Product Manual

Ultrasonic Sensor

Model · US150

Product version · V1.0



1. Product Overview

US150 is an ultrasonic obstacle avoidance sensor designed for automatic control applications. This product features a small blind zone, small measurement angle, fast response time, high installation adaptability, dust and water resistance, long service life, and high reliability.

2. Functional Features

- Adjustable measurement distance: Supports custom settings for the detection range of the switch output.
- Temperature compensation: Built-in temperature compensation function ensures measurement accuracy.
- Narrow beam angle: Emission angle is less than 8 degrees, providing better directivity.
- Small blind zone: The blind zone distance is only 15cm.
- LED status indication: Supports green/blue dual-color LED indication for working and learning status.

3. Application Scenarios

1. Robot obstacle avoidance and automatic control: Used for front obstacle detection for mobile robots and AGV carts.

2. Industrial control and security: Used for object approach and presence detection on automated assembly lines, or area security monitoring.

3. Parking management systems: Used for parking space guidance and vehicle presence detection.

4. Artificial Intelligence and Teaching & Research: Suitable for high-precision ranging experiments, automated teaching, and AI application development.

4. Structural Interface

* (Note: The original document does not provide clear structural dimension parameters; this chapter is not expanded for now.) *

5. Technical Parameters

Parameter Item	Specification Description
Operating Voltage	DC12-30V

Dimensions	Diameter 16mm, Length 72mm
Weight	Approx. 40 grams (net weight)
No-load Current	Less than 35mA
Rated Power	100mA
Detection Distance	15-150cm
Blind Zone Distance	15cm
Response Time	100ms
Operating Frequency	Approx. 40kHz
Emission Angle	Less than 8 degrees
Characteristic Curve Deviation	±1% of full scale value
Repeatability	±1% of full scale value
Temperature Drift	±1.5% of full scale value
Operating Temperature	-25~70℃
Storage Temperature	-40~85℃
Ingress Protection Rating	IP66
Resolution	1mm
Compliance Standard	IEC/EN 60947-5-2
Housing Material	ABS

6. Installation and Wiring

This sensor is available in multiple output models. Please select the corresponding wiring method based on the actual device interface. The red wire is uniformly connected to the positive terminal (VCC), and the black wire is uniformly connected to the negative terminal (GND).

- NPN output type:
- Green wire: OUT (signal line)
- White wire: teach (distance setting line)

- PNP output type:
- Green wire: OUT (signal line)
- White wire: teach (distance setting line)
- RS485 (Modbus) type:
- Green wire: RS485-B
- White wire: RS485-A

7. Configuration and Usage

7.1 LED Indicator Status Description

- Green light steady: Object is within the detection range.
- Green light flashing: Target object not detected.
- Blue light steady: TEACH-IN state learning successful.
- Blue light flashing: Target object not detected in TEACH-IN state.

7.2 Setting Detection Range (TEACH-IN)

Short the white wire (teach/distance setting wire) to the power negative terminal, maintaining the connection for at least 5 seconds. During this process, the blue LED indicator stays steady, indicating successful learning.

Note: During normal use, the white wire must be left floating; it must not be connected to a high level or a low level.

7.3 Restore Factory Settings

1. After powering on, place the sensor in an open area so that it cannot detect any object; at this time, the indicator light is in a green flashing state.

2. Short the white wire (teach) to the power negative terminal.

3. Observe the indicator light changing to blue flashing, then release the white wire; the factory settings restoration is complete.

8. Communication Protocol

The RS485 interface of this product uses the standard Modbus-RTU protocol, with a communication format of 115200, n, 8, 1. The sensor defaults to slave mode with an address of 0x01.

8.1 Data Frame Structure

Address Code	Function Code	Data Area	CRC Check

1 Byte	1 Byte	N Bytes	2 Bytes (Little-endian mode)

CRC check range: Address Code + Function Code + Data Area.

8.2 Supported Function Codes

- 0x03: Read specified information from the slave.
- 0x06: Write to a specified location on the slave.

8.3 Register Address Configuration Table

Register Address	Read/Write Attribute	Function Description
0x0010	Read	Read current measured distance
0x0015	Read/Write	Slave address. Default 0x01, unknown devices can use 0xFF instead. Settable range 0x0001-0x00FE

8.4 Protocol Examples

Reading distance value:

- Send command: 01 03 00 10 00 01 85 CF (Read distance value of device at address 0x01)
- Receive response: 01 03 02 01 12 39 D9
- Parsing: Data length is 0x02, data is 0x01, 0x12, combined as 0x0112, converted to decimal is 274, meaning the measured distance value is 274mm.

8.5 Common Operation Command Table

Operation Function	Send Command (Hex)	Remarks
Change address 0x01 to 0x02	01 06 00 15 00 02 19 CF	Modify device address
Read distance of machine at address 0x02	02 03 00 10 00 01 85 FC	Read distance
Change address 0x02 to 0x01	02 06 00 15 00 01 59 FD	Modify device address
Change unknown address machine to 0x01	FF 06 00 15 00 01 4C 10	Applicable when current address is unknown

9. Application Conditions and Limitations

- Please use and store within the temperature range specified in the technical parameters (-25~70℃).
- The sensor has a 15cm physical blind zone; targets within the blind zone cannot be effectively detected.
- The white wire (teach end) must be left floating during normal operation. It is strictly prohibited to connect it to a high or low level.

10. Packing List

- Ultrasonic Sensor x1