# [URM08-RS485 Ultrasound Ranging Sensor]

Introduction

With an internal temperature compensation and accurate distance detection, URM08-RS485 is a combination of temperature measurement device and distance inspection tool. The inner is fully enclosed and the external is made of metal crust, which has brought advantages such as waterproof, dustproof and corrosion resistance… It is applicable to detections of liquid level, levels, and barrier applications. As a high standard sensor, it guarantees smaller blind zone and larger inspection range. On the premise of stable output data, it shows better measurement capabilities in the market of temperature sensors and distance detection sensors.

Specification

- Operating Voltage: DC 6.0 ~ 12.0V
- Effective Range: 35 ~ 550 cm
- Direction Angle: 60 °
- Standby Current: 10 mA
- Peak Current: 250 mA
- Distance Resolution: 1cm
- Temperature Resolution: 0.1°C
- Operating Temperature Range: -10 ~ 70 ℃
- Temperature Error: ± 1 ℃
- Distance Error: ±1%
- Operating Humidity Range: RH<75%
- Acoustic Frequency: 38 ~ 42KHz
- Measurement Period: 70ms
- Protection Degree: IP65
- Length of Pin: 30±3cm
- Interface: 5557-2x2P male head
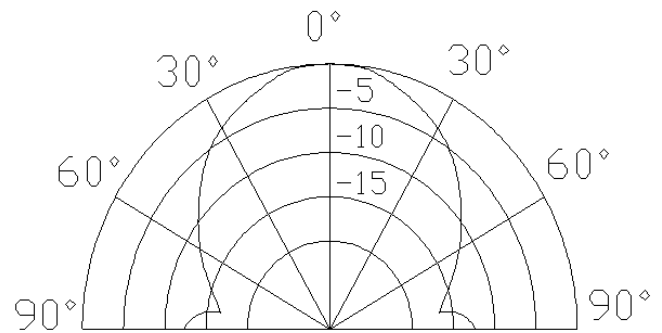
Directivity in sound pressure level

Interfaces and Dimension
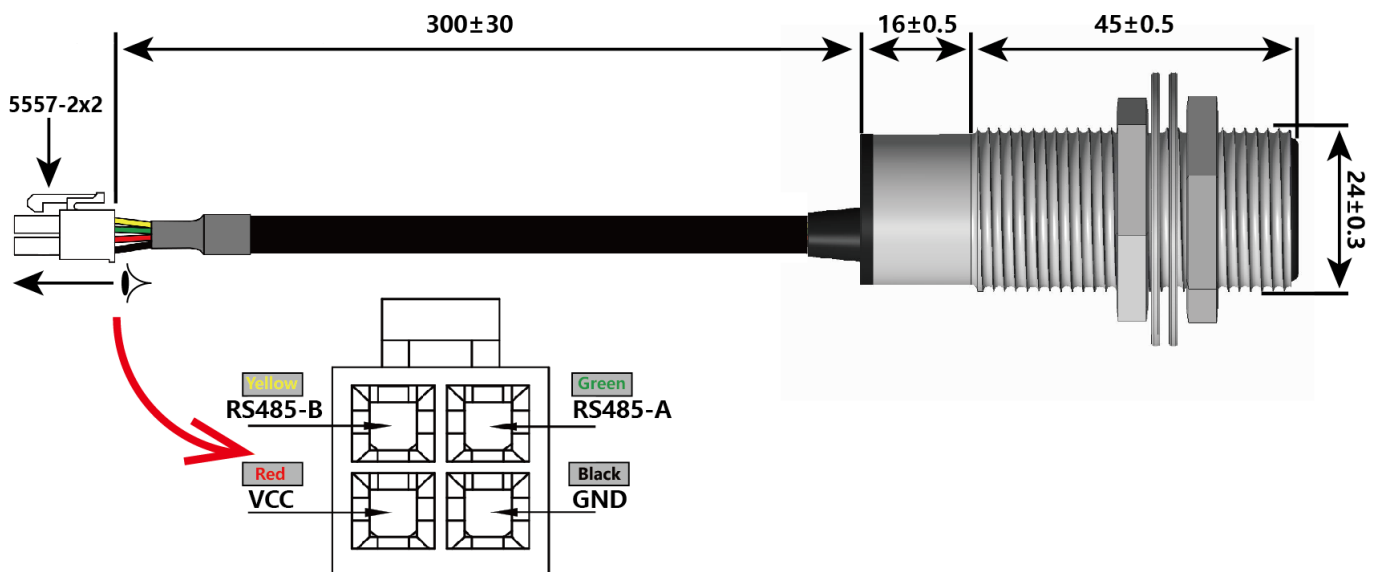
Communication Protocol

Factory Parameters:

Serial Parameters: 19200 (bps) 8N1

Factory Address: 0x11

Communication Command Frame Format

Header		Address	Data Length	Command	Data	Checksum
0x55	0xAA	1 byte	1 byte	1 byte	Data 1~Data n	1 byte

Commands List

Read distance	Read temperature	Set address	Set baud rate
0x02	0x03	0x55	0x08

Description: Checksum is the amount value of previous bytes. It only keeps low 8 bytes.

Read the Distance 0x02

The host sends a frame command to the ultrasonic module through the UART interface to trigger the module to start detection, and then the sensor sends back the distance data after the detection.

E.g. the address of the ultrasonic module is **0x11**, then the host sends: **0x55 0xAA 0x11 0x00 0x02 0x12 [55 AA 11 00 02 12]**

Description:

Frame header ---------------------- 0x55

Frame header ---------------------- 0xAA

Device address --------------------- 0x11

Data length ------------------------ 0x00

Command --------------------------- 0x02

Checksum --------------------------- 0x12

The ultrasonic module returns data: **0x55 0xAA 0x11 0x02 0x02 0x00 0xCA 0xDE**

Description:

Frame header ---------------------- 0x55

Frame header ---------------------- 0xAA

Device address -----------------------0x11

Data length ------------------------ 0x02

Command --------------------------- 0x02

Distance high -----------------------0x00

Distance low ------------------------0xCA (0x00 0xCA convert to decimal system is 202, which represent the detected distance is 202cm)

Checksum -------------------------- 0xDE

Read the Temperature 0x03

The host reads the current temperature measured by the ultrasonic module via the RS485 interface.

E.g. the ultrasonic module address is **0x11**, the host sends: **0x55 0xAA 0x11 0x00 0x03 0x13 [55 AA 11 00 03 13]**

Description:

Frame header ---------------------- 0x55

Frame header ---------------------- 0xAA

Device address --------------------- 0x11

Data length ------------------------ 0x00

Command -------------------------- 0x03

Checksum -------------------------- 0x13

The ultrasonic module returns data: **0x55 0xAA 0x11 0x02 0x03 0x00 0xFF 0x14**

Description:

Frame header ---------------------- 0x55

Frame header ---------------------- 0xAA

Device address -----------------------0x11

Data length ------------------------ 0x02

Command -------------------------- 0x03

Temperature high -----------------0x00

Temperature low ------------------0xFF (temperature value 0x000FF converts to decimal system is 255, resolution 0.1℃，the   real temperature value is 25.5℃)

Checksum -------------------------- 0x14

Set the Device Address 0x55

The host sets the ultrasonic module address via the RS485 interface.

E.g. set the ultrasonic module address **0x12** (the address range is 0x00-0xFF, except 0xAB which is just a broadcast address and could not be set as a device address), then the host sends: **0x55 0xAA 0xAB 0x01 0x55 0x12 0x12 [55 AA AB 01 55 12 12]**

Description:

Frame header ---------------------- 0x55

Frame header ---------------------- 0xAA

Broadcast address ---------------- 0xAB

Data length ------------------------ 0x01

Command -------------------------- 0x55

Device address to set ------------0x12

Checksum -------------------------- 0x12

If you set it successfully, the ultrasonic module returns command **0x55 0xAA 0x12 0x01 0x55 0xCC 0x33**, the device address changed to **0x12** now.

Description:

Frame header ---------------------- 0x55

Frame header ---------------------- 0xAA

Device address ---------------------0x12 (modified device address)

Data length ------------------------ 0x01

Command -------------------------- 0x55

Operation status ------------------0xCC (0xCC - operation completed, 0xEE - operation failed)

Checksum --------------------------- 0x33

Set the UART Communication Baud Rate 0x08

1200bps	2400 bps	4800 bps	9600 bps	14400 bps	19200 bps	28800 bps	38400 bps	57600 bps	115200 bps	128000 bps	256000 bps
0x00	0x01	0x02	0x03	0x04	0x05	0x06	0x07	0x08	0x09	0x0A	0x0B

Baud Rate Selection List

The host sets the ultrasonic module address via the RS485 interface.

E.g. if the address of the ultrasonic module is set to **0x11**, and the baud rate is set to **256000bps**,

the host sends: **0x55 0xAA 0x11 0x01 0x08 0x0B 0x24 [55 AA 11 01 08 0B 24]**

Description:

Frame header ---------------------- 0x55

Frame header ---------------------- 0xAA

Broadcast address -------------------0x11

Data length ------------------------- 0x01

Command --------------------------- 0x08

Baud rate selection --------------- 0x0B (Corresponding baud rate is 256000bps)

Checksum --------------------------- 0x24 (amount value of previous bytes)

If the setting is successful, the ultrasonic module returns the command: **0x55 0xAA 0x11 0x01 0x08 0xCC 0xE5**

Description:

Frame header ---------------------- 0x55

Frame header ---------------------- 0xAA

Device address ---------------------0x11

Data length ------------------------- 0x01

Command --------------------------- 0x08

Operation status -------------------0xCC (0xCC - operation completed, 0xEE - operation failed)

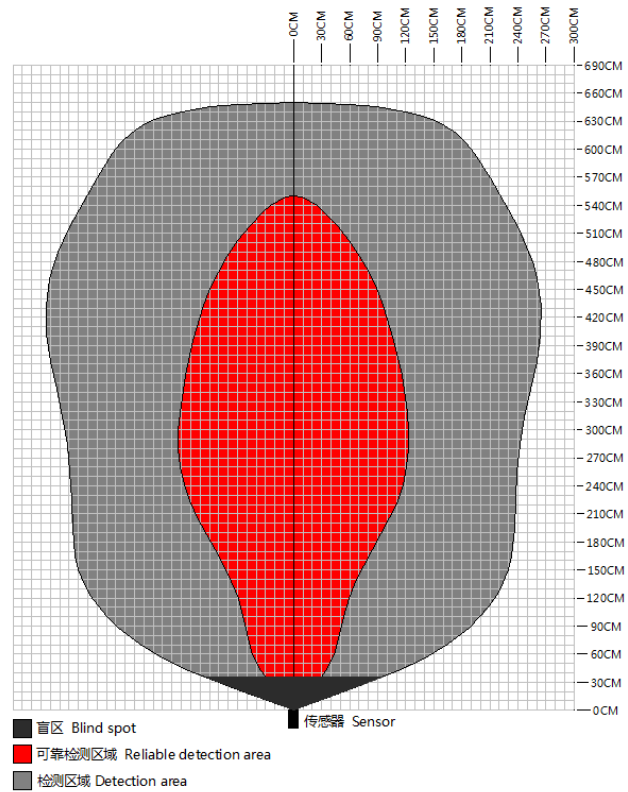*Checksum --------------------------- 0xE5 (amount value of previous bytes)*

Communication Protocol

The physics features of the ultrasound sensor lead to irregular detection zone. We have checked its detection zone on this kind of sensors with 2 example obstacles separately, the result as below:
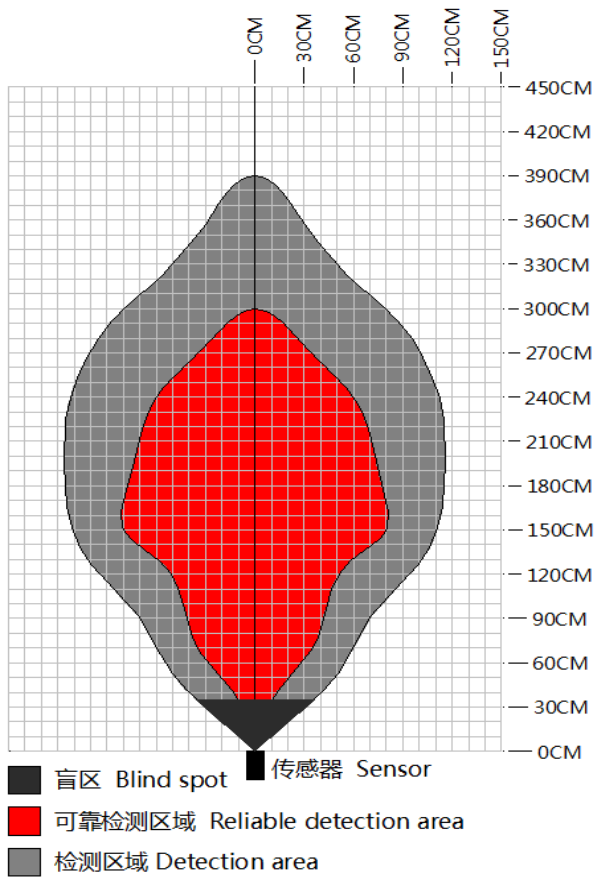
Example Obstacle A: PVC tube (D=7.5cm)

Example Obstacle B: Smooth Platform Obstacle