MULTIFUNCTION AIR QUALITY MONITOR (MODBUS)

User Guide for SRAQ-D696-1

Product Description

The SRAQ-D696-1, 7-in-1 air quality monitor is a comprehensive air quality sensor integrating CO_2, laser dust, temperature, and humidity, TVOC and formaldehyde. This sleek wall-mount device features an integrated LCD, and provides real-time output via Modbus-RTU. Uses include building automation as well as factory floors and other areas where the presence of these pollutants are a concern.

Features

- Detects multiple pollutants CO_2, dust etc.
- Integrated LCD shows concentrations
- Modbus output
- High reliability and good stability
- High accuracy & fast response
- Sleek wall-mount design

Applications

- Office and commercial buildings
- Factory floors
- Laboratories
- HAVC industry
- Residential air quality monitor
- IoT and smart home systems

Thank you for choosing L-com product. To ensure safe, accurate performance and product longevity, please take a moment to familiarize yourself with this manual before powering the device. Please keep it handy for future reference. In case of any questions regarding the installation or use of product, please call us at 800.341.5266.

Reach out to us at customerservice@l-com.com and visit our website at www.l-com.com

M_L-com_SRAQ-D696-1_10/2022_R1.0

Technical Parameters

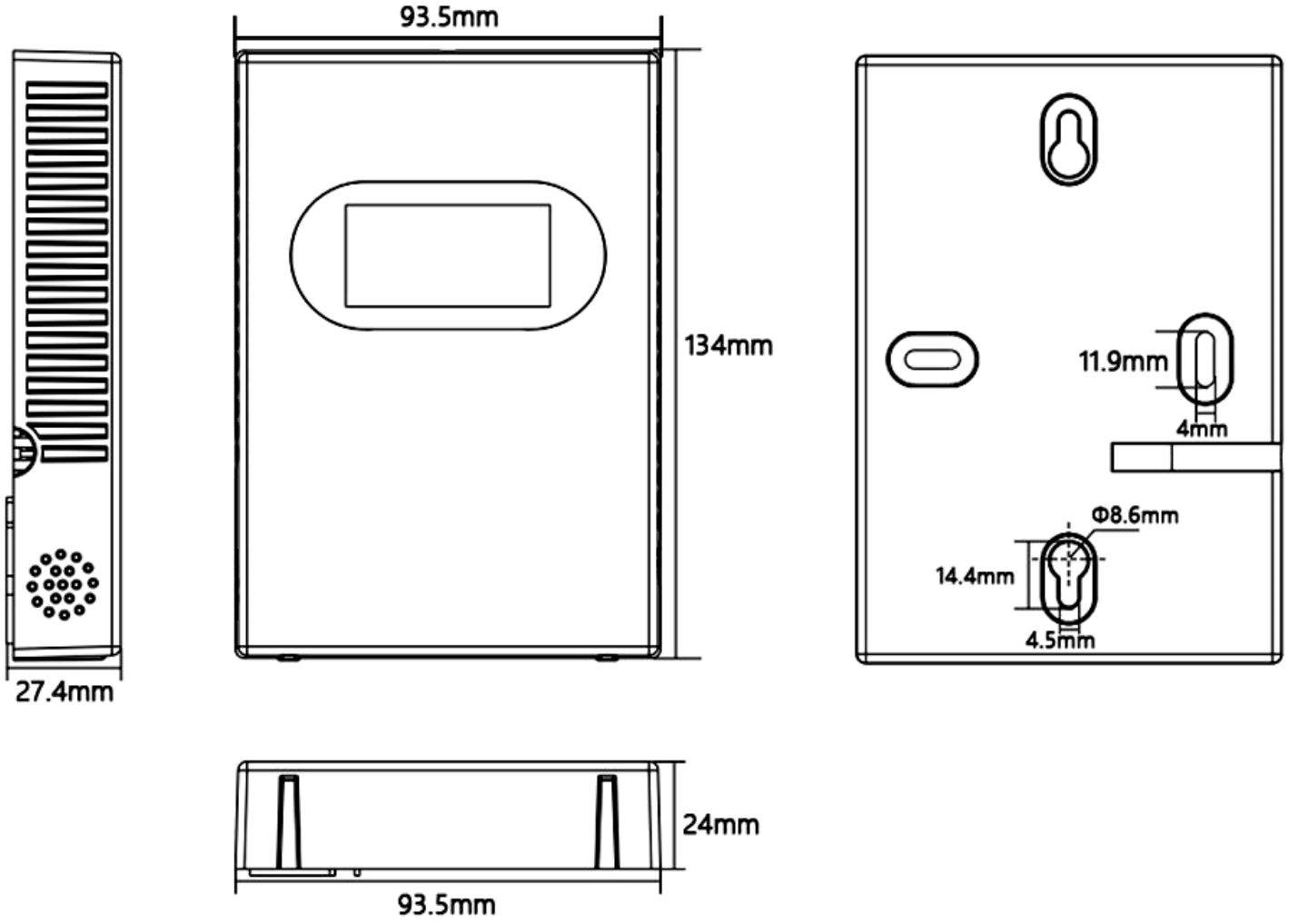
Detection Parameters and Resolution

Pollutant	Measurement resolution	Measuring range	Accuracy
CO_2	50 ppm	400~2000 ppm	± 75 ppm
PM 2.5	0.3 ug/m^3	0~1000 ug/m^3	± 10%
PM 10	0.3 ug/m^3	0~1000 ug/m^3	± 10%
Temperature	0.01 °C	0~60 °C	± 0.5 °C
Humidity	0.04%	0~100% RH	± 3% RH
TVOC	0.001 mg/m^3	0-1.2 mg/m^3	± 0.012 mg/m^3
CH_2O	0.001 mg/m^3	0-0.5 mg/m^3	± 0.003 mg/m^3

1. Working voltage: 12 VDC ~ 24 VDC (ripple wave cannot exceed 200 mv)
2. Working environment: Working temperature 0~50 °C; working humidity: 15% RH – 90% RH (no condensation)
3. Communication method: The default is ModBus-RTU RS485
4. Warm-up time: ≤ 5 minutes
5. The service life: 36 months (in the air)
6. Product size: 134mm X 93.5mm X 27.4mm (H*W*D)

Mounting Diagrams

Mounting type: Wall mount. Two horizontal holes for fixed installation, vertical holes for snap in installation.



Wire Definition

Sr. No.	Function	Notes	Color
1	VCC	12 – 24 VDC, power supply positive	Brown
2	GND	GND, power supply negative	Black
3	RS485_A+	RS485_A+	Green
4	RS485_B-	RS485_B-	Blue

Notes

1. Avoid contact with organic solvents (including silica gel and other adhesives), coatings, pharmaceuticals, oil and high concentration gases.
2. The module cannot withstand excessive impact or vibration.
3. Do not apply this module to a personal safety system.
4. Do not install the module in the strong air convection environment.

Communication Protocol

Baud rate: 9600
Check bit: No
Stop position: 1 bits
Return data time: < 300 ms
The reading speed can not exceed 350 ms
The CRC check byte length is all bytes before CRC_L, Select A001 or 8005 reverse order

Read Address Command

Send Data Format

Fixed	Function Code	Fixed	Fixed	Fixed	Fixed	CRC_L	CRC_H
FF	17	00	00	00	01	CRC check	

Read Data Format

Fixed	Function Code	Bytes	Firmware Version	Current Address	CRC_L	CRC_H
FF	17	02	aa	yy	CRC check	

Example:
Send command: FF 17 00 00 00 01 A1 D7
Return data: FF17 02 11 01 59 F0
The device address is 01, and the firmware version number is V1.1

Modification Address Command

Send Data Format

Current address	Function code	Fixed	Fixed	Reserve	Preset address	CRC_L	CRC_H
yy	06	00	00	00	zz	CRC check	

Read Data Format

Modify Front Address	Function code	Bytes	Reserve	Modify After Address	CRC_L	CRC_H
yy	06	02	00	zz	CRC check	

Example:
When the current address is 01, the preset address is: 02
Send commands: 01 06 00 00 00 02 08 0B
Return data: 01 06 02 00 02 39 49

Read Address Command

Send Data Format

Address Code	Function Code	Register Start Address		Register Number		CRC_L	CRC_H
yy	03	00	MM	00	NN	CRC check	

Read Data Format

Address Code	Function Code	Data Length	Sensor Data	CRC_L	CRC_H
yy	03	NN*2	xx xx……xx xx	CRC check	

Note: The returned sensor data xx xx……xx xx , can be changed according to the register address and the length of the data.

00 MM represents the register address of the sensor, and the 00 NN is the data length.

Register address (00 MM)						
00 00	00 01	00 02	00 03	00 04	00 05	00 06
CO_2	TVOC	CH_2O	PM 2.5	Humidity	Temperature	PM10

Notes

1. The minimum number of sensor numbers 00 NN is 00 01, and the maximum is 00 07. When the MM value is 00, the maximum NN value can be 07, at this time the value of all the sensors can be read, and the NN can be 01, and the data of the CO_2 can only be read alone at 01. And so on.
2. The register's front address can read the data of the sensor behind the data while increasing the data length. But the address behind the register can't read the sensor data before this address.

For details, see the following:

00 MM 00 NN for 00 00 00 01 express from the start address 00 00 read CO_2 data.

00 MM 00 NN for 00 00 00 02 express from the start address 00 00 read CO_2 and TVOC data.

00 MM 00 NN for 00 00 00 03 express from the start address 00 00 read CO_2, TVOC and CH2O data.

00 MM 00 NN for 00 00 00 04 express from the start address 00 00 read CO_2, TVOC, CH_2O and PM 2.5 data.

00 MM 00 NN for 00 00 00 05 express from the start address 00 00 read CO_2, TVOC, CH_2O, PM 2.5 and Humidity data.

00 MM 00 NN for 00 00 00 06 express from the start address 00 00 read CO_2, TVOC, CH_2O, PM 2.5, Humidity and Temperature data.

00 MM 00 NN for 00 00 00 07 express from the start address 00 00 read CO_2, TVOC, CH_2O, PM 2.5, Humidity, Temperature and PM10 data.

00 MM 00 NN for 00 01 00 01 express from the start address 00 01 read TVOC data.

00 MM 00 NN for 00 01 00 02 express from the start address 00 01 read TVOC and CH_2O data.

00 MM 00 NN for 00 01 00 03 express from the start address 00 01 read TVOC, CH_2O and PM 2.5 data.

00 MM 00 NN for 00 01 00 04 express from the start address 00 01 read TVOC, CH_2O, PM 2.5 and Humidity data.

00 MM 00 NN for 00 01 00 05 express from the start address 00 01 read TVOC, CH_2O, PM 2.5, Humidity and Temperature data.

00 MM 00 NN for 00 01 00 06 express from the start address 00 01 read TVOC, CH_2O, PM 2.5, Humidity, Temperature and PM 10 data.

00 MM 00 NN for 00 02 00 01 express from the start address 00 02 read CH_2O data.

00 MM 00 NN for 00 02 00 02 express from the start address 00 02 read CH_2O and PM 2.5 data.

00 MM 00 NN for 00 02 00 03 express from the start address 00 02 read CH_2O, PM 2.5 and Humidity data.

00 MM 00 NN for 00 02 00 04 express from the start address 00 02 read CH_2O, PM 2.5, Humidity and Temperature data.

00 MM 00 NN for 00 02 00 05 express from the start address 00 02 read CH_2O, PM 2.5, Humidity, Temperature and PM 10 data.

00 MM 00 NN for 00 03 00 01 express from the start address 00 03 read PM 2.5 data.

00 MM 00 NN for 00 03 00 02 express from the start address 00 03 read PM 2.5 and Humidity data.

00 MM 00 NN for 00 03 00 03 express from the start address 00 03 read PM 2.5, Humidity and Temperature data.

00 MM 00 NN for 00 03 00 04 express from the start address 00 03 read PM 2.5, Humidity, Temperature and PM 10 data.

00 MM 00 NN for 00 04 00 01 express from the start address 00 04 read Humidity data.

00 MM 00 NN for 00 04 00 02 express from the start address 00 04 read Humidity and Temperature data.

00 MM 00 NN for 00 04 00 03 express from the start address 00 04 read Humidity, Temperature and PM 10 data.

00 MM 00 NN for 00 05 00 01 express from the start address 00 05 read Temperature data.

00 MM 00 NN for 00 05 00 02 express from the start address 00 05 read Temperature and PM 10 data.

00 MM 00 NN for 00 06 00 01 express from the start address 00 06 read PM 10 data.

Example: When the address is 01, the command is sent: 01 03 00 00 00 07 04 08

Returns the data as follows:

Serial No.	Name	Explain (hex)
1	Address	01
2	Function code	03
3	Data length	0E
4	Data 1	CO2_H
5	Data 1	CO2_L
6	Data 2	TVOC_H
7	Data 2	TVOC_L
8	Data 3	CH2O_H
9	Data 3	CH2O_L
10	Data 4	PM2.5_H
11	Data 4	PM2.5_L
12	Data 5	Humidity_H
13	Data 5	Humidity_L
14	Data 6	Temperature_H
15	Data 6	Temperature_L
16	Data 7	PM10_H
17	Data 7	PM10_L
18	CRC16 check	CRC16_L
19	CRC16 check	CRC16_H

The method of data calculation is as follows:

CO_2 (ppm) = CO_2_H * 256 + CO_2_L

TVOC (mg/m^3) = (TVOC_H * 256 + TVOC_L) / 10000.0

CH_2O (mg/m^3) = (CH_2O_H * 256 + CH_2O_L) / 10000.0

PM 2.5 (ug/m^3) = PM 2.5_H * 256 + PM 2.5_L

PM 10 (ug/m^3) = PM 10_H * 256 + PM 10_L

Humidity (%RH) = (Humidity_H * 256 + Humidity_L) / 10.0

Temperature (°C) = ((Temperature_H &0 x 7F) * 256 + Temperature_L) / 10.0

Explanation: The highest bit of temperature data (bit15) is the symbol bit, bit15 = 1 is the negative temperature, and bit15 = 0 is the positive temperature.

Note: TVOC and CH_2O can only display two bits after the decimal point because of the screen space. When the data is very small, it will display 0.00 directly.

At this point, customers can display themselves in ug/m^3 units.

CRC Check Calculation Method

```
unsigned int CRC_Compute ( unsigned char *arr_buff, unsigned char len)
{
        unsigned int crc=0xFFFF;
        unsigned char i, j;
        for ( j=0; j <len;j++)
        {
                crc=crc ^*arr_buff++;
                for ( i=0; i<8; i++)
                {
                        if( ( crc&0x0001) >0)
                        {
                                crc=crc>>1;
                                crc=crc^ 0xa001;
                        }
                        else
                                crc=crc>>1;
                }
        }
        return ( crc);
}
```