User Manual for Non-contact Liquid Level Sensors

Intelligent External Liquid Level Detection Series

Model XKC-Y29A

catalogue

1. Product Overview

The intelligent non-contact liquid level sensor (hereinafter referred to as the level sensor) utilizes advanced signal processing technology and high-speed signal processing chips, overcoming the limitations imposed by container wall thickness. The Y29A series capacitive sensors are specifically designed to detect liquid levels in non-metallic containers, automatically adapting to plastic or glass walls with thicknesses up to 10mm, thereby enabling true non-contact measurement of liquid levels in sealed containers. The sensor probe is installed on the upper and lower surfaces of the container's outer wall (corresponding to the high and low levels of the liquid). This design eliminates the need for container openings, simplifying installation and facilitating the assembly of complete systems.

The XKC-Y29A series is specifically designed for liquid level detection in non-metallic containers, primarily serving industries such as healthcare, food and beverage, agriculture, and water treatment. This series offers two signal output control modes: high-low level output interface and NPN output interface, with each mode corresponding to the following models:

order number	model	signal interface
1	XKC-Y29A-V	High and low level output interface
2	XKC-Y29A-NPN	NPN output interface
3	XKC-Y29A-PNP	PNP output interface

2. Product Features

1. The XKC-Y29A series is a non-contact liquid level sensor that automatically calibrates sensitivity through a button operation.
2. Supports high-low level output, NPN, and PNP (refer to the manufacturer's specifications for selection).
3. The level of liquid can be detected accurately and stably, and the liquid can be detected in cold, hot and boiling state.
4. The electronic circuit structure is pure, the non-mechanical working mode, the performance is stable, the continuous service life is long.
5. It has high stability, high sensitivity, strong anti-interference ability, and is not affected by external electromagnetic interference. It has special treatment for power frequency interference and common mode interference.
6. The power supply features reverse connection protection, short circuit protection, overcurrent protection, and overvoltage protection, and is compatible with all 12-24V power adapters available on the market.

7. It is widely used in medical and food industry. It has strong sensing ability and can detect the liquid level in various non-metallic containers, such as plastic, glass, ceramic, etc. The sensing distance (container wall thickness) can reach 10mm. It can detect liquid, powder and particles.

8. The open-collector output mode features a wide voltage range (12-24V), making it suitable for connecting various circuits and product applications.

3. Main Functions

1. Detects water-based fluids in planar containers using a water-based solvent. It measures liquid levels in containers or pipelines without direct contact with the medium.

2. It can detect the medium reliably and has high stability. It can compensate the residual film, water or foam in the container, such as water, milk, honey, latex, body fluid (blood), acid or alkaline solution, and can distinguish the liquid level.

3. The black line can serve as a sensor button for calibration, enabling remote adjustment of the sensor's sensitivity.

4. Product Technical Specifications

project name	parameter		
Product specifications and model numbers	XKC-Y29A-V	XKC-Y29A-NPN	XKC-Y29A-PNP
Output method	high-low level	Switching quantity (low level valid)	Switching quantity (high level valid)
DC input voltage	DC12V-24V (Batch Customizable)		
Power supply ripple requirements	≤10%V		
current dissipation	≤10mA		
power-on delay	≤500mS		
response time	≤100mS		
operating ambient temperature	-25~85℃		
humidity	30%~80% (no coagulation)		
inductive thickness (sensitivity)	≤10mm (container wall thickness)		
temperature drift	≤20% (-25℃~+60℃)		
conductivity of liquid	≤50ms		
level accuracy	±3mm		
wire length	500mm (±10mm) (customizable in batches)		
line end definition	The system features brown VCC, yellow OUT signal outputs, blue GND, and black MARK sensitivity calibration lines.		
material quality	PC-V0 fireproof material		
weight	24g±10%		

Water resistance	IP67
Safety and standard certification	CE
Environmental certification	ROHS-2.0

5. Product Selection

order number	model	signal interface
1	XKC-Y29A-V (DC12V-24V)	high and low level output interface
2	XKC-Y29A-NPN（DC 12V-24V）	NPN output interface
3	XKC-Y29A-PNP（DC 12V-24V）	PNP output interface

6. Requirements for the gap between the sensor (or probe) contact surface and the container's outer wall

The contact surface of the sensor (or probe) should be tightly bonded to the container's outer wall using AB adhesive or other durable adhesives. If special requirements apply, the gap must be less than 0.5mm, ideally eliminated, as any gap could compromise measurement accuracy.

7. Applicable Container Media and Installation Methods

The following is the installation method for the XKC-Y29A series products.

(1) Requirements for the tested container and its installation method

The tested containers are classified into three categories based on material:

Class 1: Insulated material containers

A container made of non-metallic material with smooth surface, uniform thickness, tight material and good insulation, such as glass, plastic, non-absorbing ceramics, acrylic, rubber and their composite materials.

method of erection ：

1. For containers with multi-layered walls at the measurement probe installation site, ensure tight interlayer contact without bubbles or gas interlayers. Both inner and outer surfaces of the container wall must be smooth.

2. Wall thickness: 0-10mm

3. Tank types: spherical tanks, horizontal tanks, vertical tanks, etc.

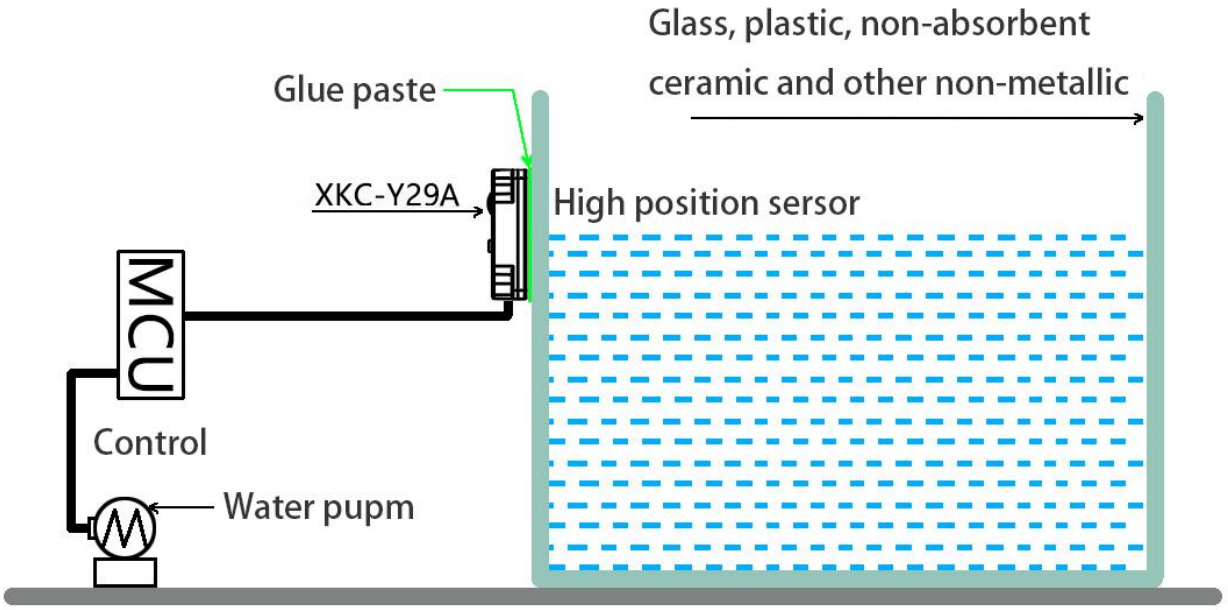
4. The installation method for such material containers is shown in the figure;

The probe can be fixed by adhesive or non-metallic bracket on the outer wall of the container.

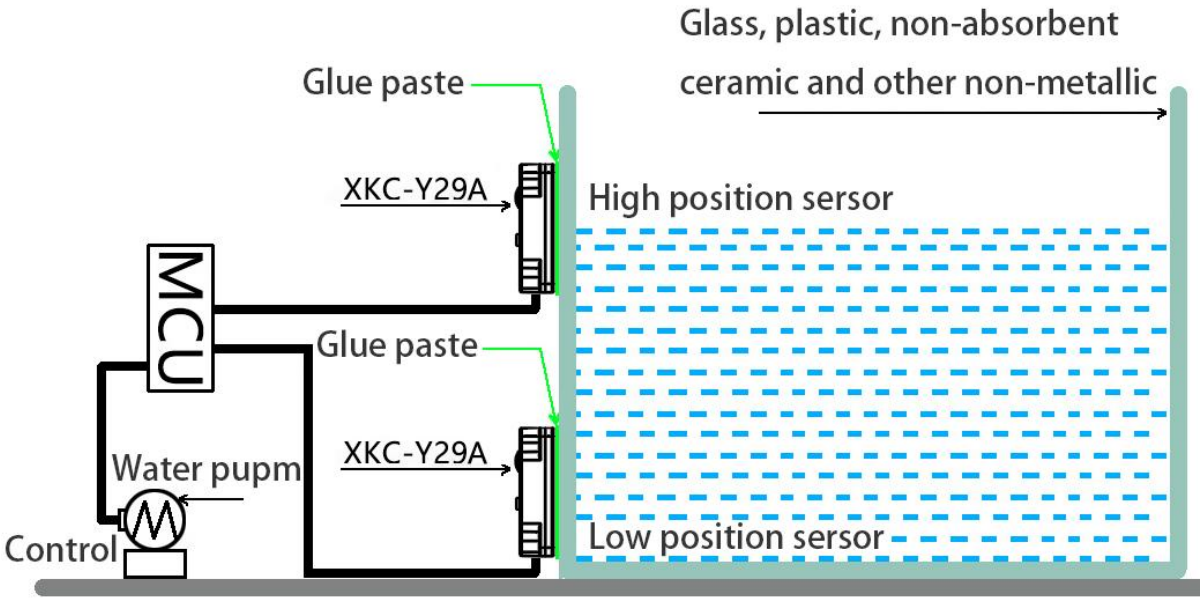
Avoid installing the probe in areas with metal components to prevent interference with detection.

The probe should be installed away from liquid flow.

The container facing the low probe should be free of sludge or other debris to avoid interference with the detection.



Schematic diagram of the installation method for one probe in the container



2 probes in the container installation schematic diagram

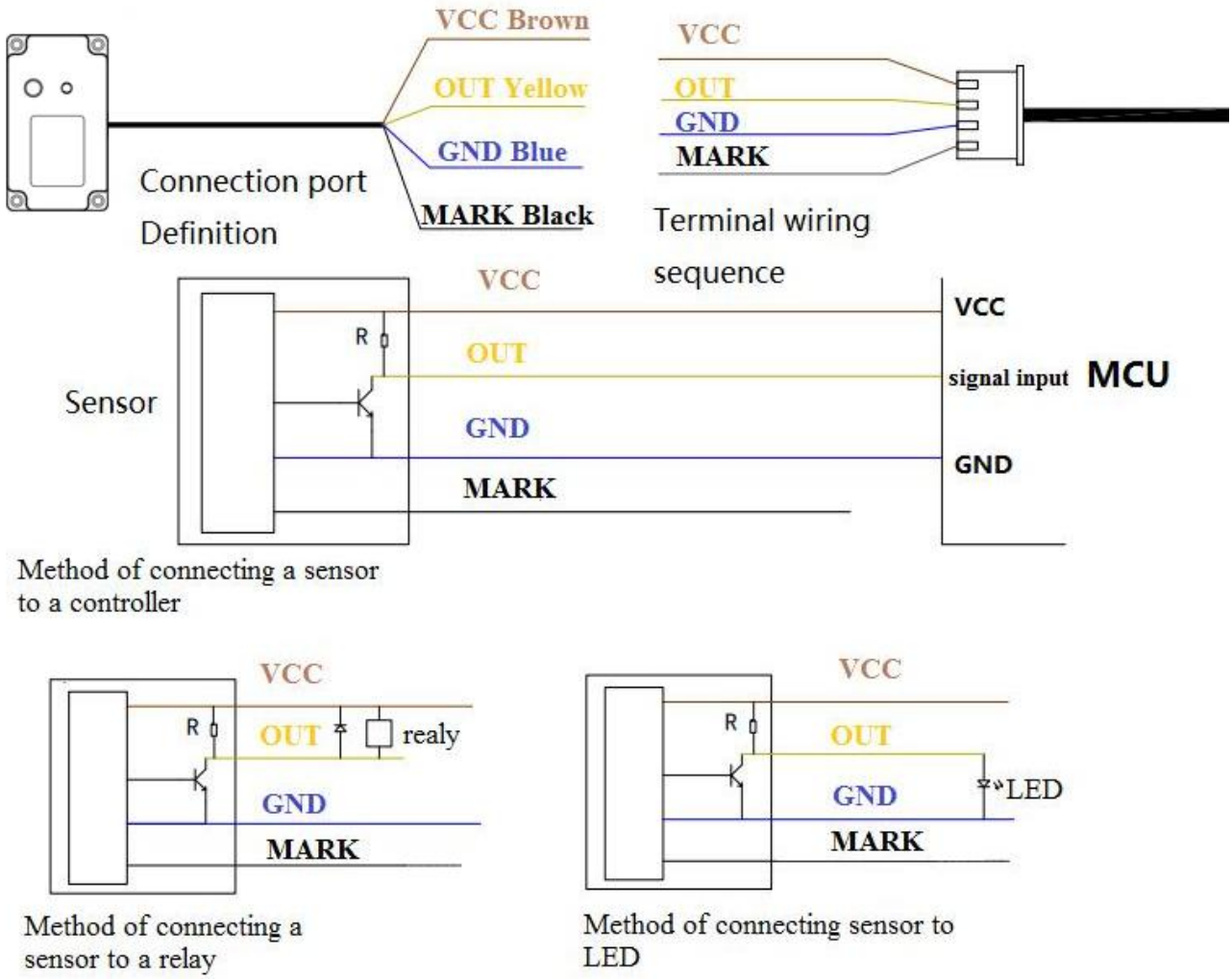
8. Application Environment

XKC-Y29A-V、XKC-Y29A-NPN、XKC-Y29A-PNP

The Y29A model is engineered for demanding industrial environments, featuring specialized EMC components including spike absorption, electromagnetic compatibility, transient suppression, and surge protection. It supports direct interfacing with PLCs and electromagnetic relays, delivering exceptional anti-interference performance for diverse harsh industrial applications.

9. Output Principle and Recommended Wiring Method

1. XKC-Y29A-V wiring method



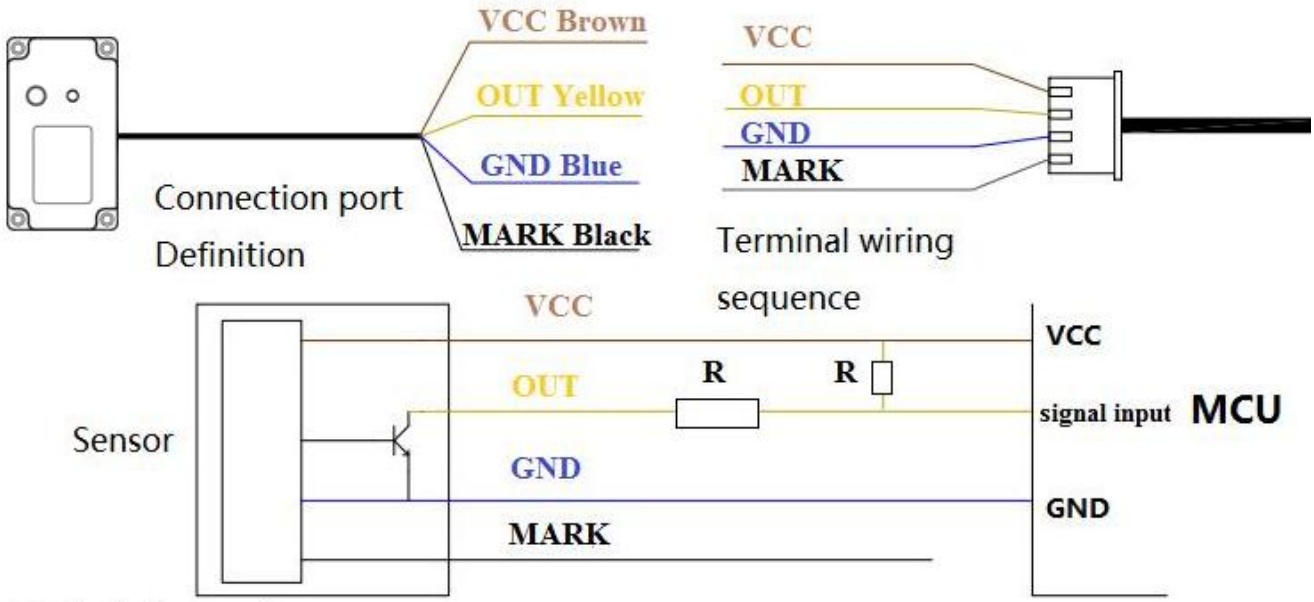
High-low level drive principle (relay drive current ≤100mA)

When the sensor detects liquid, its yellow output line (OUT) produces a high-level signal, causing the relay to open and fail to engage.

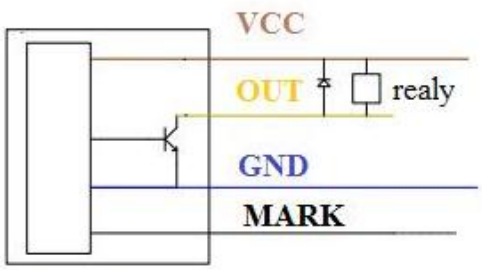
When the sensor detects no liquid, it outputs a low-level signal through its yellow line, activating the relay.

Note: Do not operate the wiring while powered on. The black MARK sensitivity calibration wire must be left free-floating or connected to a push-button switch, and should never be directly connected to the power supply's positive or negative terminals. For detailed instructions on using the black wire, refer to Step 3 in the sensitivity setup procedure.

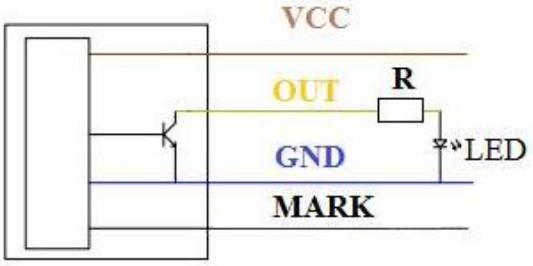
2. XKC-Y29A-NPN wiring method



Method of connecting a sensor to a controller



Method of connecting a sensor to a relay



Method of connecting sensor to LED

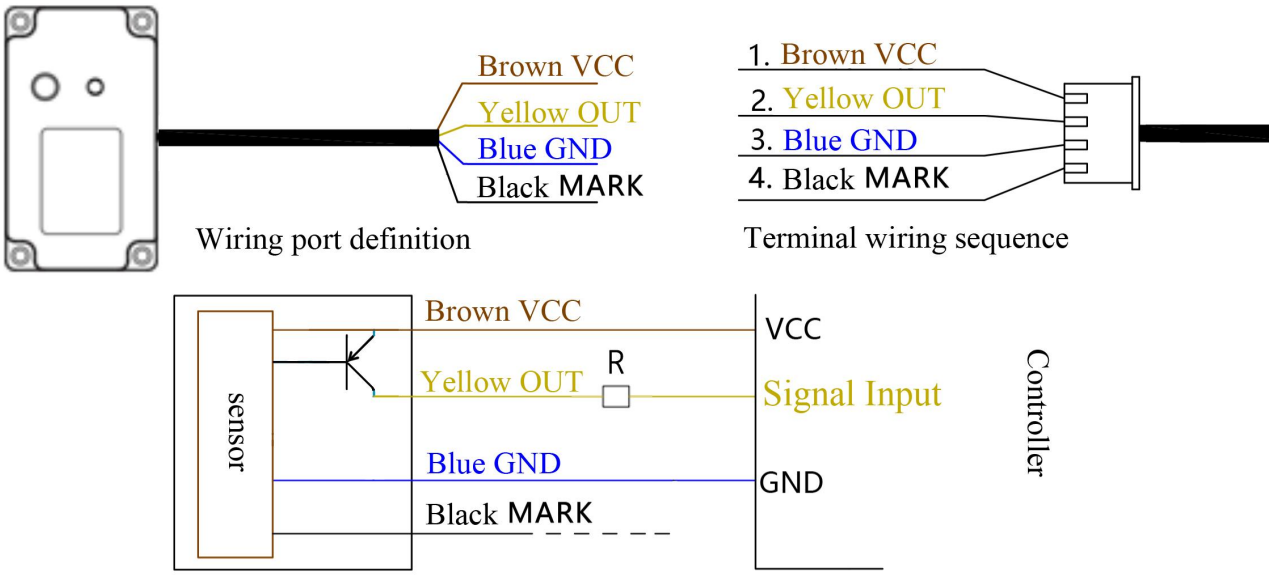
NPN-type driver principle (relay drive current ≤100mA)

When the sensor detects liquid, its yellow output line (OUT) sends a low-level signal, energizing the relay to engage.

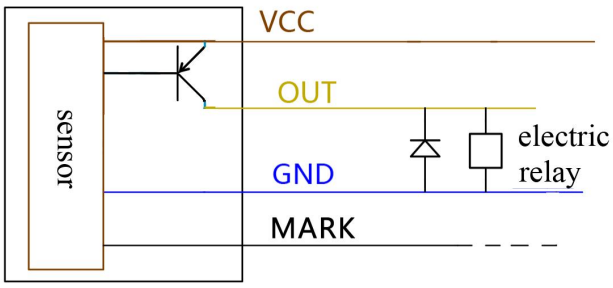
When the sensor detects no liquid, its yellow line enters a high-impedance state, causing the relay to lose power and fail to engage.

Note: Do not operate the wiring while powered on. The black MARK sensitivity calibration line must be left free or connected to a push-button switch, and should not be directly connected to the positive or negative power terminals. For detailed instructions on using the black line, refer to Step 3 in the sensitivity setting procedure.

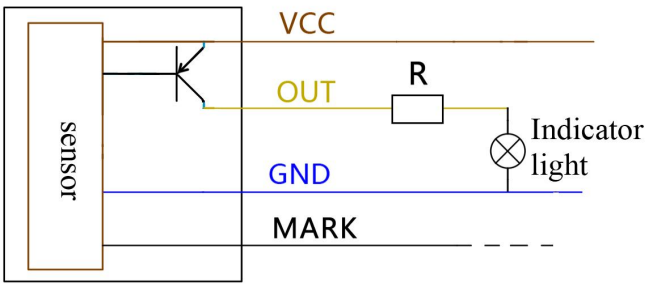
3. XKC-Y29A-PNP wiring method



PNP signal output: wiring method to connect to controller or MCU



PNP signal output:
Wiring method of connecting electric relay



PNP signal output:
Wiring method of connecting indicator light

PNP-type drive principle (relay drive current ≤100mA)

When the sensor detects liquid, its yellow output line (OUT) sends a low-level signal, energizing the relay to engage.

When the sensor detects no liquid, its yellow line enters a high-impedance state, causing the relay to lose power and fail to engage.

Note: Do not operate the wiring while powered on. The black MARK sensitivity calibration line must be left free or connected to a push-button switch, and should not be directly connected to the positive or negative power terminals. For detailed instructions on using the black line, refer to Step 3 in the sensitivity setting procedure.

10. Steps for setting sensitivity

The sensitivity is calibrated strictly according to the standard before leaving the factory. The calibration is suitable for the plastic tank wall of about 0.5 to 6 mm and the glass wall of about 0.5 to 4 mm. The glass or plastic must be non-conductive material.

Depending on the actual operating environment, the sensor sensitivity should be adjusted through the operation calibration process to achieve optimal performance. Calibration modes include full liquid calibration and empty liquid calibration, which can be performed via buttons or the control MARK line.

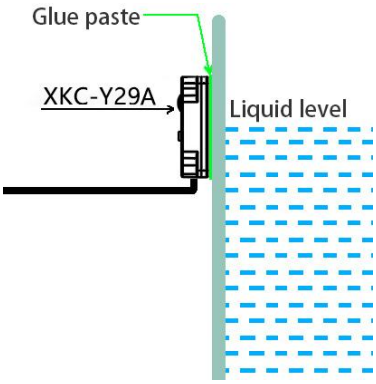


Figure 1

Figure 2

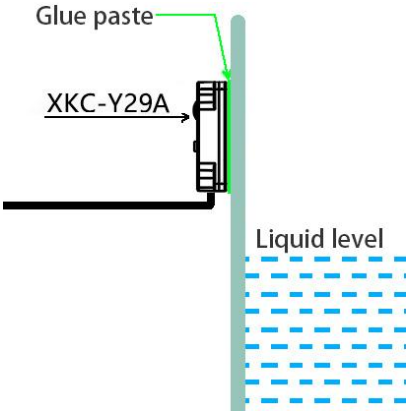


Figure 3

full liquid calibration

1. As shown in Figure 1, align the liquid level in the container with the sensor center.
2. As shown in Figure 2, press the button or connect the MARK line to the GND line for approximately 1 second, then release. The sensor's indicator light will flash rapidly (100Hz). When the flashing stops, the calibration is complete, and the indicator light will illuminate (the sensor's switch point will be set below the actual detection value).

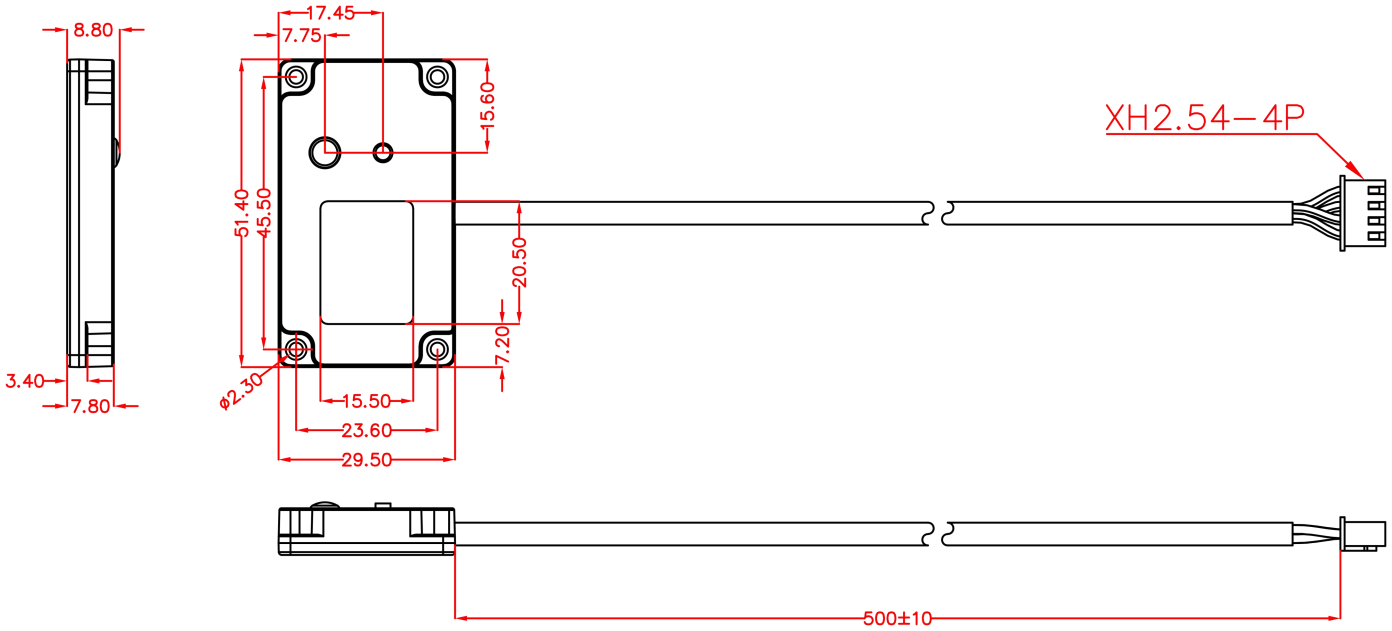
airless calibration

1. As shown in Figure 3, position the sensor above the container.
2. As shown in Figure 2, press the button or connect the MARK line to the GND line for 5-6 seconds, then release. The sensor's indicator light will flash slowly (50Hz). When the flashing stops, the calibration is complete, and the indicator light will turn off (the sensor's switch point will be set above the actual detection value).

matters need attention

In most applications, full liquid calibration fulfills most detection requirements, particularly in critical scenarios with significant variations in medium types and temperature. A calibration method that covers approximately 50% of the sensor surface with liquid provides an advantage. The advantage of dry liquid calibration lies in its applicability when containers exhibit excessive residual film, moisture, foam accumulation, or wall thickness exceeding 15mm, enabling calibration even under such conditions.

11. Product Dimensions



12.Other Important Notes

Viscosity of the liquid medium being tested

1. Normal measurement is acceptable when kinematic viscosity is <2PaS. Measurements may be affected when kinematic viscosity ranges between 2PaS and 6PaS. Measurement becomes impossible when kinematic viscosity exceeds 2PaS due to excessive liquid adhesion to container walls. (Note: Viscosity decreases with temperature increase, and most high-viscosity liquids show more pronounced temperature effects. Temperature influence should be considered when measuring viscous liquids.)

2. The conductivity of the tested liquid is less than 50ms.

3. Keep the sensor clean, and protect it from corrosion and violent impacts.

4. During outdoor installation, avoid direct sunlight and rainwater dripping onto the sensor body. Keep it away from high heat sources and ensure proper ventilation. If the ambient temperature exceeds the rated temperature, implement cooling measures.

5. When ambient temperature falls below the sensor's normal operating range, protect the sensor with an instrument protection box or similar protective cover, and ensure it remains dry. Regular maintenance and inspection of the sensor are required. (The testing interval should be determined by the user based on specific conditions).

13. Troubleshooting

analysis of causes	countermeasure	解决措施
The power supply is not properly connected.	Check and connect the power supply.	检查并接好电源
	correct wiring	更正接线
	Replace the circuit board housing the power module	更换电源模块所在电路板

	④ The sensitivity is too low.	Set the sensitivity to the appropriate level
The indicator light stays on.	The sensitivity level is too high.	Set the sensitivity to the appropriate level
	The initialization parameters were modified abnormally	Return to the factory for reinitialization
	③ The sensor has foreign objects or other metal components tightly adhered to it.	Clear debris and keep a safe distance from metal parts

14. Product Warranty Terms and Conditions

(1) Warranty Services

1. Warranty Repair: From the date of purchase, the product is covered by a one-year free warranty. The company reserves the right to repair or replace faulty components. If replacement is required, the new part may be a new device or a repair part with equivalent category, function, and quality. The replaced component will be owned by the company. Reselling or repairing the product does not affect the warranty period. The repaired or replaced product will continue to enjoy the original remaining warranty period. If the repair is completed within three months before the warranty expires, the repaired or replaced part will be covered for three months from the date of shipment. All warranty services are provided through customer repair service.

2. Defective Upon Delivery (DOA) Replacement: Within 7 days of purchase, you are entitled to a free replacement service. Products meeting any of the following criteria are classified as DOA: (1) The product's original packaging does not match the replacement package; (2) Some or all components are non-functional after initial unpacking (surface scratches or other minor defects that do not affect functionality are excluded); (3) Other hardware defects confirmed by our engineers through remote or on-site inspections.

(2) Limitations to the application of warranty

The company shall not be liable for warranty in the following cases:

1. The product has exceeded the warranty period; the surface of the product is fragile and the label is damaged; the product is severely damaged, installed or used in abnormal environments, disassembled or modified without authorization, or damaged by external power sources;

2. Damage caused by the user's improper installation or use of the product, as specified in the manual;

3. Damage caused by natural disasters or human negligence (e.g., fire, lightning, flooding, or collisions).

(3) Accessories and consumables are not covered by the warranty.

(4) Non-free warranty services

For products purchased within two years, if non-warranty issues (including parts) occur, you may opt for paid repair

services (with labor-free). We will charge for the transportation of repaired parts and accessories based on actual circumstances.

(5) Methods for obtaining warranty services

We recommend contacting the authorized dealer to purchase this product for warranty services. To claim warranty, you must present a valid warranty card (stamped by the dealer) or the original purchase invoice/receipt. If unable to provide these documents, the product will be covered under a 12-month free warranty period from the shipping date. The DOA (Delivery Order Acknowledgement) application deadline is 7 days from the shipping date.

(6) Statement

1. This manual is copyrighted by Shenzhen Xingkechuang Technology Co., Ltd. (Xingkechuang) and its authorized licensees. Xingkechuang reserves all rights.

2. Without the written permission of our company, no organization or individual may copy or reproduce any part or all of this manual without authorization, nor may they disseminate it in any form.

3. Customers acknowledge that the design and production of our products are not intended for use in life-critical products or other systems/environmental products used in hazardous activities. Should product malfunctions cause personal injury, property damage, or environmental harm (collectively termed high-risk activities), the company shall not provide warranty coverage for such incidents, nor shall it be liable to customers or third parties for any resulting damages.

4. Due to product version upgrades or other reasons, the content of this manual may be modified. StarTech reserves the right to update the manual's content without prior notice or warning. This manual is intended solely as a usage guide. While StarTech strives to provide accurate information, it does not guarantee the completeness of the manual's content. All statements, information, and recommendations herein do not constitute any express or implied warranties.

Not all models are available in all countries/regions

Please keep this manual properly. Before using the product, please read this manual carefully. During use, please strictly follow the instructions. The company will not be liable for any injuries or accidents caused by non-compliance with this manual.

(7) Environmental Protection

This product complies with environmental protection design standards. Its storage, use, and disposal must comply with relevant national laws and regulations.

15. Version of the Instruction Manual

version number	date of issue
V12	2025-12-05