-proof models must have reliable enclosure grounding. Use copper grounding wires of sufficient gauge, ensure connection points are firmly crimped, and verify that the grounding resistance meets industrial standards.

6.4 Power-On Commissioning Procedure

1. No-Load Power-On Test

After wiring is complete, first relieve the pressure in the pipeline to ensure the equipment is in a no-load state;

Connect the DC24V power supply and observe whether the LED display on the equipment panel lights up and whether the SP1/SP2 indicator lights perform a normal self-test;

Use a multimeter to measure the voltage at the power supply terminals to confirm that the input voltage is within the DC 12–30 V range, with no overvoltage or undervoltage;

Check the digital output status: Under no-load conditions, the SP1/SP2 indicator lights should be in their initial state (constantly on for normally closed models, constantly off for normally open models).

2. Signal and Function Verification
Slowly pressurize the pipeline and observe whether the pressure reading on the digital display changes synchronously with the rising pressure, confirming that the display shows no skipping or stuttering;
Pressurize to the SP1 set threshold and observe whether the SP1 indicator lights up; simultaneously use a multimeter to measure whether the SP1 output circuit is conducting normally;
Continue pressurizing to the SP2 set threshold and confirm that the SP2 indicator light and output circuit trigger simultaneously;
Slowly depressurize and confirm that after the pressure drops to the threshold plus hysteresis, the switch output automatically resets, the indicator light turns off, and there are no frequent false triggers.

3. Accuracy Calibration Method
Connect the device in parallel with a standard pressure calibrator or standard pressure gauge on the same pipeline;
Apply pressure sequentially at 0%, 25%, 50%, 75%, and 100% of the full scale range, and compare the deviation between the device's displayed value and the standard value;
If the deviation exceeds the allowable range (±0.5% FS), enter the device calibration mode and adjust the zero and full-scale points using the "mode+▲/▼" buttons to complete calibration;
After calibration is complete, power off and restart the device, then re-verify each range point to ensure the deviation remains within the acceptable range.

4. Indicator Light Status Interpretation
Normal Status: The digital display stably shows the current pressure value; the SP1/SP2 indicator lights up only when the trigger threshold is reached;
Abnormal Status: The digital display flashes or shows an error code (e.g., "Err"), indicating a sensor failure or signal abnormality;
Power Failure: The digital display is off; check the power connections and voltage to ensure they are normal;
Output Abnormality: Indicator lights are on but there is no signal in the loop; check the load wiring and whether the loop is conductive.

6.5 Installation Prohibitions and Precautions
1. Strictly prohibit overvoltage supply: The device's supply voltage must be maintained within the DC 12–30 V range. Never connect to a 220 V AC power source or a DC power source exceeding 30 V to avoid burning out the device's circuitry;

2. Never exceed the operating pressure: The device's operating pressure must not exceed the upper limit of the range specified on the nameplate; otherwise, the sensor diaphragm will be damaged, resulting in permanent accuracy deviation or rendering the device unusable;

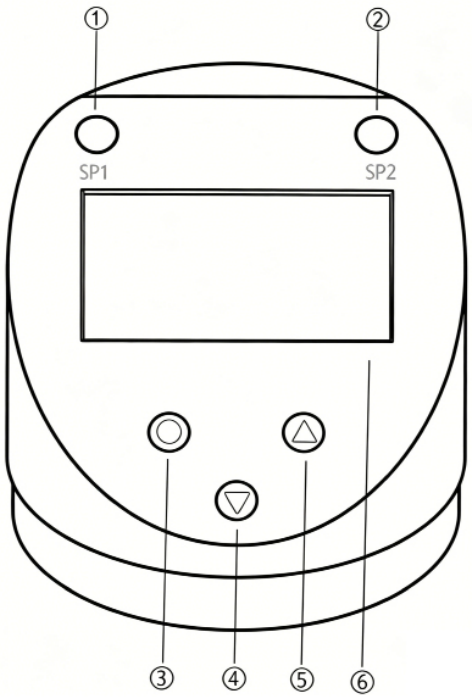
3. Avoid high-voltage interference: Signal wires must be routed separately from power lines and kept away from strong interference sources such as inverters and motors; install metal shielding tubing if necessary;

4. Protection against humid environments: For installations in humid or outdoor environments, ensure that the aviation connectors are fully tightened and the O-rings are intact to prevent moisture from entering the device. Regularly inspect the waterproof performance of the connectors to prevent aging and leakage;

5. Do not strike or drop the device: Do not strike or subject the device to vibration during installation or use to avoid damaging the sensor diaphragm, which could affect measurement accuracy;

6. Explosion-proof precautions: Explosion-proof models must not be disassembled or modified outside of explosion-proof zones, and non-original manufacturer parts must not be used; otherwise, the explosion-proof certification will be invalidated;

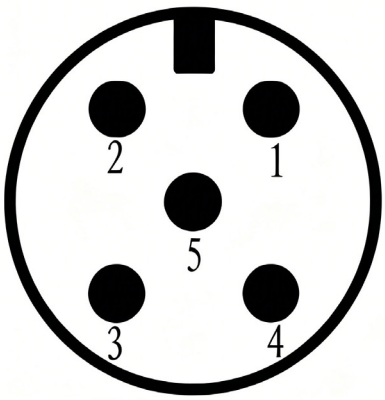
7. Media compatibility precautions: The equipment's wetted parts are made of 316L stainless steel; it must not be used with highly corrosive media (such as concentrated acids or alkalis); a corrosion-resistant model must be customized before use.



Button Operation Instructions
• When pressure is displayed normally
3[●] Press briefly to bring up the menu screen
4[▼] Press and hold to perform quick zero calibration
5[▲] Press briefly to switch units

• When in the menu screen
[●] Confirm/Exit
Press and hold [▲] or [▼] to edit data

When the system is displaying pressure normally, press [▲] or [▼] to perform quick zero calibration or switch units.



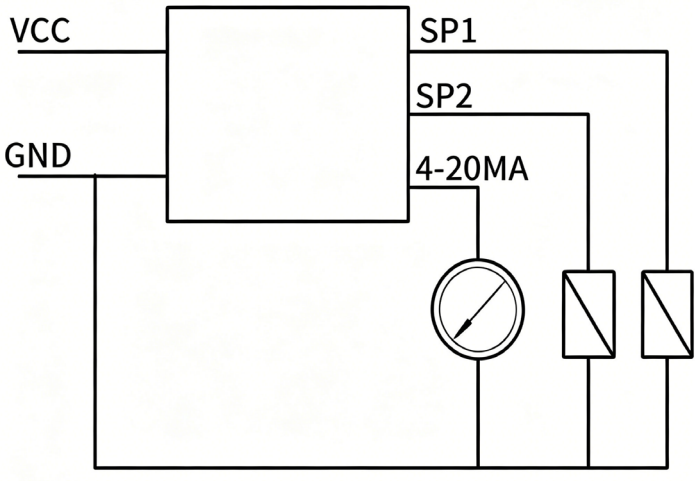
1: VCC (PWR+)

2: SP2 (SWITCH-2)

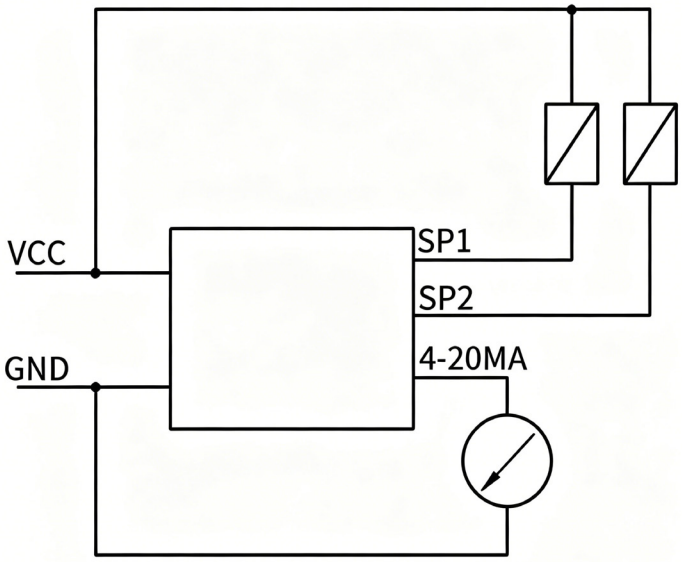
3: GND (PWR-)

4: SP1 (SWITCH-1)

5: 4-20mA



PNP Output Wire



NPN Output Wire

VII. Recommendations for Daily Use and Maintenance

7.1 Key Points for Daily Inspections

1. Monitoring Pressure Display and Signal Stability

During daily inspections, observe whether the pressure readings on the equipment's digital display are stable and free of fluctuations. If the readings fluctuate frequently or exhibit irregular variations, investigate potential issues such as signal interference, pipeline vibration, or sensor malfunction;

Verify that the status of the SP1 and SP2 indicator lights aligns with the actual pressure logic, ensuring no abnormal false triggers (e.g., unintended lighting or extinguishing). Record any deviations between the trigger threshold and the actual pressure;

If the device features a 4–20 mA analog output, simultaneously verify that the pressure data collected by the central control system matches the device's local display value to identify issues such as line attenuation or signal drift.

2. Inspection of the Device Unit and Installation Status

Inspect the device housing for damage, corrosion, or condensation/water accumulation; ensure the IP65 protective sealing gasket is intact and free of aging; verify that aviation connectors are secure and show no signs of water ingress;

Confirm that pipe threaded connections are leak-free and secure; ensure the device has not shifted due to pipe vibration; check that the installation location exhibits no noticeable looseness or abnormal noises;

Check that the display panel has no scratches or stains, and that the buttons operate normally without sticking or malfunctioning.

3. Monitoring of Ambient Temperature, Humidity, and Interference Sources

Record the temperature and humidity of the installation environment daily to ensure the device operates within the normal range of -25°C to +80°C and ≤80% RH (non-condensing), avoiding damage caused by excessive temperature or humidity;

During routine inspections, check the area around the equipment for newly installed sources of strong electromagnetic interference, such as variable frequency drives or high-power motors. If new equipment is installed, verify the stability of the pressure signal simultaneously; if necessary, adjust the equipment's installation location or install shielding measures;

In damp or outdoor installation environments, pay close attention to whether there is standing water or direct water spray around the equipment to prevent moisture from entering the interior.

7.2. Regular Maintenance Plan

1. Equipment Cleaning Schedule and Methods

Basic Cleaning: Clean the equipment housing, display panel, and aviation connectors quarterly. Wipe away surface dust and stains with a dry, soft cloth. Never rinse the equipment directly with water to avoid compromising the IP65 protection rating;

Removal of Stubborn Stains: In metallurgical or industrial environments with heavy oil or dust, use a neutral detergent with a soft cloth for cleaning. Never use organic solvents (such as alcohol or acetone) to wipe the display panel to prevent corrosion of the panel material;

Cleaning of tubing connections: Disassemble the equipment every six months to remove impurities and scale from the tubing connections, preventing blockage of the sensor diaphragm. After cleaning, re-wrap with PTFE tape before reassembly to prevent leaks.

2. Wiring and Fastening Inspection

Inspect the M12 aviation connectors quarterly to ensure wiring is secure, with no loose or oxidized conductors, reliable shield grounding, and no broken wires or damaged insulation;

Annually inspect and tighten the equipment housing's grounding terminal to ensure grounding resistance ≤4Ω. In explosion-proof environments, additionally verify the wire gauge and connection integrity of the grounding circuit;

In high-vibration environments (e.g., hydraulic stations, stamping equipment), inspect the equipment mounting threads and bracket fastenings every six months. Install anti-loosening washers as needed to prevent the equipment from loosening or falling off.

3. Recommendations for Accuracy Retesting and Calibration

Standard operating conditions: Conduct accuracy retesting every six months using a standard pressure calibrator to perform comparison tests at 0%, 25%, 50%, 75%, and 100% of the full scale range, confirming that the deviation between the device's displayed value and the standard value is within ±0.5% FS;

Harsh Conditions (Dust, Vibration, Corrosive Media): Conduct accuracy retests quarterly. If the deviation exceeds the allowable range, enter calibration mode to adjust the zero and full-scale points, then re-verify after calibration;

After Overpressure / Failure Recovery: After the device experiences overpressure shocks, power abnormalities, or shutdowns due to failures, immediately perform accuracy retests and functional verification. Only resume operation after confirming that the sensor and circuitry are undamaged.

7.3 Long-Term Maintenance Tips

1. Optimizing Dust and Moisture Protection

In dust-heavy environments such as metallurgy and building materials, install a custom dust cover on the exterior of the device to prevent long-term dust accumulation from affecting heat dissipation and display functionality;

For humid or outdoor installations, wrap waterproof tape around the aviation connector terminals to prevent moisture from entering through gaps. Additionally, regularly inspect the condition of the connector O-rings and replace any damaged ones promptly;

Equipment that will be idle for an extended period should be stored in a dry, well-ventilated environment to prevent moisture-induced corrosion. Before reactivation, power on the unit to warm it up and perform an accuracy retest.

2. Anti-Interference Optimization Measures

Route signal and power lines separately, maintaining a safety distance of ≥20 cm. Run signal lines through separate metal shielded conduits, and ground the shield only at one end (on the control cabinet side) to prevent ground loop interference;

Install the equipment away from strong electromagnetic interference sources such as inverters, motors, and transformers. If this is not possible, install a power filter at the equipment's power input to reduce the impact of power supply interference on signals;

In environments with frequent signal fluctuations, increase the output delay setting in the device menu as appropriate to filter out false triggers caused by interference or pressure fluctuations.

3. Protection Solutions for Extreme Environments

High-temperature environments (e.g., steam pipelines, high-temperature hydraulic systems): Select high-temperature-resistant extended models and install them with heat-dissipating connectors to prevent direct contact with high-temperature media. Additionally, regularly inspect the heat sinks to ensure they are not clogged with dust;

Low-Temperature Environments (Cold Storage, Low-Temperature Refrigerant Piping): Select low-temperature-resistant models. Allow the device to acclimate to room temperature for a period before powering it on to prevent internal condensation and circuit damage caused by sudden

temperature changes;
Highly Corrosive Media Environments (Chemical Acid/Alkali Piping): Regularly inspect the wetted diaphragm for corrosion or pitting. If necessary, replace it with a custom model featuring Hastelloy or titanium wetted parts to extend the device's service life.

VIII. Troubleshooting & Emergency Procedures

8.1 List of Common Faults

No output / Switch fails to operate: No signal output from the SP1/SP2 circuits; downstream equipment does not start, stop, or trigger alarms

Pressure Signal Drift / Display Fluctuations: Digital display values fluctuate frequently or jump erratically, not matching the actual pipeline pressure

Indicator Light Abnormalities: SP1/SP2 indicator lights remain constantly on or off, or illuminate abnormally when there is no pressure and fail to trigger when pressure is within range

False Alarms / Frequent Triggers: While pressure is within the normal range, the device frequently triggers alarms or starts/stops, exhibiting erratic false actions

No display / LED display not lit: No display after power-on; buttons unresponsive

Accuracy deviation exceeds limit: Displayed pressure deviates from standard pressure gauge / calibrator readings by more than ±0.5% FS

Anomalous analog output (optional models): 4-20mA signal out of range (e.g., 0mA or 24mA); central control system cannot acquire valid data

8.2, Analysis of Fault Causes

Wiring errors: Reversed power supply polarity, incorrect output load wiring, shielding wire grounded at both ends, analog circuit not forming a closed loop

Power supply abnormalities: Supply voltage exceeds the DC 12–30 V range, excessive power supply ripple, poor power supply contact / loose connection, power supply circuit short circuit / overcurrent

Signal Overload / Abnormal Operating Conditions: Equipment operating at overpressure beyond the upper limit of the measurement range; severe fluctuations in pipeline pressure; load current exceeding the switch's output capacity (>1.2A)

Environmental Interference: Equipment located near strong interference sources such as inverters or motors; signal and power lines routed in the same conduit; poor grounding at the site causing ground loops

Equipment Damage: Sensor diaphragm damaged by impact; internal circuitry burned out; keypad or display panel malfunction; water ingress and corrosion due to seal failure

8.3, Step-by-Step Troubleshooting

1. No Display / LED Display Not Lit

Troubleshooting Steps:

Use a multimeter to measure the voltage at the power terminals to confirm normal DC 12–30V supply with no under-voltage or over-voltage;

Check the aviation connector wiring to ensure the brown wire (VCC) and white wire (GND) are not reversed or loose;

Disconnect the load and power the device alone to determine if the device's power protection was triggered by a short circuit in the load;

Check the device housing for water ingress or condensation. If water marks are present, disconnect the power, disassemble the unit, and dry it (non-explosion-proof models only); explosion-proof models must not be disassembled without authorization.

Repair Measures:

Wiring errors: Rewire according to the pin definitions; if the positive and negative terminals are reversed, adjust them before powering on;

Power supply issues: Replace with a 24V DC power supply that meets specifications; clean loose connections in the power circuit;

Water ingress / circuit damage: Contact after-sales service for inspection and repair; explosion-proof models must be returned to the factory for handling; do not disassemble on-site.

2. No output / Switch does not operate

Troubleshooting steps:

Confirm that the device is powered on and the display is normal; check the status of the SP1/SP2 indicator lights;

Verify the switch threshold and output mode (Normally Open / Normally Closed) settings in the device menu to ensure they are not set incorrectly;

Use a multimeter set to continuity mode to test the SP1/SP2 circuits; check if the circuit is conductive when the pressure reaches the set point;

Check if the downstream load is short-circuited or overloaded; ensure the load current is ≤1.2A.

Remedial Actions:

Incorrect parameter settings: Re-enter the menu, set the correct switching thresholds and output mode, save the parameters, and restart the device;

Load overload: Replace the intermediate relay to connect to the load, avoiding direct drive of high-current equipment;

Output circuit failure: Return the device to the factory for output circuit testing and replace any damaged output modules.

3. Signal Drift / Display Fluctuations

Troubleshooting Steps:

Compare the device's display reading with the standard pressure gauge reading to confirm whether the fluctuation is due to actual pressure variations in the piping;

Inspect the device's installation location to ensure it is not near strong interference sources such as variable frequency drives or motors;

Inspect the signal cable routing to ensure it is not run in the same conduit as power cables, and that the shielded cable is grounded at only one end;

Check for loose or leaking pipe connections, or for air bubbles/impurities in the piping causing pressure fluctuations.

Remedial Actions:

Piping pressure fluctuations: Adjust the hysteresis and delay parameters in the device menu to filter out minor fluctuations and prevent false triggers;

Electromagnetic interference: Route signal cables through separate conduits away from interference sources, and ensure the shield is grounded only on the control cabinet side;

Piping leaks/contaminants: Tighten pipe connections, remove air bubbles and contaminants from the piping, and install a pressure buffer if necessary.

4. False Alarms / Frequent Triggers

Troubleshooting Steps:

Verify the threshold and hysteresis settings for SP1/SP2; ensure the hysteresis is not set too low, which could cause repeated triggering near the threshold;

Check for ripple interference in the on-site power supply or voltage fluctuations exceeding the ±10% range;

Confirm that the device is not subjected to strong vibrations, which could cause the sensor to misinterpret pressure signals.

Remedial Actions:

Hysteresis set too low: Increase the hysteresis parameter (e.g., adjust from 0.1 bar to 0.3 bar) to prevent frequent triggering caused by minor fluctuations;

Power supply interference: Install a power filter at the power supply end to stabilize the supply voltage and reduce ripple interference;

Vibration impact: Install anti-loosening brackets or vibration-damping connectors to reduce the amplitude of equipment vibration.

5. Analog Output Abnormalities (Optional Models)

Troubleshooting Steps:

Use a multimeter set to the current range to measure the 4–20 mA output loop and verify that the current varies with pressure;

Check the analog circuit wiring to ensure the positive and negative terminals are not reversed and that the loop load is ≤500 Ω;

Verify the analog range setting in the device menu to ensure it matches the actual pressure range.

Remedial Actions:

Circuit wiring error: Rewire according to specifications to ensure the analog circuit forms a closed loop;

Excessive load: Replace with a low-impedance load or adjust the circuit wiring to reduce the load on the analog circuit;

Incorrect range setting: Enter the menu to recalibrate the analog zero and full-scale points to match the actual pressure range.

8.4, After-Sales Repair Guidelines

1. Failure Determination Criteria (Situations Where Repair is Recommended)

The device has no display or response, and cannot be restored after ruling out power supply and wiring issues;

Severe pressure display deviation (> ±2% FS) that cannot be corrected even after on-site calibration;

Complete failure of the output circuit; SP1/SP2 do not activate regardless

of pressure changes;
Water ingress, damaged housing, deformed/corroded sensor diaphragm, or obvious physical damage;
Explosion-proof models exhibit seal failure, damaged explosion-proof markings, or have lost explosion-proof certification due to unauthorized disassembly.

2. Repair Process
Gather basic device information: model (PCM710-QD), measurement range, serial number, duration of installation and use, and a description of the fault symptoms;
Take photos of the device nameplate, wiring status, and the display screen at the time of the fault (e.g., error codes, indicator light status), and provide them to after-sales support;
Contact after-sales technical support, provide the fault details and on-site troubleshooting results, and allow the technician to determine whether factory repair is necessary;
If factory repair is required, pack the equipment (including all accompanying cables and manuals) according to after-sales instructions, complete the repair request form, and mail it to the designated address.

3. Warranty Coverage
Warranty Period: Within 12 months from the date of shipment, free repair or replacement services are provided for non-human-induced faults occurring under normal usage conditions;
Exclusions: Damage caused by human error (e.g., dropping, overpressure, incorrect power connection), water ingress or corrosion, unauthorized disassembly or modification, or force majeure. Repairs for equipment beyond the warranty period will be charged at cost;
Explosion-proof Models: Unauthorized disassembly or modification of the explosion-proof structure will void the explosion-proof certification and warranty eligibility. The equipment must be used strictly in accordance with explosion-proof regulations.

4. Precautions
Before returning the equipment for repair, remove any residual media from the device to ensure it meets transportation safety requirements;
Repairs for explosion-proof models must be handled by manufacturers with explosion-proof repair certification; unauthorized disassembly or repair by non-professional entities is strictly prohibited;
After repair, the equipment must undergo re-calibration and explosion-proof testing; it may only be put back into service after passing these inspections.