

# CRY2112 I /CRY2110 II Noise Sensor

User Manual V3.0

## Overview

CRY2112/2110 sensor is an industrial-grade remote sound level meter, comply with IEC61672-1/2 and GB/T3785-1/2. Measured sound pressure level data can be output in RS485 digital signal and 4-20 mA analog signal, transmission distance is greater than 1 km, easy to connect to PC, PLC and all kinds of digital module.

CRY2112/2110 has small appearance with stainless steel shell, built-in high sensitive acoustic sensor (measurement microphone), preamplifier, data acquisition module, DSP processor; It has Excellent performance, 110 dB dynamic range and low noise measurement to 25dBA.

The series of products has been widely used in machinery and equipment, industrial enterprises, construction, road construction site and social living environment noise testing, monitoring and evaluation.

## Features

- Comply with IEC61672-1/2 and GB/T3785-1/2, comply with GB 3096-2008 《Environment quality standard for noise》
- 4-20mA current loop and RS-485 output, transmission distance exceeds 1km
- Easy connect to PC, PLC, DCS and other controllers
- Dynamic range up to 110dB, low noise measurement to 25dBA
- Small size with 25mm diameter and 115mm length
- Wide range power supply from DC 5V to 24V
- Stainless steel shell, robust in harsh environments



## Typical Application

- System Integration Noise
- Construction Noise
- Production Noise
- Transportation Noise

## Technical Parameters

Product Model	CRY2112	CRY2110
Applicable standards	IEC61672 Class 1 GB/T3785 Type 1	IEC61672 Class 2 GB/T3785 Type 2
Measurement Range	25~130dBA with CRY331/CRY333 microphone (Default) 20~130dBA with CRY311 microphone 25~140dBA with CRY371 microphone	
Dynamic Range	≥ 110 dB, no range selection needed	
AD Sampling rate	48kHz	
Detection Method	Digital	
Background Noise	19dB(A), 20dB(C), 23dB(Z)	22dB(A), 23dB(C), 24dB(Z)
Frequency Range	10Hz~20kHz	
Frequency Weighting	A(default) / C / Z	
Time Weighting	F (default) / S	
Measurement Function	L <sub>p</sub> (RS485 output, Voltage or Current output) L <sub>eq</sub> (RS485 output, Integration time can be customized)	
SPL Output	RS-485; 4-20mA(default)/DC 1-5V/DC2-10V (Choose one in three)	
Power Supply	DC 5-24V	
Dimensions	φ24.5mm×115mm	
Weight	115g	
Temp Range	-20 ~ +50 °C; Relative Humidity ≤ 80%	
Shell Material	Stainless steel, robust in harsh environments	

## RS485 Instruction

### 1. RS485 Connection Guide

Please refer to the below connection method to use the RS485 bus to connect the noise sensor, it can connect to the host computer, PLC and SCM. A host can connect to multiple sensor noise at the same time (128 or more).

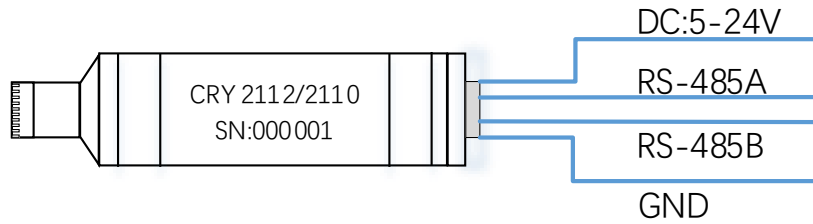


Fig.1 RS485 Connection Method

### 2. RS485 Communication Protocol

CRY2110 noise sensor's RS-485 bus uses half-duplex communication. At any time only one controller or sensor can send data.

#### 【Basic Setting】

- Baud Rate: 9600
- Word Length: 8
- Stop Bits: 1
- Check digital: None

#### 【Communications Steps】

1. Master (e.g. PC) send code to slave (Noise Sensor), including slave address and function code.
2. Slave receive code, check the address, according to the function code to send a response; if the address is wrong, slave stay silent.
3. Master receive response and repeat step1, send an instruction to the slave at next address.

#### 【Code Structure】

Protocol: 8-bit address + 8-bit function code + 8-bit data (Only needed when set the Noise Sensor's address)

Function Code	0x01	Set A weighting (default)	0x05	Set S Time weighting
	0x02	Set C weighting	0x06	Set sensor address
	0x03	Set Z weighting	0x07	Read SPL
	0x04	Set F Time weighting(default)	0x08	Read sensor address

**【Samples】**

**e.g.1: Use broadcast address 0xFF and function code 0x07 to read SPL**

Master send: 0xFF 0x07

Slave response: 0x21 0x30 0x37 0x32 0x2E 0x31 0x24

Response data analysis: 0x21 is frame header, 0x30 0x37 0x32 0x2E 0x31 is SPL data '072.1' in ASCII mode (unit: dB) , 0x24 is frame tail.

**e.g.2: Use sensor address 0x01 and function code 0x07 to read SPL**

Master send: 0x01 0x07

Slave response: 0x21 0x30 0x37 0x31 0x2E 0x39 0x24

Response data analysis: 0x21 is frame header, 0x30 0x37 0x31 0x2E 0x39 is SPL data '071.9' in ASCII mode (unit: dB) , 0x24 is frame tail.

**e.g.3: Set noise sensor use C weighting**

Master send: 0x01 0x02

Slave do not response

**e.g.4: Use broadcast address 0xFF set noise sensor's address**

Master send: 0xFF 0x06 0x02

Slave do not response

3. Single channel USB-RS485 adapter (with power supply)

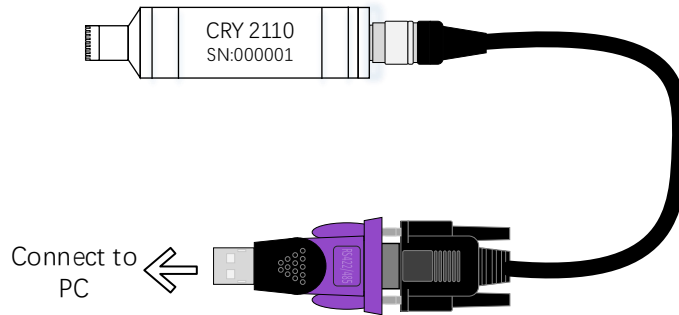


Fig.2 3. Single channel USB-RS485 adapter cable

One side of the cable connect to noise sensor, the other side use the port of USB-RS-485 adapter to connect to PC. Use serial port send instruction to read SPL from noise sensor.

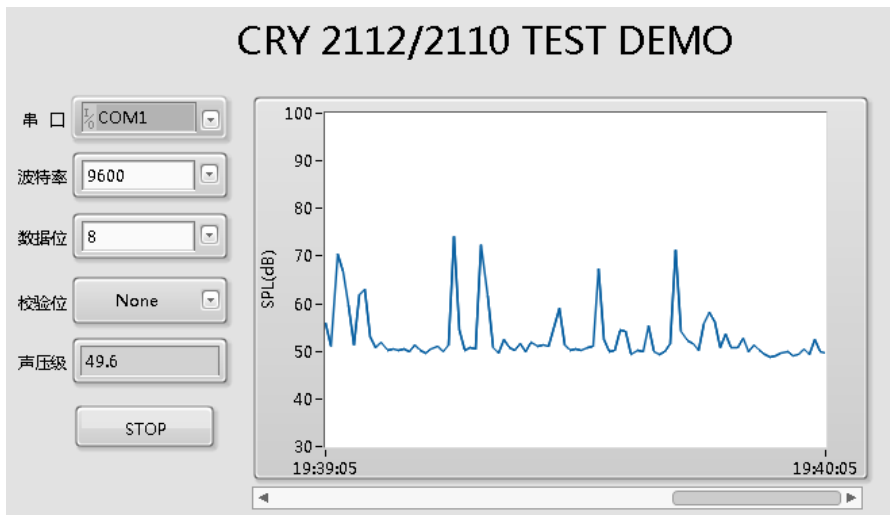


Fig.3 Serial port communicate with CRY2110

4. CRY208 8-channel distributor of noise sensor (selective purchase)

CRY208 8-channel distributor of noise sensor has a master port to connect to PC, 8 slave ports to connect to noise sensor or other CRY208, PC can communicate to all connected noise sensors.

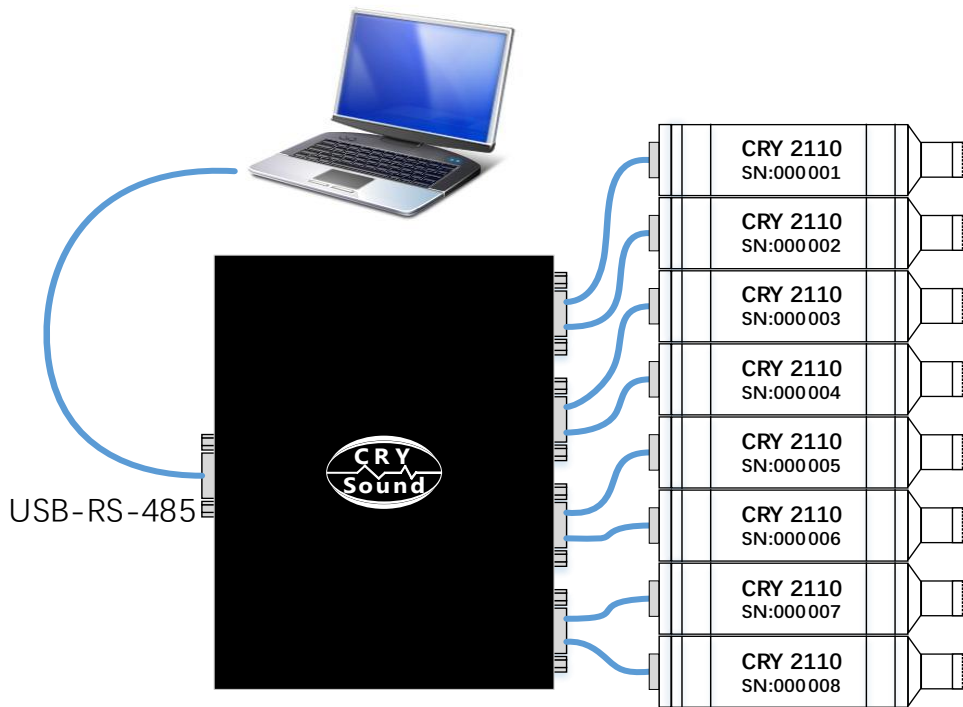


Fig.4 Working diagram of noise sensor 8 channel distributor

## 4-20mA Output Instruction

### 1. 4-20mA Connection Guide

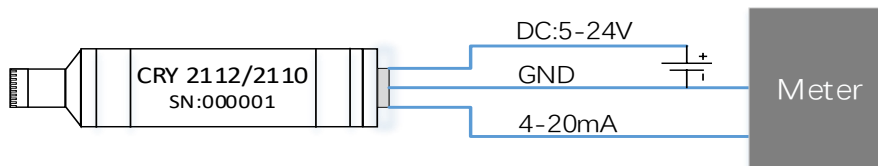


Fig.5 4-20mA Connection Diagram

CRY2110 applies 3-wire 4-20mA current loop output. Only 3 wires (power supply, ground and 4-20mA signal) are used to transmit sound pressure level signal.

### 2. Calculate Sound Pressure Level (SPL) from Current

The measurement range of noise sensor is 20dB to 140dB. The output current range is 4mA to 20mA, the formula to calculate sound pressure level (SPL) from current is:

$$\text{SPL(dB)} = (I - 4\text{mA}) \times 7.5\text{dB/mA} + 20\text{dB}$$

In above formula, I(mA) is the measured current.

Current(mA)	SPL(dBSPL)	Current(mA)	SPL(dBSPL)
4	20	13	87.5
5	27.5	14	95
6	35	15	102.5
7	42.5	16	110
8	50	17	117.5
9	57.5	18	125
10	65	19	132.5
11	72.5	20	140
12	80		

### DC Voltage output connection Guide(selective purchase)

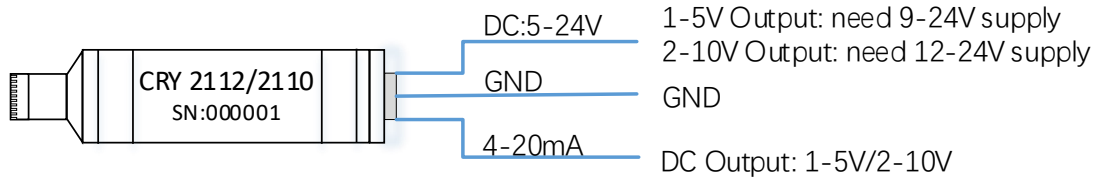


Fig. 6 4-20mA Connection Diagram

Users can customized DC voltage output, there are 1-5V and 2-10V two specifications. Sound pressure level of noise sensor output range of 20-140 dB, the corresponding voltage range

$$\text{SPL(dB)} = (U - 1V) \times 30\text{dB/V} + 20\text{dB} \quad (1-5V)$$

$$\text{SPL(dB)} = (U - 2V) \times 15\text{dB/V} + 20\text{dB} \quad (2-10V)$$

In above formula, U(V) is the measured voltage.

Voltage 1-5V	Voltage 2-10V	SPL(dBSPL)
1.0	2.0	20.0
1.5	3.0	35.0
2.0	4.0	50.0
2.5	5.0	65.0
3.0	6.0	80.0
3.5	7.0	95.0
4.0	8.0	110.0
4.5	9.0	125.0
5.0	10.0	140.0

## Calibration

- (1) Use sound calibrator CRY5611(1kHz, 94dB);
- (2) Connect the noise sensor correctly;
- (3) Open sound calibrator and insert noise sensor into it.
- (4) Press the calibration button at the end of noise sensor for one or two seconds, and the LED behind the button will start to blink, which means calibration starts.
- (5) If the rear LED blinks quicker than the start time, it means calibration failed. Please keep all the things steady and try again. If the rear LED does not blink quickly, it means calibration is successful.
- (6) Operation steps show below:

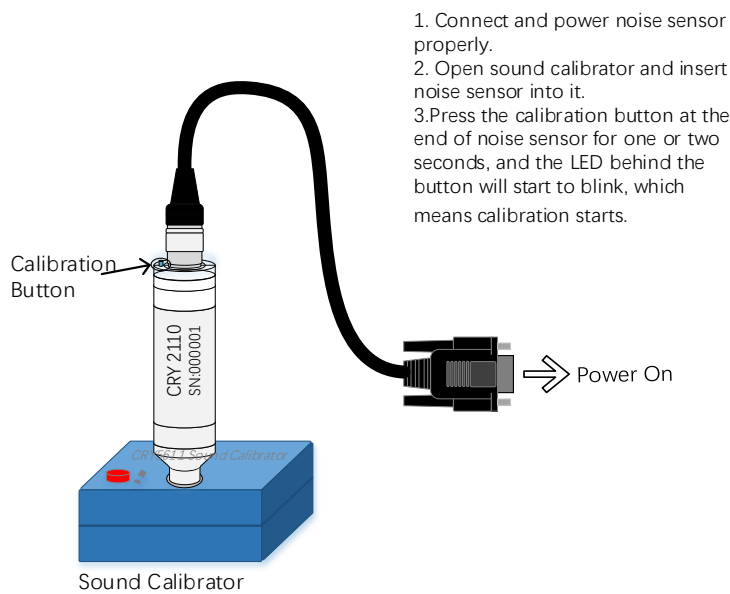


Fig.7 Sensor calibration

## Port Definition

The following figure is the definition of noise sensor's rear ports.

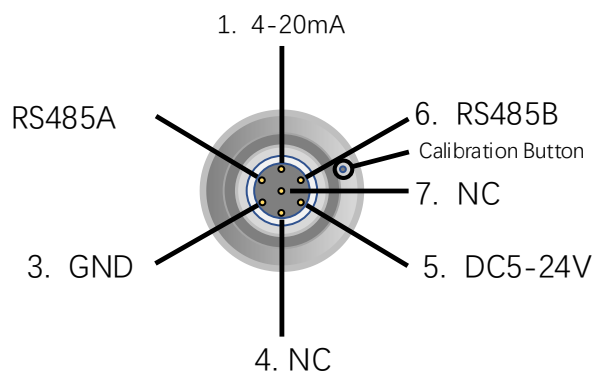


Fig. 8 The definition of noise sensor's rear ports



For ease of use, the other side of the cable has been connected to DB9 port. The DB9 port definition is as follows:

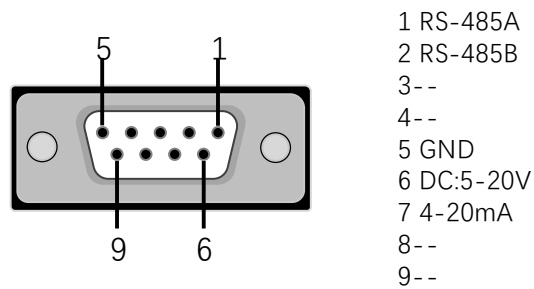


Fig.9 The DB9 port definition

## Configuration

### 【Typical Configuration】

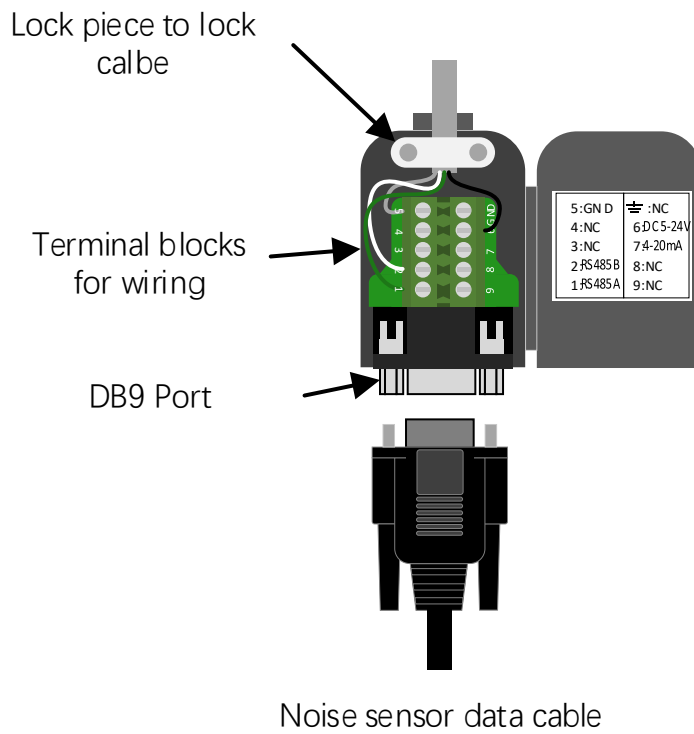
- noise sensor 1pcs
- windscreen 1pcs
- calibration tool 1pcs
- adapter plate 1pcs
- user manual 1pcs
- cables (2m) 1pcs

### Optional Accessory:

- sensor stand
- sound calibrator
- measurement software
- extend cable (5m, 10m, 20m or longer)

## Appendix How to use the adapter plate

In order to facilitate users to self-wire, each sensor distribution an adapter plate, adapter plate can be directly connected to the standard DB9 female. After wiring the terminal of the adapter plate according to the pin definition of the data line, cable can be secured with white locking tabs and black screws to prevent disconnection when pulling the cable , fix the black screws from external to internal.



### CRY Sound Measuring Instruments

- Noise sensor
- Multi-channel Noise and Vibration Measurement System
- Electro-Acoustic Analyzer
- Audio Signal Generator
- Measurement Microphone



## Sales and Customer Service

CRY2100 series noise sensor is independently developed and produced by CRY Sound Co., Ltd.

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