

Manual for KSLV Series Capacitive Level Sensor



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1. Precautions for Use

New users should carefully read this instruction manual and correctly use the sensor according to the operation steps described in the manual. If the sensor is damaged due to improper use, it will not be covered by our one - year free warranty commitment.

If the user has the digital display version, it should be noted that the digital display head should be installed in a place protected from rain and direct sunlight.

When installing the signal cable of the sensor, it should not be close to cold sources such as distribution heads, liquid inlet and outlet pipes, etc., to avoid damage to the transmitter and signal cable caused by long - term low - temperature condensation.

If you encounter any problems during use, please contact us.

2. Overview

The KSLV series capacitive level gauge is a universal capacitive level gauge independently developed by Xi'An Kacise Optronics Tech Co., Ltd.. It is suitable for measuring various liquids under different conditions. It can also be customized to measure fine solid particles. There are no movable parts inside, and it will not be affected by steam. It can still measure the liquid level under the condition of liquid fluctuations. It adopts multi - pole detection technology, which is more flexible, greatly improving the measurement range and helping to troubleshoot sensor failures.

The KSLV series sensors have the advantages of high long - term reliability, high temperature resistance, high sensitivity, good linearity, customizable length, customizable output, customizable protection level, customizable high and low temperature resistance, and customizable anti - corrosion process. The available output methods include RS485, two - wire 4 - 20mA, voltage output, switch output, RS485 to 4G, RS485 to Bluetooth, etc. It is widely used in industries such as water treatment, papermaking, petrochemical, metallurgy, power, pharmacy, and medical treatment.

3. Features

- The MODBUS RTU protocol is easy to integrate.
- A variety of output types are available.
- Customizable output.
- Customizable protection level.
- Customizable anti - corrosion process.
- Customizable temperature resistance.
- No moving parts, reliable and stable operation.
- Can measure any liquid medium or fine solid particles.
- Can measure the liquid level of fluctuating liquids.
- Can be connected to a display to show the liquid level in real - time.
- Can be equipped with a temperature measurement function.
- A variety of models and specifications are suitable for different environments.

4. Technical Parameters

Measurement Range	10cm - 300cm (default), 5cm - 40cm (compact)
Accuracy	±0.5%, ±1%, ±2% (compact)
Protection Level	IP67
Pressure	-0.1Mpa - 1Mpa (Customizable up to 32MPa)
Temperature Resistance of Probe	-60℃-200℃ (Customizable low - temperature: -200℃, high - temperature: 800℃)
Ambient Temperature	-40℃ - 85℃
Interface	RS485, TTL
Output	RS485, 4 - 20mA, 0 - 10V, NPN, PNP, Relay, etc.
Supply Voltage	5 - 36V DC, 12 - 36V DC (analog output)
Level Gauge Material	304/316 stainless steel, PTFE
Long - term Stability	<0.1%FS/year
Temperature Drift	<0.01%FS/℃
Explosion - proof Level	ExibIICT6
Installation Thread	Default M24*2 or M20*1.5, (customizable)

5. Wiring

The default is to use a five-core cable, AVVR 5*0.12mm² 300V, and the cable length is 1.5m.

Both the cable material and length can be customized, and the number of wire cores is determined according to the customer's requirements.

5.1 RS485 Output Wiring Method

Color	Definition
Red	Power +/VCC (5~30VDC)
Black	Power -/GND
Yellow	Empty
Blue	RS485A
White	RS485B

5.2 4-20mA Output Wiring Method

Color	Definition
Red	Current Loop + (12~30VDC)
Black	Current Loop -
Yellow	Empty
Blue	RS485A
White	RS485B

5.3 Voltage Output Wiring Method

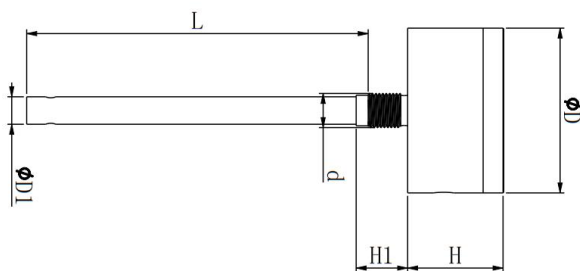
Color	Definition
Red	Power +/VCC (12~30VDC)
Black	Power -/GND
Yellow	Voltage output
Blue	RS485A
White	RS485B

For other output types and customized wiring methods, please refer to the label on the sensor or consult our after - sales staff.

6. Dimension Diagram

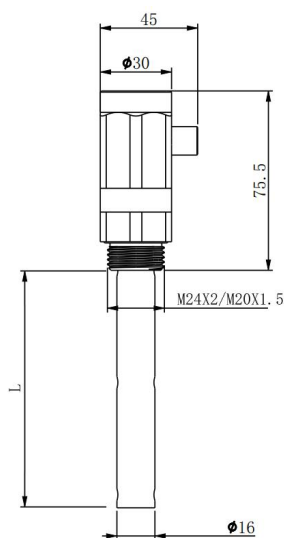
The measurement range of the sensor is the distance from the bottom of the installation thread to the bottom of the probe rod, and it can be customized.

Compact model

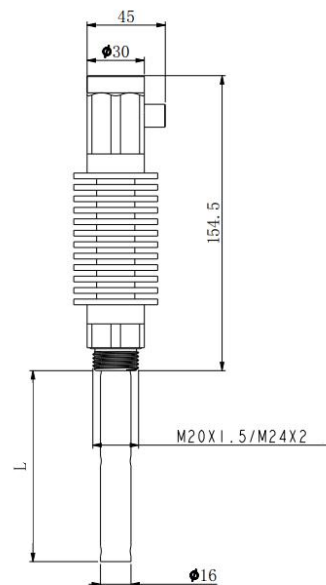


$D = 48\text{mm}$
 $H = 29\text{mm}$
 $d = \text{M10} \times 1\text{mm}$ (installation thread)
 $L = \text{Measurement range}$
 $D1 = 8\text{mm}$

Regular model



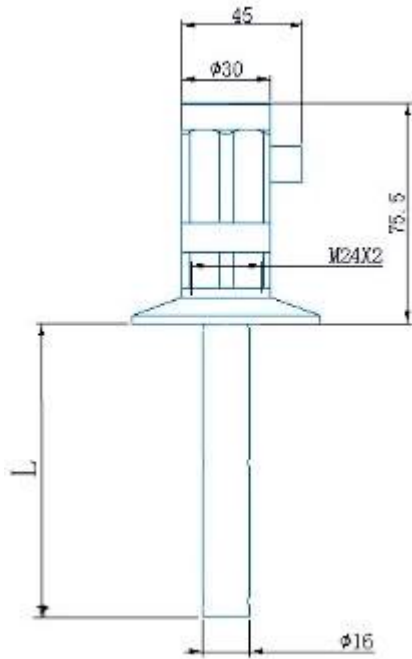
The high (low) - temperature model



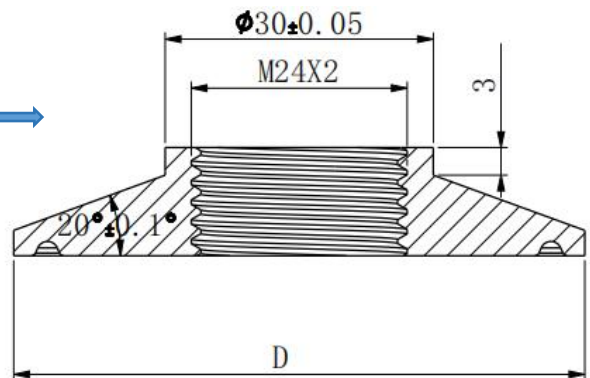
Different lengths of heat dissipation according to different temperatures.

This model is a sanitary capacitive level meter, equipped with a sanitary quick-disconnect flange. The size can be customized, and the distance from the bottom of the flange to the bottom of the sensor is the measuring range.

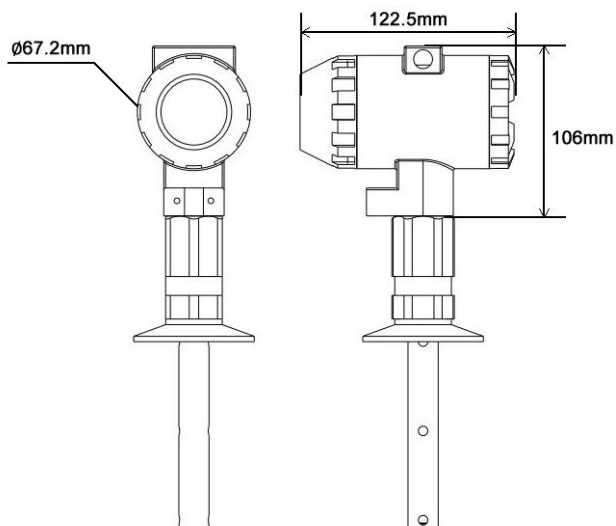
Sanitary



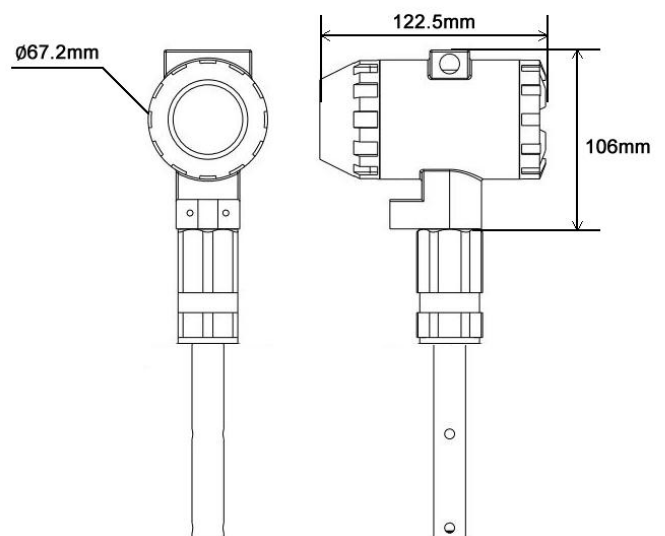
Sanitary Quick-disconnect Flange



Sanitary with Display



Regular model with Display



7.Display Unit

The indication content of the display unit for the digital display head version is shown in the figure below:



8. Structure and Principle

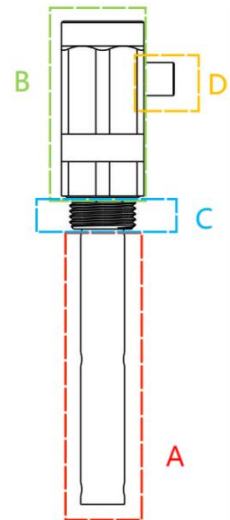
The structure of the capacitive liquid level measurement and control instrument may vary due to different application scenarios and parameters. Generally speaking, its main structure can be roughly divided into two parts: the sensor part and the transmitter part.

A is the sensor part. Its main function is to measure the capacitance of the measured medium. When the height of the measured medium immersed in the measuring electrode changes, it causes a change in capacitance. The change in liquid level is obtained by detecting the change in capacitance.

B is the transmitter part, which is the central part of the entire capacitive liquid level gauge. It calculates the capacitance change and converts it into a liquid level value. At the same time, it converts and outputs switching values, RS485 signals, 4 - 20mA signals, etc.

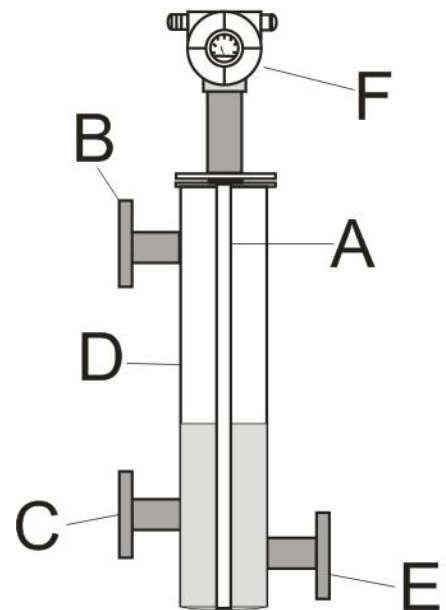
C is the installation thread, which is used to connect to the tank body. Pay attention to the pressure - bearing capacity at this part. It can be fixed with thread glue during connection or a rubber ring can be installed.

D is the wire outlet, from which all the wiring is led out.



9. Installation

No.	Name	Function
A	Sensor	Collect the change in capacitance
B&C	Gas - phase and liquid - phase connection flanges	Dock with the equipment flanges to lead the liquid in the equipment into the measuring cylinder.
D	Measuring Cylinder	Measuring cylinder of the liquid - level measurement and control device.
E	Sewage - draining flange	Periodically remove accumulated debris.
F	Transmitter	Convert the change in capacitance into a standard current signal



The installation methods of the capacitive level gauge vary depending on the application scenarios. Our company's capacitive level sensor can be directly inserted into the liquid to be measured, and the part D (measuring cylinder) in the right - hand figure may not be required.

The typical application uses the principle of a communicating vessel to introduce the medium from the measured container into the measurement cylinder, with the sensor placed at the center of the measurement cylinder. When liquid flows into the measurement cylinder or the liquid level inside the measurement cylinder changes, the capacitance between the sensor's electrodes and the inner wall of

the measurement cylinder will change. The sensor collects this capacitance change and sends it to the transmitter, which then converts it into a 4-20mA/RS485 signal output. The capacitive level meter works by measuring the change in capacitance to calibrate the liquid level change.

Note: The transmitter and the measuring cylinder are connected in a sealed manner to ensure that the measured medium does not leak outwards. Non - professional technicians are not allowed to disassemble it without permission to avoid accidents and environmental hazards.

10. Calibration of the sensor, setting of the high and low values of 4 - 20mA, and setting of the switch position

10.1 Calibrate the sensor

The sensor may give inaccurate measurements due to environmental factors or a change in the measured medium. In such cases, calibration is required. (This issue can also be resolved through remote services. You may need to cooperate by performing some actions. Alternatively, you can provide the medium and we will calibrate it for you.)

First, install the sensor in the desired location and empty the measured medium so that it does not come into contact with the probe rod. Send the following commands via the serial port:

Step 1 (Query the process):

Send: 01 03 00 AE 00 01 CRC check code

Reply: 01 03 02 03 00 CRC check code

Note: (Write down the marked "3". It could also be other numbers, which is related to the production process, usually 3.)

Step 2 (Calibrate the empty position):

Send: 01 06 00 AE 13 00 CRC check code

Reply: 01 06 00 AE 13 00 CRC check code

Step 3 (Calibrate the full position):

Fill the medium to the bottom of the installation thread to be considered full.

Send: 01 06 00 AE 23 00 CRC check code

Reply: 01 06 00 AE 23 00 CRC check code

Step 4 (Save the settings):

Send: 01 06 00 AE 03 00 CRC check code

Reply: 01 06 00 AE 03 00 CRC check code

After completing the fourth step, the sensor can be used normally.

10.2 Set the High and Low Levels of 4 - 20mA

First of all, it should be noted that when setting the 4 - 20mA, attention should be paid to the measurement range of the sensor. (We can calibrate it for you before shipment or through remote calibration)

Step 1 (Set the low level, assuming a setting of 100mm):

The sensor's liquid level unit is 0.1mm, so 100mm corresponds to 1000 sensor units. We convert 1000 into hexadecimal and get 3E8.

Send: 01 06 00 02 03 E8 CRC check code

Reply: 01 06 00 02 03 E8 CRC check code

Step 2 (Set the high level, assuming a setting of 500mm):

The sensor's liquid level unit is 0.1mm, so 500mm corresponds to 5000 sensor units. We convert 5000 into hexadecimal and get 1388.

Send: 01 06 00 05 13 88 CRC check code

Reply: 01 06 00 05 13 88 CRC check code

The high and low level settings are completed, and it can be used normally.

10.3 Switch Position Setting

Switch position setting (We can set it for you before shipment or through remote setting). The switch output type is set before shipment. If you need to modify it, remote setting is required.

Switch One Upper and Lower Limit Setting:

Step 1 (Set the lower limit, assuming a setting of 100mm):

The sensor's liquid level unit is 0.1mm, so 100mm corresponds to 1000 sensor units. We convert 1000 into hexadecimal and get 3E8.

Send: 01 06 00 02 03 E8 CRC check code

Reply: 01 06 00 02 03 E8 CRC check code

Step 2 (Set the upper limit, assuming a setting of 500mm):

The sensor's liquid level unit is 0.1mm, so 500mm corresponds to 5000 sensor units. We convert 5000 into hexadecimal and get 1388.

Send: 01 06 00 03 13 88 CRC check code

Reply: 01 06 00 03 13 88 CRC check code

Switch Two Upper and Lower Limit Setting:

Step 1 (Set the lower limit, assuming a setting of 100mm):

The sensor's liquid level unit is 0.1mm, so 100mm corresponds to 1000 sensor units. We convert 1000 into hexadecimal and get 3E8.

Send: 01 06 00 02 05 E8 CRC check code

Reply: 01 06 00 02 05 E8 CRC check code

Step 2 (Set the upper limit, assuming a setting of 500mm):

The sensor's liquid level unit is 0.1mm, so 500mm corresponds to 5000 sensor units. We convert 5000 into hexadecimal and get 1388.

Send: 01 06 00 06 13 88 CRC check code

Reply: 01 06 00 06 13 88 CRC check code

11. Fault Diagnosis and Handling

11.1 First, conduct the following basic checks:

1. Check the wiring to ensure it is correct.
2. Check the power supply to ensure the supply voltage is correct.
3. Check whether the cable is tightly connected.
4. Check whether the computer serial port or the communication conversion module is faulty.

11.2 Further Checks

If there are no problems with all of the above, but the sensor still fails to work properly:

1. Check the current passing through the sensor to see if it is within the normal operating current range of the sensor.
2. Check whether the communication port of the upper computer is normal and confirm that the communication signal line is not reversed.
3. Check whether the software configuration of the upper computer is normal, including whether the protocol, port, check code, baud rate, sensor address, and sent instructions are correct.

During this process, you can seek our help, and we will assist you in using the sensor correctly. If there are still no problems with the above and the sensor remains faulty, the sensor may need to be returned to the factory for repair.

12. Notes:

1. Check whether there are problems such as breakage, compression, or water ingress in the packaging. If there is a problem, please contact the salesperson in time.
2. Check whether the sensor and its accessories have visible damage. If there is a problem, please contact the salesperson in time.
3. When wiring, you need to confirm whether the power supply voltage is within the required voltage range of the sensor, and confirm the wire sequence before wiring. If you are unsure about the wiring, please take a clear photo of the wiring and send it to us.
4. Once you confirm that there are no problems with the above steps, you can supply power, and the sensor will work normally.