

Honeywell

C7355B In-Duct IAQ Monitor

USER GUIDE



INTRODUCTION

About This Monitor

This air quality monitor is specially designed for monitoring multiple air quality parameters in the air duct. The sensor is installed in the outdoor or return air duct. Real time monitoring parameters are particles (PM2.5 and PM10), carbon dioxide (CO₂), TVOC, air temperature and relative humidity.

The intelligent control algorithms built into the device help to minimize the influence of ambient temperature and humidity on the measured values. The device is

packaged with numerous presets suitable for most commercial building requirements that enable quick and easy initial setup.

The device, with pitot tube inlet and outlet design instead of common air pump, adapts to a wider range of air speeds and insures a long lifetime of usage. It provides Modbus RTU (RS-485) communication protocol, easily integrating with the building automation system.

Intended audience and assumed knowledge

This document provides information about installing and commissioning the IAQ monitor. It also shows how to operate the user interface.

It is assumed that the user is trained and familiar with HVAC concepts.

IMPORTANT

Always install equipment in accordance with the National Electric Code and in a manner acceptable to the local authority having jurisdiction (AHJ). No guidelines, instructions, installation practices, or other information presented in this guide may be interpreted to supersede or modify the local codes and practices of the AHJ.

Reference documents

- In-Duct IAQ Monitor Specification Data 31-00439: Describes in-duct IAQ monitor and its features.
- In-Duct IAQ Monitor Mounting Instructions 31-00440: Describes how to mount the monitor.
- In-Duct IAQ Monitor Quick Start Guide 31-00441: Contains only necessary procedures to enable the users to quickly use the device.



31-00438-01

DIMENSIONS AND MOUNTING HOLES

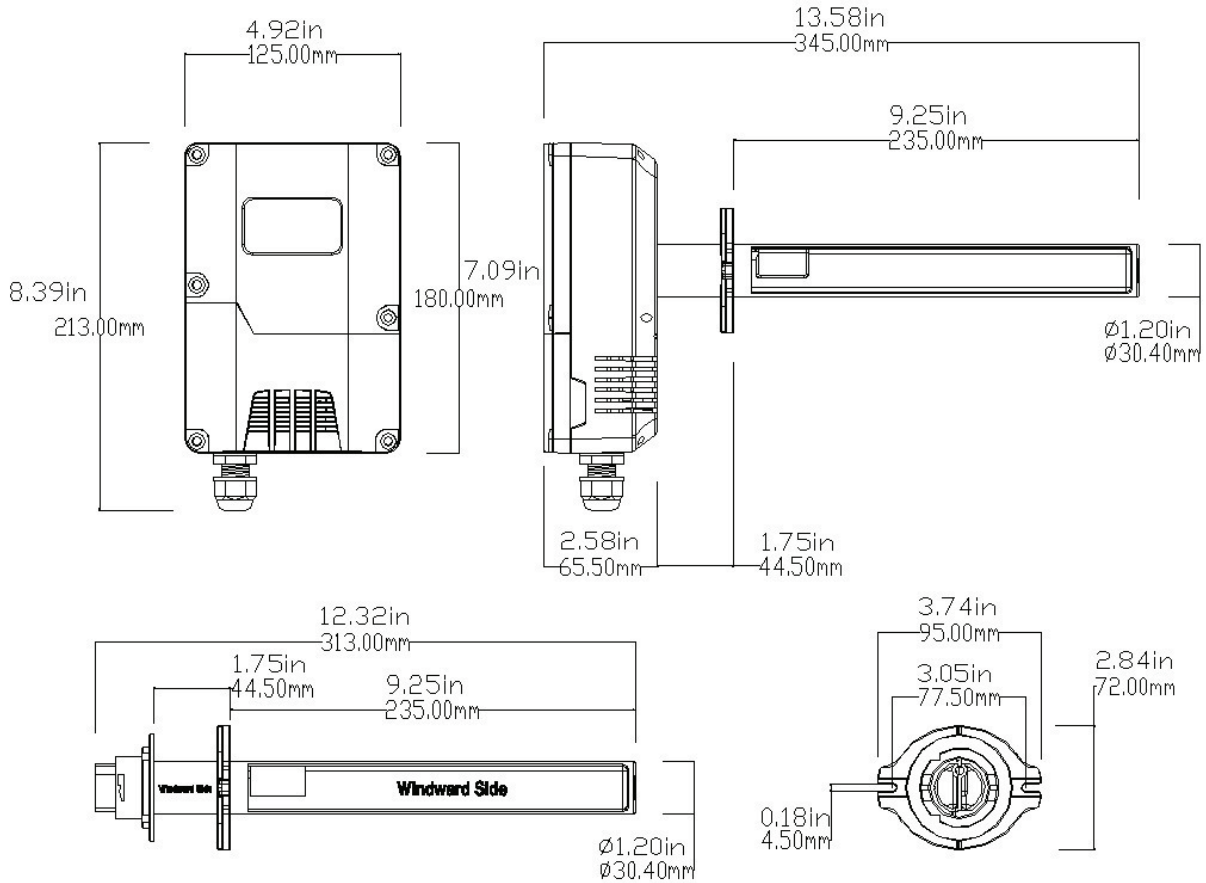


Fig. 1. Dimensions

SPECIFICATIONS

Part Number:
C7355B1052

Detection Parameters:
PM2.5/PM10, CO2, TVOC, Temperature & RH

Operating Environment:
-4 to 140°F (-20°C to 60°C)
0 to 99% RH, (No condensation)

Storage Condition:
32 to 122°F (0°C to 50°C)
10 to 60% RH

Overall Dimension:
See Fig. 1

Net weight:
1.87lb (850g)

Certification Standard:
CE/FCC

IN-DUCT IAQ MONITOR AT A GLANCE

Monitor Overview

The image below illustrates the typical enclosure of the IAQ monitor. There is a pitot tube, main unit sensor compartment and main unit communication control compartment, as well as an external temp & humidity sensors.

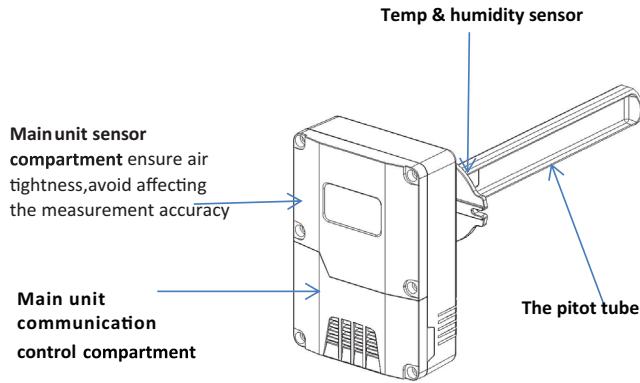


Fig. 2. Monitor Overview

Light Indication

The bottom right side of the device is the indicator area. For this monitor (Part number: C7355B1052), only refer to the ON and SCALE indicators.

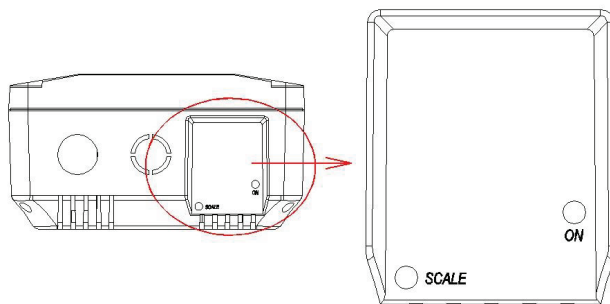






Fig. 3. Location of light indicators

Table 1. Light Indication

Display	LED status and Description
 ON	Work indicator When the power is on, it will illuminate to indicate the device is working. Otherwise, the device is faulty.
 SCALE  SCALE  SCALE	- Three-color concentration indicator. - The default is the average concentration change of PM2.5 every 1 minute. When PM2.5 < 35 $\mu\text{g}/\text{m}^3$ green light on. 35 to 75 $\mu\text{g}/\text{m}^3$ yellow light on. >75 $\mu\text{g}/\text{m}^3$ red light on At the same time, the measurement value of the indicator change can be selected in the communication command to be 1-minute average.

POWER SUPPLY AND RS-485 WIRING

⚠ WARNING

- To reduce the risk of electrical shock do not disassemble the detector. There are no user serviceable parts inside. Refer servicing to qualified service personnel only.
- Use a dry cloth to clean the product. Do not use liquid cleaners or aerosol cleaners
- Do not use the product near water. Do not install the product in a place where water may splash onto it.
- Do not operate the detector with a hard, sharp or pointed object.

IMPORTANT

All wiring must comply with local electrical codes and ordinances. Follow equipment manufacturer wiring instructions when available. Power must not be connected while wiring. Wiring a unit that is powered may result in electrical shock and/or equipment damage.

Wiring Diagram

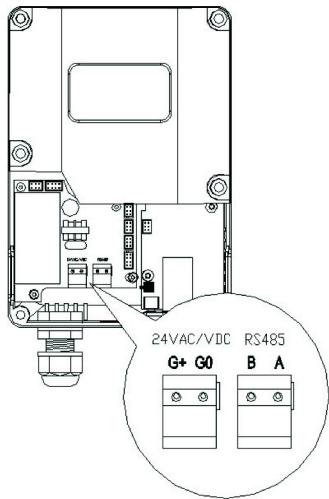


Fig. 4. Wiring Diagram

There are two sets of terminals, power supply wiring on the left, RS-485 wiring on the right.

1. Remove the cover of the electrical wiring compartment on the main unit.

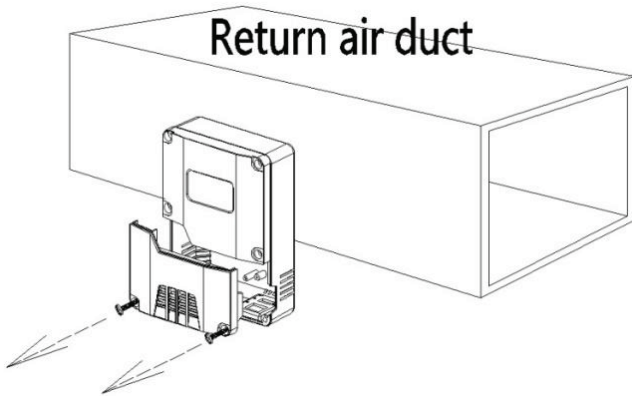


Fig. 5.

2. Remove the two terminal blocks for power supply and RS-485 respectively.

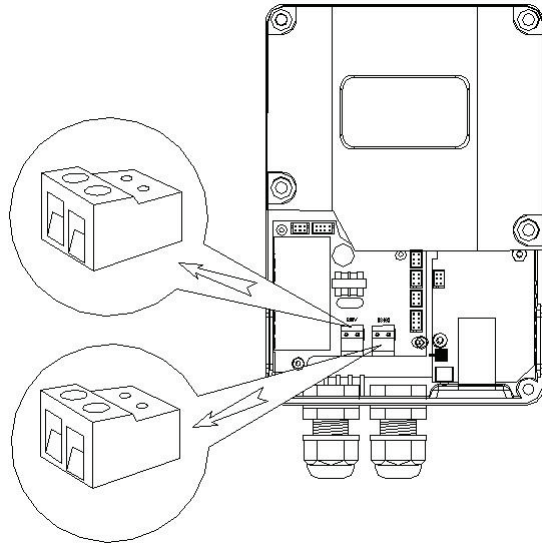


Fig. 6.

NOTE: The left terminal is the power terminal block. The right terminal is the RS-485 terminal block.

3. Run the power cable and RS-485 cable through each waterproof connector as shown in Fig. 7.

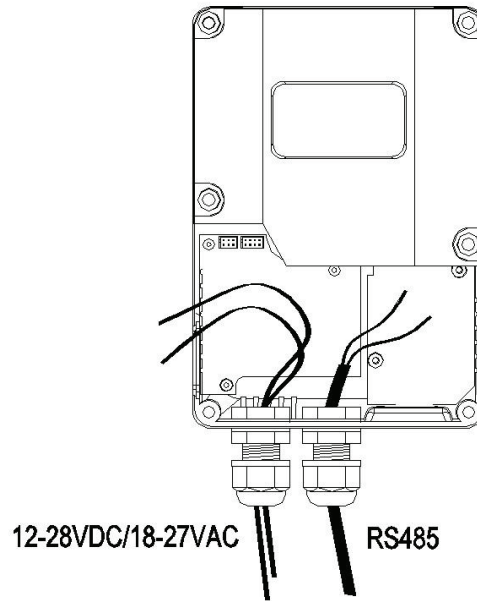


Fig. 7.

4. Connect the cable to the terminal blocks.

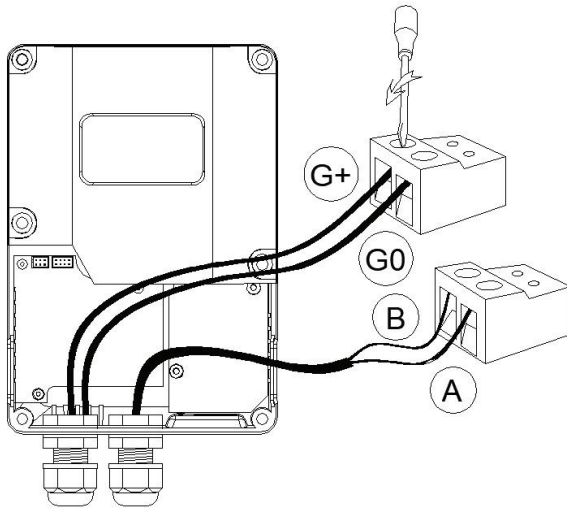


Fig. 8.

5. Plug the terminal block back onto the pin connector and tighten the waterproof connectors.

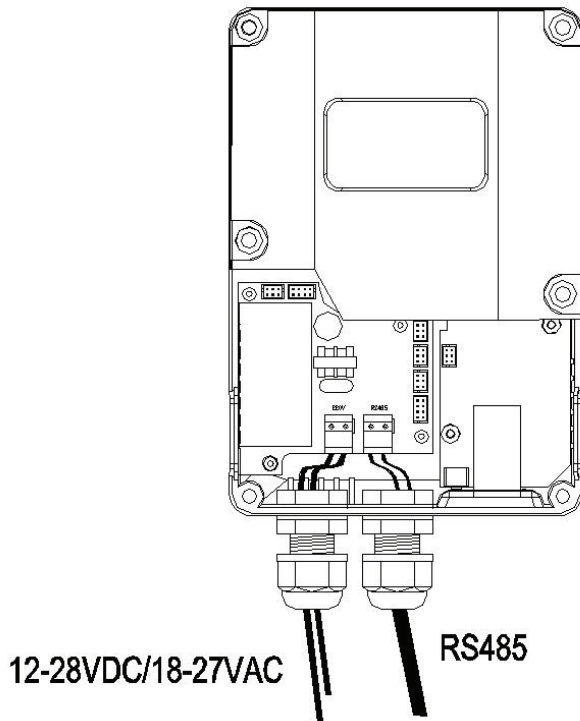


Fig. 9.

6. Replace the cover of the electrical wiring compartment and tighten the screws.

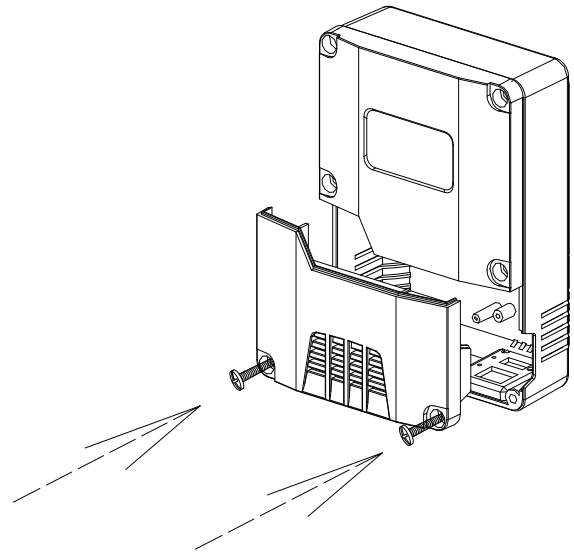


Fig. 10.

RS-485 CONFIGURATION

Prerequisites

Before going through RS-485 configuration, ensure the monitor is installed and wired up according to the Mounting Instructions.

After installing the monitor and powering it up for initial use or re-use, the device should be energized continuously for more than 48 hours to ensure stable output of all measured values.

Modbus Register Table

Mode: RTU (MSB First)

Baud Rate: 1-4800 2-9600 3-14400 4-19200 5-38400
6-56000 7-57600 8-115200
default: 2-9600bps

Start Bits: 1

Data Bits: 8

Stop Bits: 1 / 2
default: 1

Parity: None / Odd / Even
default: None

Register Map

Support Function code:

- 3 - Read Holding Registers
- 4 - Read Input Registers
- 6 - Write Single Register
- 16 - Write Multiple registers

Table 2. Modbus Register Table.

Starting Register Decimal	Data Description	Function	Read/Write	Quantity of Registers (2Bytes/16bit)	Format	Decimals	Data Range, Data Description	Default
0/1050	PM2.5 hourly average measurement	4	R	2	Float-Big Endian	1	0-1000.0 µg/m ³	
2/1052	PM10 hourly average measurement	4	R	2	Float-Big Endian	1	0-1000.0 µg/m ³	
8/1058	CO ₂ hourly average measurement	4	R	2	Float-Big Endian	0	0-5,000 ppm	
10/1060	TVOC hourly average measurement	4	R	2	Float-Big Endian	3	0-4000 mg/m ³	
12/1000	PM2.5 one minute average measurement	4	R	2	Float-Big Endian	1	0-1000.0 µg/m ³	
14/1002	PM10 one minute average measurement	4	R	2	Float-Big Endian	1	0-1000.0 µg/m ³	
16/1004	Temperature real-time measurement	4	R	2	Float-Big Endian	2	-20.00 °C-60.00 °C	
18/1006	Humidity real-time measurement	4	R	2	Float-Big Endian	2	0-100.00% RH	
20/1008	CO ₂ real-time measurement	4	R	2	Float-Big Endian	0	0-5,000 ppm	
22/1010	TVOC real-time measurement	4	R	2	Float-Big Endian	3	0-4000 mg/m ³	
24/1100	PM2.5 24-hour moving average measurement	4	R	2	Float-Big Endian	1	0-1000.0 µg/m ³	
26/1102	PM10 24-hour moving average measurement	4	R	2	Float-Big Endian	1	0-1000.0 µg/m ³	
32/1108	CO ₂ 24-hour moving average measurement	4	R	2	Float-Big Endian	0	0-5,000 ppm	
34/1110	TVOC 8-hour moving average measurement	4	R	2	Float-Big Endian	3	0-4000 mg/m ³	
1300	Primary pollutant 24-hour average measuring value (One of PM2.5/PM10/CO ₂ /TVOC) (Calculated based on 24-hour or 1-hour moving average measurement)	4	R	2	Float-Big Endian		1300	
1302	Primary pollutant type (One of PM2.5/PM10/CO ₂ /TVOC) (Calculated based on 24-hour or 1-hour moving average measurement)	4	R	1	INT16		1-PM25, 2-PM10, 3-CO ₂ ; 4-TVOC	
1303	Index level of the primary pollutant (One of PM2.5/PM10/CO ₂ /TVOC) (Calculated based on 24-hour or 1-hour moving average measurement)	4	R	1	INT16		Level 1-Excellent Level 3-Light pollution Level 4-Medium pollution Level 5-Heavy pollution Level 6-Severe pollution	

Table 2. Modbus Register Table.

Starting Register Decimal	Data Description	Function	Read/ Write	Quantity of Registers (2Bytes/16bit)	Format	Decimals	Data Range, Data Description	Default
1304	AQI value of the primary pollutant) (One of PM2.5/PM10/CO ₂ /TVOC) (Calculated based on 24-hour or 1-hour moving average measurement)	4	R	1	INT16		0-500	
1320	PM2.5 AQI value (Calculated based on 24-hour moving average measurement)	4	R	1	INT16		0-500	
1321	PM10 AQI value (Calculated based on 24-hour moving average measurement)	4	R	1	INT16		0-500	
1322	CO ₂ AQI value (Calculated based on 24-hour moving average measurement)	4	R	1	INT16		0-500	
1323	TVOC AQI value (Calculated based on 24-hour moving average measurement)	4	R	1	INT16		0-500	
1350	PM2.5 Pollution index level (Calculated based on 24-hour moving average measurement)	4	R	1	INT16		1-6	
1351	PM10 Pollution index level (Calculated based on 24-hour moving average measurement)	4	R	1	INT16		1-6	
1352	CO ₂ Pollution index level (Calculated based on 24-hour moving average measurement)	4	R	1	INT16		1-6	
1353	TVOC Pollution index level (Calculated based on 24-hour moving average measurement)	4	R	1	INT16		1-6	
78	3 color LED status	4	R	1	INT16		0-OFF, 1-Green, 2-Yellow, 3-Red	
0	Modbus Address	3/6	R/W	1	UINT16		1-247	1
1	Modbus rate (bps)	3/6	R/W	1	UINT16		1-4800, 2-9600, 3-14400, 4-19200, 5-38400, 6-56000, 7-57600, 8-115200	2
2	Modbus Parity check bit	3/6	R/W	1	UINT16		1-NONE, 1STOP_BIT, 2-NONE, 2STOP_BIT, 3-Odd, 1STOP_BIT, 4-Even, 1STOP_BIT	1
4	Temperature correction value	3/16	R/W	2	Float-Big Endian	2	-3.0-3.0 °C/ -6.0-6.0 °F	-2.0
6	Humidity correction value	3/16	R/W	2	Float-Big Endian	2	-5.0-5.0%RH	0
14	CO ₂ compensation value	3/16	R/W	2	Float-Big Endian	0	-300.0-300.0 ppm	0

In order to reserve the decimal part, the measuring value with decimal will be magnified 10/100/1000 times, marked as x10/x100/x1000.

Starting Register Decimal	Data Description	Function	Read/Write	Quantity of Registers (2Bytes/16bit)	Format	Decimals	Data Range, Data Description	Default
50/1175	PM2.5 hourly average measurement x10	4	R	1	UINT16	1	0-10000 corresponding to 0-1000.0 µg/m ³	
51/1176	PM10 hourly average measurement x10	4	R	1	UINT16	1	0-10000 corresponding to 0-1000.0 µg/m ³	
54/1179	CO ₂ hourly average measurement x1	4	R	1	UINT16	0	0-5000 corresponding to 0-5,000 ppm	
55/1180	TVOC hourly average measurement x1000	4	R	1	UINT16	3	0-3575 corresponding to -4,000 mg/m ³	
56/1150	PM2.5 one minute average measurement x10	4	R	1	UINT16	1	0-10000 corresponding to 0-1000.0 µg/m ³	
57/1151	PM10 one minute average measurement x10	4	R	1	UINT16	1	0-10000 corresponding to 0-1000.0 µg/m ³	
58/1152	Temperature real-time measurement x100	4	R	1	INT16	2	-2000-6000 corresponding to -20.00 °C-60.00 °C	
59/1153	Humidity real-time measurement x100	4	R	1	UINT16	2	0-10000 corresponding to 0-100.00% RH	
60/1154	CO ₂ real-time measurement x1	4	R	1	UINT16	0	0-5000 corresponding to 0-5,000 ppm	
61/1155	TVOC real-time measurement x1000	4	R	1	UINT16	3	0-3575 corresponding to -4,000 mg/m ³	
62/1200	PM2.5 24-hour moving average measurement x10	4	R	1	UINT16	1	0-10000 corresponding to 0-1000.0 µg/m ³	
63/1201	PM10 24-hour moving average measurement x10	4	R	1	UINT16	1	0-10000 corresponding to 0-1000.0 µg/m ³	
66/1204	CO ₂ 24-hour moving average measurement x1	4	R	1	UINT16	0	0-5000 corresponding to 0-5,000 ppm	
67/1205	TVOC 24-hour moving average measurement x1000	4	R	1	UINT16	3	0-3575 corresponding to 0-4,000 mg/m ³	

CORRECTION AND CALIBRATION

Regular Correction

In order to ensure the accuracy of the measured value, the C7355B should be corrected every year. The correction should be carried out when a large deviation in the measured value occurs even if it has been used for less than one year.

This chapter describes the correction environment and requirement needed on user's site, the correction could be carried out by user via RS-485.

The following environment conditions are required for field correction.

CORRECTION ENVIRONMENT:

Temperature: 68 °F to 77 °F (20 to 25 °C)

Humidity: 40% to 50% RH

The C7355B needs to be placed in the indoor natural environment within the above temperature and humidity range. There should be windows and no human interference with good air circulation.

The room area for correction should not be less than 325 ft² (30 m²).

CALIBRATION STANDARDS NEEDED FOR ON-SITE CORRECTION.

PM2.5/PM10

PM2.5/PM10 calibration standard: A PM2.5 instrument, such as TSI 8533, or a new C7355B device. After PM2.5 calibration standard and C7355B that needs to be corrected are powered on continuously and synchronously for more than 10 minutes, record the PM2.5 value for 30 minutes, the synchronous average value over 30 minutes can be applied for correction.

Temperature and humidity

Temperature and humidity calibration standard: commercial or industrial temperature and humidity calibration standard.

After the temperature and humidity calibration standard and C7355B that needs to be corrected are powered on continuously and synchronously for more than 60 minutes, start to record the value of temperature and humidity for 10 minutes, use the synchronous average value within 10 minutes over correction.

CO₂

CO₂ calibration standard: e.g. CO₂ transmitter. Outdoor CO₂ reference value is about 380ppm-420ppm.

After the CO₂ calibration standard and C7355B that needs to be corrected are powered on continuously and synchronously for more than 48 hours, the CO₂ value shall be continuously recorded for 30 minutes, use the synchronous average value over 30 minutes for correction.

TVOC

TVOC calibration standard:

TVOC sensors produced by different manufacturers are sensitive substances at difference levels, it is recommended to use a new C7355B as the TVOC calibration standard

After the TVOC and C7355B that needs to be corrected are powered on continuously and synchronously for more than 48 hours, record the TVOC value continuously for 30 minutes and use the synchronous average value over 30 minutes for correction TVOC value will be stable only after correction and at least 24 hours power-on.

Measurements Adjustment Via Modbus:

1. Temperature
2. Humidity
3. CO₂
4. TVOC coefficient
5. Particle coefficient

Use MODBUS PC software to operate according to the following table:

Table 3. Measurement Adjustment via MODBUS.

	Temperature value adjustment	RH value adjustment	CO₂ value adjustment	TVOC coefficient adjustment	Particle total environmental coefficient adjustment
Function code	3(Read)/16(Write)	3(Read)/16(Write)	3(Read)/16(Write)	3(Read)/16(Write)	3(Read)/16(Write)
Starting point (Base 0)	4	6	14	12	1224
Data length	2	2	1	2	2
Data type	32 Bit Float Big-endian	32 Bit Float Big-endian	INT16	32 Bit Float Big-endian	32 Bit Float Big-endian
Setting value	Standard reading - C7355A local temperature measured value	Standard reading - C7355A local humidity measured value	Standard reading - C7355A local CO ₂ measured value	Standard reading/TVOC local measured value	Standard reading X C7355A local PM2.5 average measured value
Setting range	-9.00~+9.00 °F(--5.00~+5.00 °C)	-10.00~+10.00%RH	-300~+300 ppm	0.001~65.000 times	0.001~10.000 times

MAINTENANCE & FAULT CHECK

Maintenance

To ensure accurate C7355B data, regular maintenance is required in normal use environments. Depending on the environment in which it is used, maintenance is usually required once every 3 months. Public places with high concentration of dust, dry seasons, pollen seasons, and poor environmental cleanliness can shorten the maintenance period.

Maintenance should include: cleaning of the outer casing, internal structure cleaning, air inlet filter cleaning, and module cleaning.

Regular Maintenance

1. Cleaning of the inlet filter: The general maintenance period is every 3 months.
2. Cleaning of internal structure: The general maintenance period is every 12 months.
3. Sensing module cleaning: The general maintenance period is every 12 months.

Maintenance Procedure

1. Open the upper compartment of the main unit.

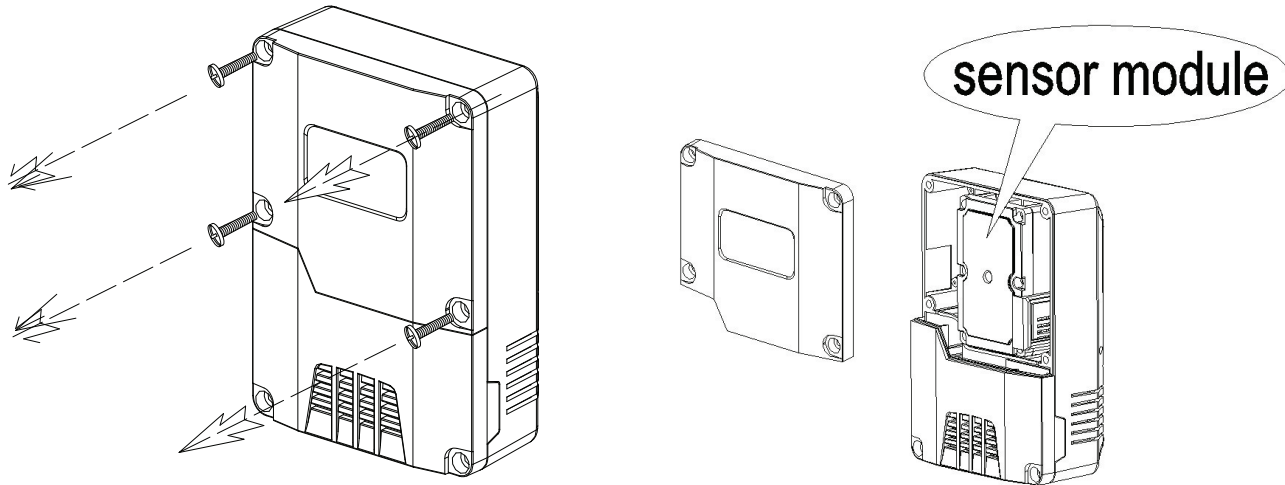


Fig. 11.

2. Remove the dust filter next to the air inlet of the sensor module, clean the filter.

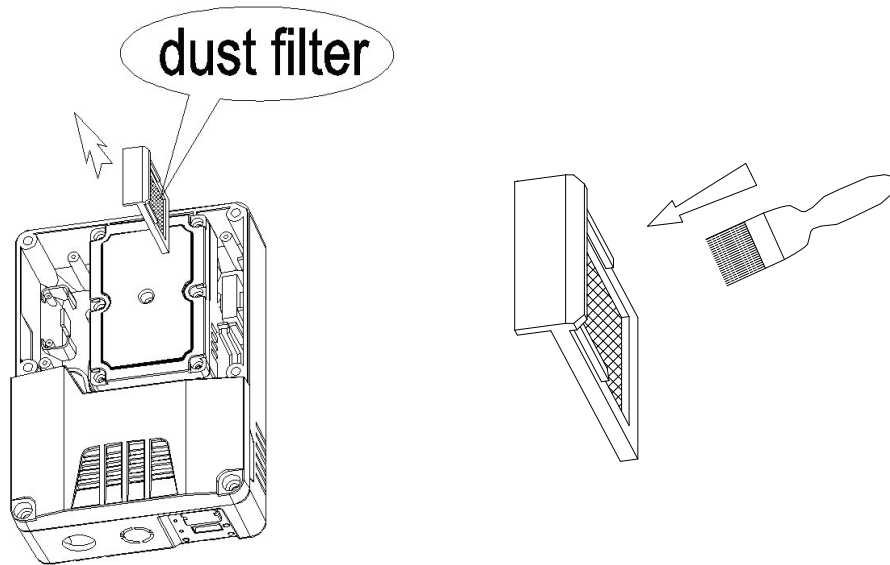


Fig. 12.

3. Remove the mounting screw on the middle of the sensor module, take out the sensor module, and clean the sensor module inlet and outlet, use compressed air to clean the sensor module inside.

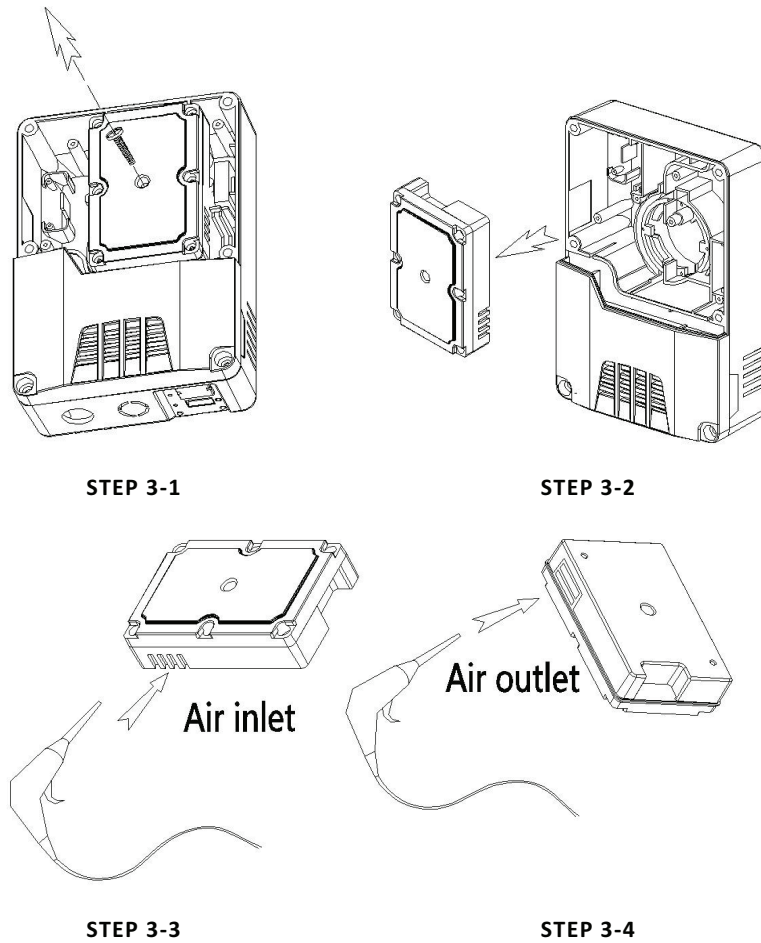


Fig. 13.

4. Assembling the sensor module after cleaning

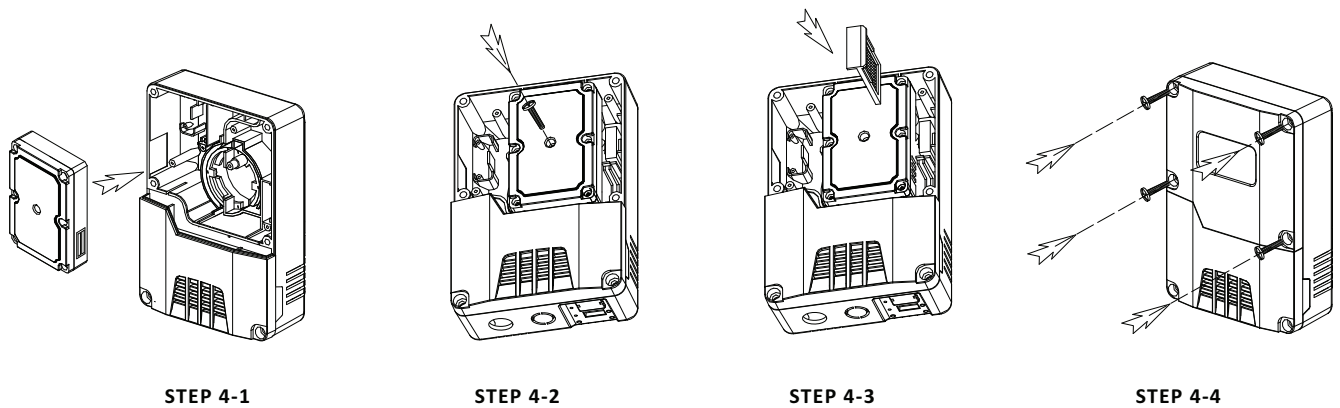


Fig. 14.

Fault Check

If a fault occurs in a normal use environment, see Table 4 to troubleshoot. If the fault cannot be eliminated, contact the dealer or the manufacturer.

Table 4. Fault Check-out.

Fault condition	Troubleshooting
PM2.5 data abnormal, deviation is too large, the value is too high or too low	Check whether there is debris or a lot of dust in the C7355A housing or on the air inlet and air outlet.
The CO ₂ data is abnormal, the value is too high or too low	The CO ₂ sensor has a self-calibration function inside. Usually the self-calibration will return CO ₂ values to normal. Self-calibration conditions: The CO ₂ concentration is around 400 ppm for at least 4 hours in every 24 periods. The self-calibration environment should last for one week.
TVOC's deviation is too large (high or low)	TVOC in the environment needs to be stabilized for at least 48 hours after the sensor is powered on. TVOC data deviation may be a little large within a short time after power is on. TVOC base line deviation may result in large data deviation. The equipment can be placed outside the window or outdoors for at least 24 hours when the outdoor air is good and clear, allowing TVOC to retrace its baseline.
Temperature and humidity deviation is too large, the value is too high or low	Check whether the environmental factors surrounding the C7355B has any influence, such as direct sunlight, close to the heating or air conditioning air outlets, etc.
Temperature and humidity deviation is too large; value does not change for a long time	Sensor can be powered off and back on to see if the reading returns to normal. If value cannot be recovered, contact the dealer or manufacturer.
Communication interruption RS-485 (Modbus RTU)	Check if the power supply is normal and if the RS-485 terminal is loose. Check whether the RS-485 communication line is accidentally cut. Check for an inductive load with electromagnetic interference near the equipment or RS-485 communication line, such as a water pump.

Waste Electrical and Electronic Equipment (WEEE)



- At the end of the product life, dispose of the packaging and product in an appropriate recycling center.
- Do not dispose of the device with the usual domestic refuse.
- Do not burn the device.

FCC Part 15 compliant

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:
 (1) This device may not cause harmful interference, and
 (2) This device must accept any interference received, including interference that may cause undesired operation.

Honeywell Building Technologies

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