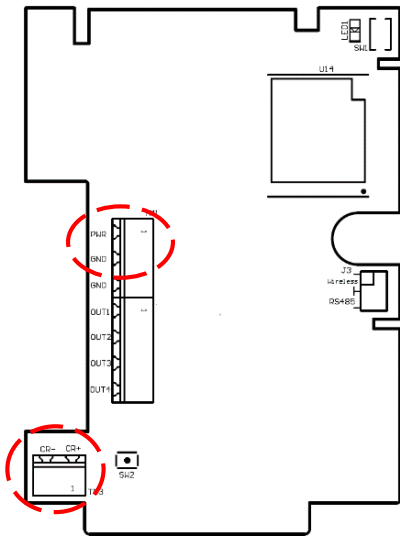


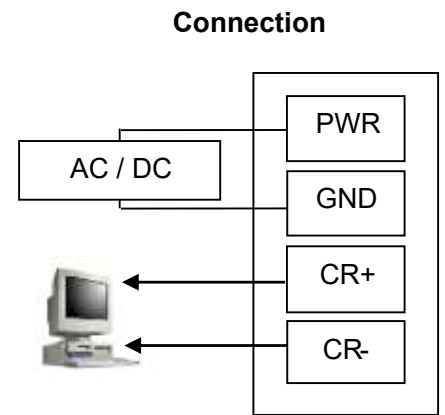
Introduction

In most public space or office buildings, the air ventilation and air quality is poor. The ADC-M series can detect several important parameters of indoor air quality and environment, such as CO₂, CO, HCHO, O₂, NH₃, TVOC, PM_{2.5}, PM₁₀, temperature and humidity. Easy installation and the recommended height of installation is 1~2M above the floor level. It uses good quality sensors; such as the NDIR CO₂ sensor; electro-chemical sensor for HCHO, CO, O₂ and NH₃; laser scattering principle sensor for PM_{2.5} and PM₁₀; CMOS sensor for TVOC, temperature and humidity. ADC-M can be used with a monitoring system, which can activate ventilation system to keep a better indoor air quality or for energy saving. It is perfect for school, library, offices, meeting room, commercial building, shopping center, train/subway station or exhibition hall and etc.

Wiring



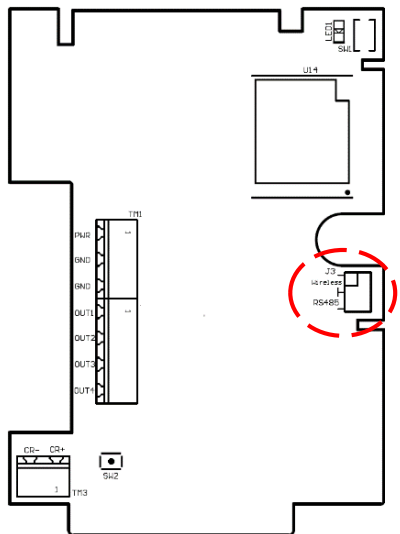
| | | |
|---|-----|--------------------------------|
| 1 | PWR | DC 12 ~ 36V AC 24V(50/60Hz) |
| 2 | GND | System GND |
| 3 | CR+ | RS-485(+) |
| 4 | CR- | RS-485(-) |



[Figure 1]

Notice: Please remove power from the unit before wiring, in order to avoid any damage or hazard.

Transmission mode setting



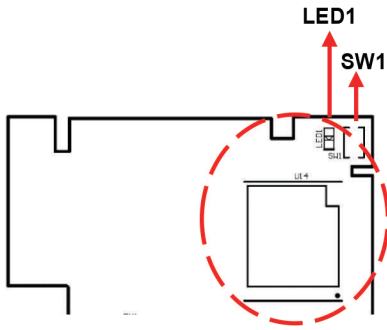
Jumper setting:

Transmission mode setting (Wireless/RS485)

| Transmission mode | J3 |
|-------------------|----|
| Wireless | |
| RS485 | |

Join a wireless network (Only available for wireless version)

If the transmission mode is set as “Wireless”, please follow the steps as below to establish the connection between transmitter and receiver.



1. Please make sure the wireless receiver has been connected with PLC or with computer. (Please refer the manual of wireless receiver for the detail operation.)
2. Please press and hold the SW1 on wireless module until the LED1 (Green) is ON. And it will activate the pairing procedure and complete the connection within 60 sec.
3. When the LED1 switches off, the connection between the transmitter and receiver has been done. If the LED1 blinks every 5 secs, the connection fails. Then please repeat the above-mentioned steps.

Modbus RTU settings

1. Default setting: Device ID=1; Baud rate = 9600; Word Length = 8; Parity = none; Stop Bits = 1
2. Checksum is the error detection codes for CRC-16/MODBUS.
3. The measurement will be varied depending on detection functions of the model. The measurement value would be displayed as “0” if there is no corresponding detection function.

Command 0x04: Read input registers

Reading data type

| Device ID | Function | Address (High byte) | Address (Low byte) | Data Length (High byte) | Data Length (Low byte) | Checksum (High byte) | Checksum (Low byte) |
|------------|----------|---------------------|--------------------|-------------------------|------------------------|----------------------|---------------------|
| By setting | 0x04 | 0x00 | 0x00 | 0x00 | 0x0A | 0xXX | 0xXX |

Responding data type

| Device ID | Function | Data byte | Data (High byte) | Data (Low byte) | Data (High byte) | Data (Low byte) | Checksum (High byte) | Checksum (Low byte) |
|------------|----------|-----------|------------------|-----------------|------------------|-----------------|----------------------|---------------------|
| By setting | 0x04 | 0x14 | 0xXX | 0xXX | ... | ... | 0xXX | 0xXX |

Reading data register

| Data (High byte) | Data (Low byte) | Description | Remark |
|------------------|-----------------|-------------------------|--|
| 0x00 | 0x00 | CO ₂ value | Decimal, Unit: ppm |
| 0x00 | 0x01 | PM _{2.5} value | Decimal, Unit: ug/m ³ |
| 0x00 | 0x02 | PM ₁₀ value | Decimal, Unit: ug/m ³ |
| 0x00 | 0x03 | CO value | Decimal, Unit: ppm |
| 0x00 | 0x04 | HCHO value | Decimal, Two decimal places, Unit: ppm |
| 0x00 | 0x05 | NH ₃ value | Decimal, One decimal place, Unit: ppm |
| 0x00 | 0x06 | O ₂ value | Decimal, Two decimal places, Unit: % |
| 0x00 | 0x07 | TVOC value | Decimal (IAQ) |
| 0x00 | 0x08 | Temperature value | Decimal, Two decimal places, Unit: °C |
| 0x00 | 0x09 | Humidity value | Decimal, Two decimal places, Unit: %RH |

Remark:

The data obtained of HCHO, O₂, temperature or humidity has to be divided by 100 to get the measurement value; the data obtained of NH₃ has to be divided by 10 to get the measurement value.

For example, the temperature data obtained is 2600 which has to be divided by 100, and the measurement value is 26.00°C.

Command 0x03 : Read holding registers

Reading data type

| Device ID | Function | Address (High byte) | Address (Low byte) | Data Length (High byte) | Data Length (Low byte) | Checksum (High byte) | Checksum (Low byte) |
|------------|----------|---------------------|--------------------|-------------------------|------------------------|----------------------|---------------------|
| By setting | 0x03 | 0x00 | 0x00 | 0x00 | 0x0D | 0xXX | 0xXX |

Responding data type

| Device ID | Function | Data byte | Data (High byte) | Data (Low byte) | Data (High byte) | Data (Low byte) | Checksum (High byte) | Checksum (Low byte) |
|------------|----------|-----------|------------------|-----------------|------------------|-----------------|----------------------|---------------------|
| By setting | 0x03 | 0x1A | 0xXX | 0xXX | ... | ... | 0xXX | 0xXX |

Command 0x06 : Write single register

To calibrate 27°C to 27.30°, the correction value is $(27.30 - 27.00) * 100 = 30$. And convert it into 0x001E (hexadecimal).

Writing data type

| Device ID | Function | Address (High byte) | Address (Low byte) | Modify value (High byte) | Modify value (Low byte) | Checksum (High byte) | Checksum (Low byte) |
|------------|----------|---------------------|--------------------|--------------------------|-------------------------|----------------------|---------------------|
| By setting | 0x06 | 0x00 | 0x08 | 0x00 | 0x1E | 0xXX | 0xXX |

Responding data type

| Device ID | Function | Address (High byte) | Address (Low byte) | Modify value (High byte) | Modify value (Low byte) | Checksum (High byte) | Checksum (Low byte) |
|------------|----------|---------------------|--------------------|--------------------------|-------------------------|----------------------|---------------------|
| By setting | 0x06 | 0x00 | 0x08 | 0x00 | 0x1E | 0xXX | 0xXX |

Modifying data register

| Data address (High byte) | Data address (Low byte) | Description | Default | Adjustable minimum Range | Adjustable maximum Range |
|--------------------------|-------------------------|--------------------------------------|---------|---|--------------------------|
| 0x00 | 0x00 | CO ₂ manual calibration | 0 | -70 ppm | +70 ppm |
| 0x00 | 0x01 | PM _{2.5} manual calibration | 0 | -150 ug/m ³ | +150 ug/m ³ |
| 0x00 | 0x02 | PM ₁₀ manual calibration | 0 | -150 ug/m ³ | +150 ug/m ³ |
| 0x00 | 0x03 | CO manual calibration | 0 | -5 ppm | +5 ppm |
| 0x00 | 0x04 | HCHO manual calibration | 0 | -50 (-0.5ppm) | +50 (+0.5ppm) |
| 0x00 | 0x05 | NH ₃ manual calibration | 0 | -50 (-0.5ppm) | +50 (+0.5ppm) |
| 0x00 | 0x06 | O ₂ manual calibration | 0 | -500 (-5.00%) | + 500 (+5.00%) |
| 0x00 | 0x07 | TVOC manual calibration | 0 | -100 | +100 |
| 0x00 | 0x08 | Temperature manual calibration | 0 | -1000 (-10.00°C) | +1000 (+10.00°C) |
| 0x00 | 0x09 | Humidity manual calibration | 0 | -1000 (-10.00%RH) | +1000 (+10.00%RH) |
| 0x00 | 0x0A | Sampling interval | 2 | 1 | 3600 |
| 0x00 | 0x0B | Baud rate | 0 | Please refer to "Baud rat and connection setting" | |
| 0x00 | 0x0C | Device ID | 1 | 1 | 247 |

Remark:

These any gas concentration to be adjusted by a fixed register, the data shows the concentration value plus current offset value. For example, the CO₂ concentration data is 700, and CO₂ manual calibration is -70, the value is $(700-70) = 670$ ppm.

Baud rate and connection setting

To change baud rate from 9600 to 19200, and set the connection setting as 8/E/2, the command would be “0x1011”.

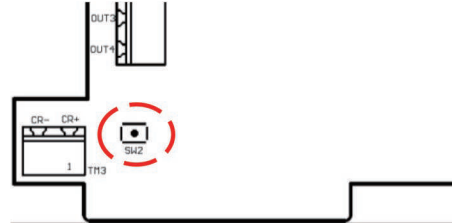
| Settings | Device ID | Function | Address (High byte) | Address (Low byte) | Data (High byte) | Data (Low byte) | Checksum |
|----------|------------|----------|---------------------|--------------------|------------------|-----------------|----------|
| 9600 | By setting | 0x06 | 0x00 | 0x0B | 0x00 | - | XXXX |
| 19200 | By setting | 0x06 | 0x00 | 0x0B | 0x10 | - | XXXX |
| 38400 | By setting | 0x06 | 0x00 | 0x0B | 0x20 | - | XXXX |
| 57600 | By setting | 0x06 | 0x00 | 0x0B | 0x30 | - | XXXX |
| 115200 | By setting | 0x06 | 0x00 | 0x0B | 0x40 | - | XXXX |
| 8/N/1 | By setting | 0x06 | 0x00 | 0x0B | - | 0x00 | XXXX |
| 8/N/2 | By setting | 0x06 | 0x00 | 0x0B | - | 0x01 | XXXX |
| 8/E/1 | By setting | 0x06 | 0x00 | 0x0B | - | 0x10 | XXXX |
| 8/E/2 | By setting | 0x06 | 0x00 | 0x0B | - | 0x11 | XXXX |
| 8/O/1 | By setting | 0x06 | 0x00 | 0x0B | - | 0x20 | XXXX |
| 8/O/2 | By setting | 0x06 | 0x00 | 0x0B | - | 0x21 | XXXX |

* Notice : If the transmission mode is set as “Wireless”, please set the baud rate as 9600 and the connection setting as 8/N/1.

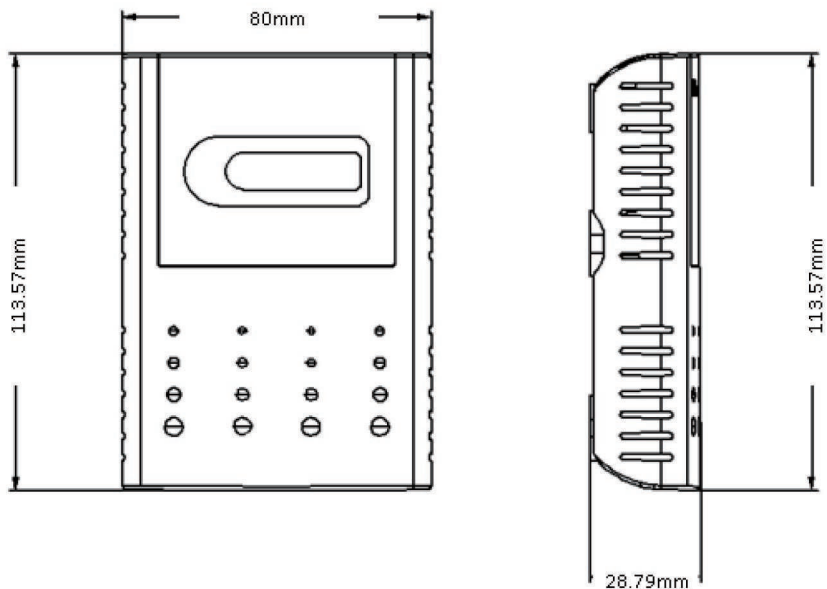
* Remark: The connection setting format is Word length/Parity/Stop bits; Parity: N = None, E = Even, O = Odd

Reset to default settings

To reset all the settings to default, please press and hold SW2 for 5 sec.



Dimensions



Installation

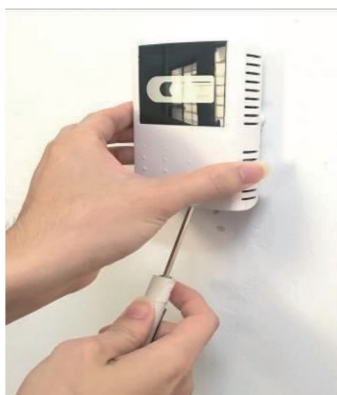
1. Please check if the transmitter, accessory pack and instruction manual are included in the package.
2. Please decide right position for installation.
3. Press tenon on bottom of the housing with a screw driver to remove the upper cover. (Please refer to the Figure 2 to Figure 4).
4. Fix the base with screws on the wall.
5. Please refer Figure 1 for wiring.

Notice: Please remove power from the unit before wiring, in order to avoid any damage or hazard.

6. Place and fix the upper cover back to the unit.



【Figure 2】



【Figure 3】



【Figure 4】

Notice for installation

1. Please install the transmitter at a height of 1~2M above the floor level and the location with relatively stable air circulation, without turbulent airflow.
2. Do not mount the transmitter near doors, opening windows, fans, air outlet, elevator entrance, or other known air disturbances. Install the transmitter at least 3 meters away from any air outlets.
3. Please avoid the waterish area and direct sunlight.
4. Do not install the transmitter on an unstable or shaking surface.
5. Please do not install the transmitter in areas with rapid temperature changes or with extreme ambient conditions.
6. Please keep away from the devices generating heat or emitting exhaust.

Trouble shooting

| Problem | Possible cause | Recommended solution |
|---------------------------------------|---|--|
| No response after wiring power supply | <ol style="list-style-type: none">1. Insufficient power supply2. The power wiring is disconnected. | <ol style="list-style-type: none">1. Please make sure the power supply should be more than 3W(RS485) 、4.5W(LoRa).2. Check power wiring |
| RS485 connection fails | <ol style="list-style-type: none">1. Incorrect device ID setting or incorrect connection settings.2. RS485 wiring is disconnected. | <ol style="list-style-type: none">1. Please verify the device ID and connection settings.2. Check RS485 wiring.3. Reset to default settings. |
| High loss rate of packet for RS485 | <ol style="list-style-type: none">1. Signal interference2. RS485 wiring is disconnected. | <ol style="list-style-type: none">1. It is recommended to use 2 pair twisted shielded cable.2. Check RS485 wiring. |
| Fail to pair with LoRa devices | <ol style="list-style-type: none">1. The antenna is not fixed.2. There is some interference around. | <ol style="list-style-type: none">1. Please check if antenna is fixed.2. Please relocate the LoRa devices to avoid the interference.3. Use signal test software to choose a better location to install the LoRa devices. |
| The loss rate of packet is high | | |