

KUS-M56 series ultrasonic sensor

1. Introduction

The Ultrasonic sensor uses sound waves to do non-contact and wear-free detection on target subjects. It can be used to detect either transparent or colored objects, metal objects or non-metallic objects, as well as solid, liquid or powdered substance. Ambient conditions such as environmental smoke, dust, environment or rain have very small affect on the detection performance of ultrasonic sensors.

2. Ultrasonic Ranging principle

Transmitting ultrasonic transducer emits ultrasonic pulses propagated to the measured media through communication media, through reflection and then return to the receiving transducer through the acoustic medium, the measured ultrasonic pulse propagates from the transmitter to the receiver in the acoustic medium of time. Then according to the speed of sound in the acoustic medium, it can be considered from the transducer to the media surface distance. To determine the liquid level. Therefore, we can calculate the distance from the probe to the reflecting surface $D = C * t / 2$ (divided by 2 is because the sound waves from the transmitter to the receiver is actually a round, D is the distance, C is the speed of sound, t is the time).

3. Product Features

High resolution
Short response time
Digital tube display measuring distance
Various springs available: switch, analog, or RS232/485

4. The Main Technical Index

Range	0.1~0.5m、0.15~1m、0.3~3m、0.4~5m、0.5~6m
Resolution	3mm or 0.1% (which is bigger)
Response time	< 200ms
Display	LED
Emission angle	20°
Analog output	4~20mA/500Ω LOADING
Switch output	PNP/NPN (optional)
RS232/485	MODBUS protocol or customized protocol (optional)
Power supply	Standard 24VDC (±15%)
Ambient temperature	-20~+60℃
Protection Class	IP65 (IP66 is optional)
Installation	M56*2

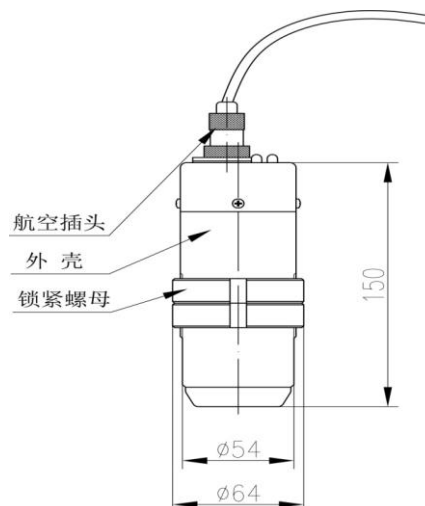
Note: Only one output can be chose among the three kinds of outputs.

5. Installation Guide

5.1 Installation Notes:

- (1) ultrasonic sensor installation emission surface should be perpendicular to the object to be tested
- (2) the power cord and output don't pick up the signal lines

5.2 Ultrasonic sensor installation dimensions:



5.3 The real installation

①fix a flange over the object to be tested



②put a gasket with same inner diameter on the flange



③point the sensor to the flange hole



④put the sensor into the flange hole



⑤view from bottom of the flange



⑥put a gasket with same inner diameter under the flange



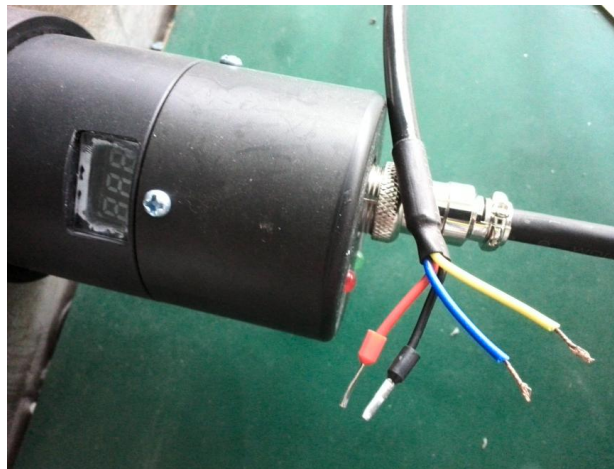
⑦Screw the nut to fix the sensor



⑧Plug cable to the sensor



5.4 Connection



Power supply:	Red line:	24VDC+	Black line:	24VDC-
1、4~20mA:	Blue Line:	mA +	Yellow Line:	mA-
2、0~5V:	Blue Line:	V +	Yellow Line:	V-
3、485/232:	Yellow Line:	T/R+	Blue Line:	T/R-
4、Relay signal:	Blue Line		Yellow Line	
5、NPN signal:	Blue Line:	NPN+	Yellow Line:	NPN -
6、PNP signal:	Blue Line:	PNP+	Yellow Line:	PNP-

Note: 1, Please choose one output signal from selection (1-6);

2, The black wire need to be grounded reliably;

3, when the sensor is mA module, the yellow line (mA-) also can be grounded.

6. Signal Description

When power-up at first, power indicator "green light" keeps light. When search echo signal, status indicators "red light" flashes, when search to the correct echo, status indicators "red light" stays on. When measure distance normally, digital display shows actual measured values; when the wave is lost, digital display "- - -."

7. Serial assistant modify parameters

Note: This article shows only for the distance sensor with 485 or 232 communication module.

7.1 Serial Connection:



A



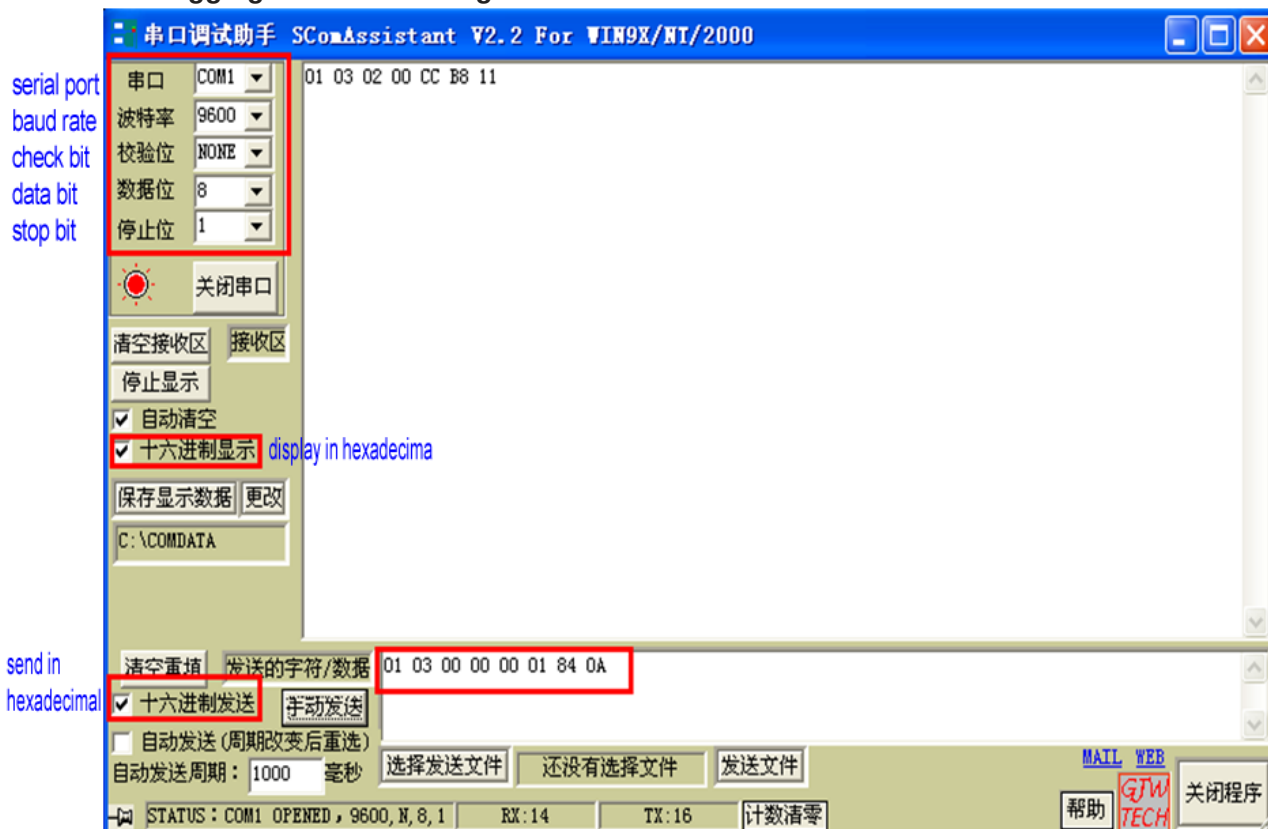
B

Figure A: Serial one end connected to the computer's serial port to do, the other end connected to RS-232 terminal 485 to 232;

7.2 Cable Connection:

Figure B: red wire 24V +; black pick 24V-; yellow line then 485 T / R +; blue line then 485 T / R -;

7.3 Serial debugging assistant settings



Baud Rate selection: 9600;

Check bit selection: **NONE**

Data bits selection: **8**

Stop bit selection: **1**

Select hexadecimal and hexadecimal display sent

7.4 modify the parameters of instruction

Note: The instructions detail view " KUS-M56 Ultrasonic Sensor MODBUS Communication Protocol_v1.7"

8. LCD screen operation menu

Note: The LCD screen is optional.

8.1 screen installation

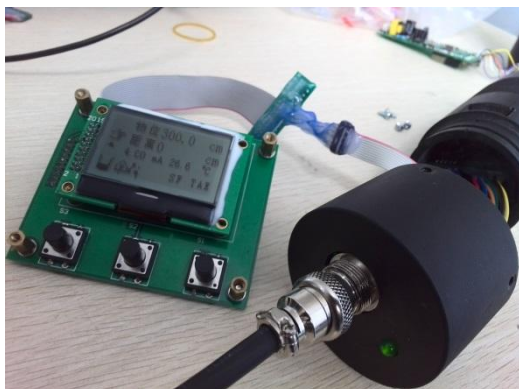
1. Use a screwdriver to unscrew



2. Connect the LCD interface (red side inwards)



3. Connect cable



4. Power on



8.2 Instruction for push-buttons on LCD operator

There are three buttons on the panel, the instrument can be debugged by these three buttons. The LCD screen will display the measured values after debugging.



键

- ◇Access the menu item
- ◇Confirm the menu item
- ◇Confirm parameter modification



键

- ◇Move the cursor
- ◇Select the menu item
- ◇Parameter modification

8.3 Introduction of the operating mode interface

This series of ultrasonic distance sensor has two modes of operation and setup, after the device is powered on and complete the initialization process, sensor will automatically enter Run mode and start

measuring data. In this case it is in distance measurement mode, and output corresponding 4 ~ 20mA value. Current output is in proportional to the measured level.

Ultrasonic sensor operation mode interface is as follows:



8.4 Introduction of menu settings

① Press "Set" to enter one-level menu interface:

② one-level menu instruction:

◆ "0 End the Settings"

When you select this option, if press "Set", will return to the operating mode interface.

◆ "1 Parameter lock"

Menu locked, when you set up the parameters, you do not want others to tamper with, the menu lock, so we must enter a password to unlock the menu. The level meter initial password is 25, the user can modify the initial password arbitrarily set your own password (please remember the password remind yourself set, should forget should contact the manufacturer).

Description:

Unlocked: not locked, it will all menus can be freely modified.

Global Lock: After the Global Lock, you must enter a password to modify.

★When the parameter is locked, press the Set button to enter the unlock interface.

◆ "2 Range settings"

Set the reference zero point high range, low range, display units.

Reference Zero: Set distance sensor reference zero, this is mainly level measurement when it makes sense; factory set default maximum range.

Range lows: Set distance sensor output 4mA corresponding measured values; factory set default is 0.

High Range Point: Set distance sensor 20mA output corresponding measurement set; factory-set default for the maximum range.

Display units: There are m, cm, mm three units can be selected, m: meters display, cm: centimeters display, mm: millimeters shows the default factory settings for m.

◆ "3 Measurement mode"

Mode Selection: distance measurement and level measurement two to choose from. Distance measurements: the horizontal distance measured value display to probe; level measurement: Show

value of zero to the reference surface of the distance that the liquid level. The factory default setting is level measurement.

Response time: There slow, medium, fast three to choose from. Slow: Slow response rate, high accuracy, is not susceptible to interference; speed: between slow and fast; Fast: response rate, the measurement accuracy is low, susceptible to interference. The factory set default speed.

Safety level: holding, minimum, maximum, setting four to choose from. Hold: throw wave after the system displays the value last measured value, the corresponding current value; Minimum: throw wave after the display system is 4mA, current is 4mA; Max: throw wave after the display system is 20mA, current of 20mA ; setting: throw wave after the system displays the value last measured value, the current output is set current settings. The factory default setting is maintained.

Setting Current: Set throw wave after the specified output current greater than 3.6mA, less than 22mA, and then choose to keep / Max / Min invalid. The factory default setting is 3.6mA.

◆"4 **Probe Set" (Do not modify this parameter)**

Select the probe and set the relevant parameters.

Probe selection: There are a total of nine can choose to 9. Select the probe according to the label on the factory set default is 5.

Blind setting: Set the probe proximal blind, factory set default is 0.30.

◆"5 **Algorithm selection" (Do not modify this parameter)**

Algorithm Selection: There is a special environment, a special environment two, three special circumstances, special circumstances four, five special circumstances, special circumstances six, seven special circumstances, a total of seven to choose from. The factory default setting for special environments seven.

◆"6 **Alarm Settings" to set the alarm relay.**

Alarm 1 Mode: off, low alarm, high alarm three to choose from. OFF: Relay 1 does not act; Low alarm: relay a low alarm; high alarm: relay a high level alarm. The factory setting is off by default.

Alarm 1 Value: in meters, the factory set default is 0.

Alarm 1 hysteresis: in meters, reset the alarm after alarm is triggered need to measure the value to the alarm value + hysteresis only valid alarm. The factory setting defaults to 0.

◆"7 **Parameter correction" (Do not modify this parameter)**

Make span calibration, sound velocity correction, the current output calibration, the reference level correction operation.

Range Correction: Enter the actual value, the system automatically span calibration. The factory set default values for the measurement.

Sound Velocity Correction: Enter the actual value, the system automatically correcting speed of sound, using the occasion instead of air. For example: In many occasions volatile gases gasoline, acetone, alcohol, etc., the sound propagation velocity in these gases are not the same, needs to be corrected.

4mA correction: Modify the value until the actual output current of 4mA so far. The factory default setting is 3100.

20mA correction: Modify the value until the actual output current of 20mA so far. The factory default setting is 7200.

Reference Level: Enter the appropriate voltage test points measured. The factory default setting is 5.00.

◆"8 **Communication Settings"**

Mailing address: Select the communication address, the default value is 1.

Baud Rate: Select the communication frequency, there 2400,4800,9600,19200 optional, default is 9600.

Work: communication mode is selected, the "automatic reporting", "query", the default is "Automatic reporting."

◆"9 Reset Select"

Factory Reset: Yes: to restore to factory settings just state. Setting the wrong problem can be solved.
No: exit. No default factory settings.

System reset: Yes: Restore system settings. No: exit. No default factory settings. (Please do not modify this one)

9. Error phenomenon and processing

phenomenon	reason	solution
Power light green light is not bright	Power is not connected	Check the power cord
Status indicator light flashing red	1.tested distance beyond the sensor range	1.Consider replacement of sensors in a wide range
	2.measured medium with Strong disturbance, severe vibration or dust	2.when measured medium restore calm, device will automatically return to normal measurement
	3.With frequency converter, motor and other strong interference sources	3.Check the surrounding environment, good electromagnetic shielding. Do not share the same with frequency converter, motor power, and ensure the power supply reliable grounding
	4.The probe measured plane misalignment	4.Reinstall the sensors, perpendicular to the surface to be tested
	5.Space with extra object to be tested, such as feed opening support bar, and so on	5.To choose the appropriate installation position, try to avoid distractions
	6.Interface of measured object was in blind area	6.Raise the sensor installation location
	7.measured medium is the loose powder, or liquid level with foam.	7.Remove bubbles, if it is powder producers to counseling