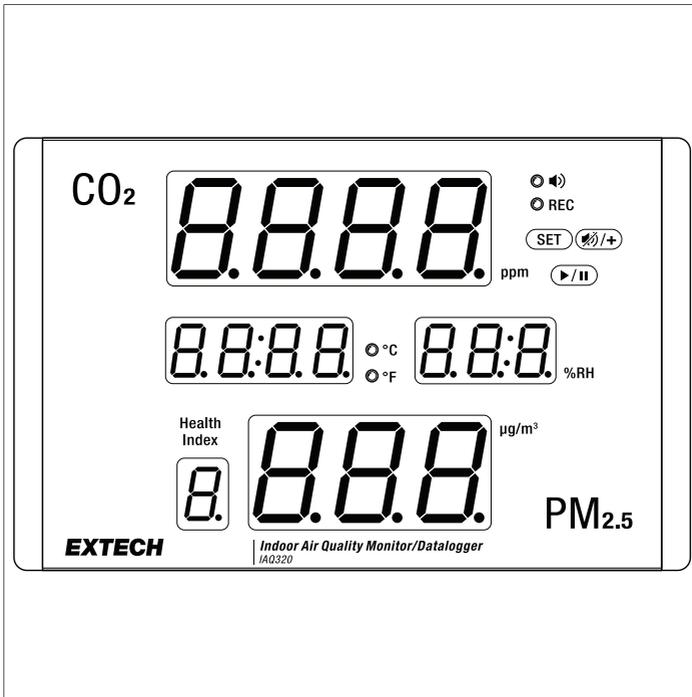


## Model IAQ320, Indoor Air Quality Monitor / Datalogger

Displays PM<sub>2.5</sub>, CO<sub>2</sub>, Humidity, Temperature, and Health Index





# 1 Introduction

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## 1.1 Product Overview

Thank you for selecting the Extech model IAQ320 air quality monitor. The monitor is easy to use and offers high accuracy, quick response, and intelligent operation.

In addition to monitoring PM<sub>2.5</sub> (particulate matter, or dust) and CO<sub>2</sub> (carbon dioxide) concentration, the IAQ320 also monitors ambient Temperature and Relative Humidity, and calculates 'Health Index'.

Visual and audible alarms alert you when air quality is unhealthy or immediately hazardous. The internal data logger can store up to 12,000 readings that can be downloaded to a PC and opened in a spreadsheet.

This device, when used properly, will provide years of reliable service.

## 1.2 Product Features

- Large display and intuitive user interface
- Tricolor light bars for viewing CO<sub>2</sub> and PM status from a distance
- Desktop or wall-mount installation
- Alarm function with audible and visual alerts
- USB port for power and PC interface
- Data logger stores up to 12,000 readings
- Transfer readings to PC and open in a spreadsheet
- High accuracy PM<sub>2.5</sub> sensor (laser type)
- NDIR (non-dispersive infrared) waveguide CO<sub>2</sub> concentration measurement method
- Automatic background CO<sub>2</sub> calibration (ABC) provides long-term drift compensation

## 1.3 Supplied Materials

- IAQ320 monitor
- USB-C cable (for charging and data transfer)
- Universal AC adapter
- User manual
- Mounting materials (adhesive and mounting screws)
- Ten (10) spare air inlet filters (see *Maintenance* section)

# 2 Safety

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## CAUTION

Do not block or obstruct air inlet, air outlet, or ventilation openings, otherwise the meter can overheat.

To avoid overheating, disconnect the meter from the power source when not in use.

To avoid damage to the meter and injury to persons, use only the supplied AC adapter or a PC USB port to power the meter.

# 3 Meter Power

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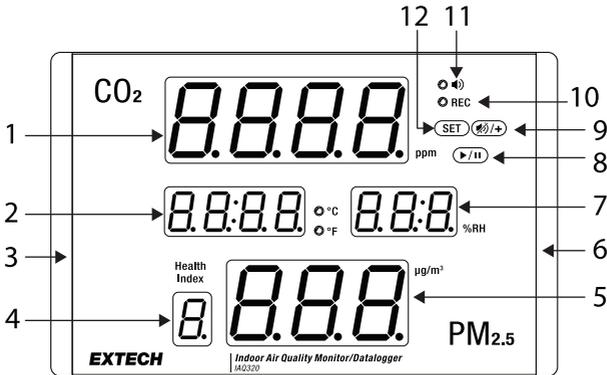
The IAQ320 is powered using the supplied USB cable and AC adapter, as described below.

1. Connect the supplied USB cable to the meter. The meter's USB port is located on its right side.
2. Connect the other end of the USB cable to the supplied AC adapter. Connect the adapter to an AC power source. The meter can also be powered by connecting it to a PC USB port.
3. Allow 30 minutes warm-up time before using the data logger function.

If the meter display switches off, check that the USB cable and power adapter are securely connected. See the *Maintenance* section for further troubleshooting information.

# 4 Product Description

## 4.1 Front Panel

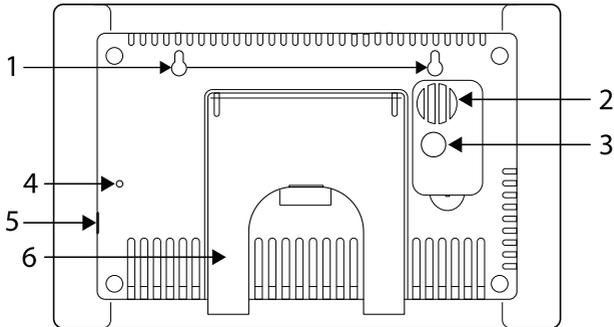


1. CO<sub>2</sub> concentration (0 to 9999 ppm)
2. Ambient temperature 14 to 140°F (10 to 60°C)
3. Tricolor light bar for CO<sub>2</sub> (green: low, yellow: moderate, red: alarm)
4. Health index (1 to 7) based on 24 hour average
5. PM<sub>2.5</sub> dust concentration (0 to 999 µg/m<sup>3</sup>)
6. Tricolor light bar for PM<sub>2.5</sub>
7. Relative humidity (0.1 to 99.9%)
8. Start / Stop data logger button
9. Beeper mute and plus (+) button
10. Data log record LED indicator
11. Alarm LED indicator
12. Settings button

## 4.2 Control Buttons

	Long press to access the Settings menu.
	Short press to silence the alarm beeper (beeper is disabled by default, enable it in the Settings menu). In the Settings menu, short press to change a value.
	Long press to start/stop the data logger.

### 4.3 Rear Panel



1. Wall-mount holes
2. Air outlet
3. Air inlet with replaceable filter. Loosen the screws to access the filter
4. Reset button (recessed)
5. USB port for meter power and PC interface
6. Tilt stand

# 5 Operation

 <b>CAUTION</b>
The IAQ320 is limited to monitoring air in an approximately 19.8 x 19.8 ft. (6 x 6 m) range. The range varies depending on the height of the room and the contents in the area. For larger areas, an additional meter may be necessary to provide adequate coverage.

## 5.1 Taking Measurements

1. Connect the meter to a power source using the supplied USB cable, as described in the *Meter Power* section.
2. Allow a ten-second warm-up; the meter will display the ten-second timer.
3. The meter will begin displaying CO<sub>2</sub>, PM<sub>2.5</sub>, temperature, humidity, and health index.
4. For best accuracy, allow a 30 minute warm-up before using the data logger.

## 5.2 Three-Color Alarm Light Bars

As shown in the *Product Description* section, there are two tricolor light bars, one to the left of the display (CO<sub>2</sub> concentration) and one to the right (PM<sub>2.5</sub>).

Each light bar has two thresholds. One threshold switches the light bar from green to yellow, and the other from yellow to red (alarm). The table below shows the default threshold and the range of adjustment. Set the threshold in the Settings menu.

The front panel Alarm LED and audible beeper (if enabled) will trigger when a light bar turns red.

Light Bar Colors	CO <sub>2</sub> (ppm)	PM <sub>2.5</sub> (µg/m <sup>3</sup> )
Green to Yellow	Adjustable: 700 to 3000 in Settings menu (default: 800)	Adjustable: 10 to 100 in Settings menu (default: 35)
Yellow to flashing Red	Adjustable: 700 to 3000 in Settings menu (default: 1000)	Adjustable: 10 to 100 in Settings menu (default: 54)

## 5.3 Audible Beeper

The beeper sounds once per second when the CO<sub>2</sub> or PM<sub>2.5</sub> reading exceeds an alarm threshold (set the alarm threshold in the Settings menu). Press the mute button  to silence an alarm. The beeper is disabled by default; enable it in the Settings menu.

#### 5.4 Health Index

The Health Index shows PM<sub>2.5</sub> as a factor (1 to 7). A factor of 1 indicates good air quality; a factor of 7 indicates an extremely hazardous condition. The Health Index is defined by the EPA (Environmental Protection Agency in the US), refer to the table below.

Health Index	Description	Range (µg/m <sup>3</sup> , 24 hour average)
1	Good	0.0 to 12.0
2	Moderate	12.1 to 32.4
3	Unhealthy for sensitive people	35.5 to 55.4
4	Generally unhealthy	55.5 to 150.4
5	Very unhealthy	150.5 to 250.4
6	Hazardous	250.5 to 350.4
7	Extremely hazardous	350.5 to 500

# 6 Settings Menu

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## 6.1 Settings Menu Overview

Long press the **SET** button to open the menu. In the menu, short press the **SET** button to step through the options explained below. Press the '+' button to change a setting. If no button is pressed within 25 seconds, the meter will automatically exit the menu.

## 6.2 Light Bar Brightness

Use the '+' button to set the CO<sub>2</sub> and PM<sub>2.5</sub> light bar brightness (bLt) from 0 (off) to 10 (brightest); the default is 6.

The light bars continue to flash (at their weakest setting) in an alarm condition, even when the light bars are switched off.

## 6.3 CO<sub>2</sub> Alarm

**ALC 2.0:** Use the '+' button to set the alarm threshold. In operation, when the threshold is reached, the light bar turns from green (good) to yellow (moderate) in color. The range is 700 to 3000 ppm in 100 ppm steps (default is 800).

**ALC 2.1:** Use the '+' button to set the alarm threshold. In operation, when the threshold is reached, the light bar turns from yellow to red (alarm condition). The default setting is 1000.

When a light bar turns red, the front panel alarm LED will flash and the audible beeper will sound at 1 second intervals. Enable the beeper in this Settings menu (below), it is disabled by default.

If the ALC 2.0 and 2.1 thresholds are set to the same value, the yellow light bar action is disabled.

## 6.4 PM<sub>2.5</sub> Alarm

**ALC 3.0:** Use the '+' button to set the alarm threshold. In operation, when the threshold is reached, the light bar turns from green (good) to yellow (moderate) in color. The range is 10 to 100 ug/m<sup>3</sup> (default is 35).

**ALC 3.1:** Use the '+' button to set the alarm threshold. In operation, when the threshold is reached, the light bar turns from yellow to red (alarm condition). The default setting is 55.

When a light bar turns red, the front panel alarm LED will flash and the audible beeper will sound at 1 second intervals. Enable the beeper in this Settings menu (below), it is disabled by default.

If the ALC 3.0 and 3.1 thresholds are set to the same value, the yellow light bar action is disabled.

### **6.5 Temperature Units**

Press the '+' button to toggle the °C/°F temperature units.

### **6.6 Beeper Enable/Disable**

Press the '+' button to toggle the beeper ON/OFF.

### **6.7 Pressure Compensation**

Use the '+' button to adjust the compensation from 600 to 1100 hPa (default is 1013).

This setting allows you to calibrate the meter at one altitude and use it at a different altitude, with no affect on accuracy.

Note that hPa stands for hecto-pascal which is a unit of pressure equal to one millibar (1 hPa = 1 mb). The default setting of 1013 represents the pressure at sea level.

### **6.8 Automatic CO<sub>2</sub> Baseline Calibration (ABC)**

This process is enabled by default. To disable it, use the '+' button.

When enabled, the meter will record the lowest CO<sub>2</sub> reading over the previous 7 days and use it as the 400 ppm calibration reference. This reduces long-term drift, but is not suggested for use in hospitals, green houses, wineries, and other areas with poor ventilation.

# 7 Data Logger

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## 7.1 Data Logger Overview

The meter can automatically log up to 12,000 readings at an adjustable sampling rate. The meter must be powered for 30 minutes before accurate readings can be logged. Before logging can begin, **the logger must be connected to a PC and configured**, using the supplied pop-up configuration window, as explained below.

When logging is complete, download the records by reconnecting the meter to the PC and using the same configuration window.

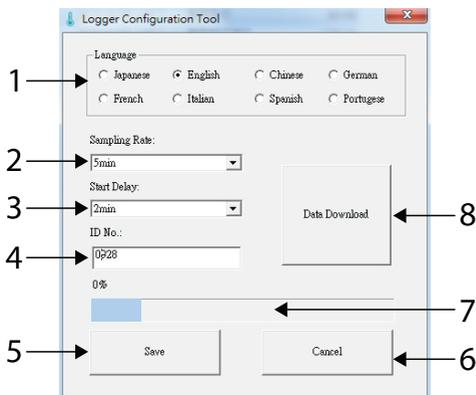
## 7.2 Connecting to a PC

Attach the supplied USB cable to the meter (right side) and to the Windows® PC USB port. The PC will recognize the meter as an external storage drive named **PDF Logger**. There is no need to install software, as the PC interface is plug-and-play; the meter configuration window will automatically open.

If the configuration window does not open, double-click the recognized **PDF LOGGER** drive on the PC and double click the **Logger Configuration Tool** program file – the configuration window should now open.

### 7.3 Configuring the Data Logger

Set the options in the Configuration window and click **SAVE** to prepare for data logging. The numbered list, below, references the numbered items in the accompanying screen shot.



1. Click the **Language** that will be used for the data log report files.
2. Set the **Sampling rate**. This is the rate at which readings will be captured (from 1 minute to 2 hours).
3. Set the **Start Delay** time (interval of time that the meter waits, after the start button  is pressed, before logging begins).
4. Custom **ID** (optional four-digit code that gives each logger a unique identifier).
5. Click **SAVE** to store the configuration and to synchronize the PC time zone with the meter.
6. Click **CANCEL** to abort the configuration.
7. After logging, when downloading data, track the download progress on this bar.
8. After logging, return to this window and tap **Data Download** to download the readings to PC.

After configuring the data logger, eject the data logger by right-clicking the **PDF Logger** drive on the PC and selecting **Eject**. Physically disconnect the meter from the PC by first disconnecting the USB cable from the PC and then the meter.

## 7.4 Starting/Stopping the Datalogger

After configuring the data logger, as explained above, place the meter in the test area and long press the start/stop button (▶/⏻) to start logging at the programmed rate. The sample rate is set during the configuration process, above. The front panel **REC** LED will flash while the meter is logging.

Note that the start/stop button must be pressed within 30 minutes after clicking **SAVE** in the configuration window, otherwise the configuration will expire and the data logger must be configured again. However, you can set a **Start Delay** timer (in the configuration process) to override the 30 minute expiration. You can then press the start/stop button immediately after configuring the data logger but not have it start until a later time.

When the memory is full the meter will display **FULL** and logging will stop. To stop the logger manually, long press the start/stop button (the **REC** indicator will switch off).

Note: If the meter switches off while data logging, the data stored for the current session will be lost. The data logger must be re-configured and restarted.

## 7.5 Downloading Data Log Files

1. Connect the meter to the PC and open the configuration window as described in the *Configuring the Data Logger* section.
2. Click **Data Download** in the configuration window and choose the location where the file will be stored on the PC.
3. Saved files are standard \*.csv text files that are easily opened in spreadsheets and other applications. See example below.

	A	B	C	D	E	F	G	H	I
1	Config Time	2022/6/9	14:59:31	Start Time	2022/6/9	14:59:45			
2	Start Delay	00:02:00		Sampling Rate	00:02:00				
3	ID No.	1041		Total Records	6				
4									
5	Index	Date	Time	PM2.5	CO2	TA(C)	RH(%)	HEALTH-INDEX	
6	1	2022/6/9	15:01:45	5	599	26.7	69	1	
7	2	2022/6/9	15:03:45	8	595	27.3	66.8	1	
8	3	2022/6/9	15:05:45	8	591	27.8	65.9	1	
9	4	2022/6/9	15:07:45	7	586	28.2	65.1	1	
10	5	2022/6/9	15:09:45	8	573	28.6	64	1	
11	6	2022/6/9	15:11:45	7	561	28.9	63.4	1	

Each record includes the time-stamped PM<sub>2.5</sub>, CO<sub>2</sub>, temperature, humidity, and health index values. The record includes the configuration information (configuration time, start time, start delay, sample rate, logger ID) and the total number of readings captured.

# 8 Maintenance

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## 8.1 Cleaning

Gently wipe the housing and display using a damp, lint-free cloth. Mild soap can be used, if necessary. Do not use detergents, solvents, or abrasives.

## 8.2 CO<sub>2</sub> Calibration

The meter is factory calibrated to 400 ppm CO<sub>2</sub> concentration. To check the calibration, place the meter in fresh air and wait five minutes. If the meter reads 400 ppm (within the specified accuracy) the meter is in calibration, however it is recommended that calibration be performed often to ensure the highest accuracy. Follow the steps, below, to calibrate the meter.

1. Press the **SET** and **+** buttons simultaneously until **CAL** and **400** are displayed.
2. Long press the **SET** button to start the calibration. During the calibration, **400** will flash on the display.
3. After five minutes, the display will return to the normal mode of operation, indicating that the calibration is complete.

 <b>CAUTION</b>
Do not calibrate the meter in areas where the CO <sub>2</sub> level is unknown, inaccurate readings will result.
Perform calibration outdoors, in fresh air, with adequate ventilation. Do not perform a calibration in areas with high humidity or when raining. Do not calibrate near groups of people, or other areas where high CO <sub>2</sub> levels exist (near ventilators or fireplaces, for example).

## 8.3 PM<sub>2.5</sub> Sensor Maintenance

- When dust accumulates in the sensor, the fan automatically switches on. No manual cleaning is needed. To start the fan manually, press the **SET** and  buttons simultaneously; a ten-second cleaning process will begin. Please perform this step in clean, fresh air.
- Keep the rear air inlet port and outlet vent unobstructed.
- Replace the filter in the air inlet, as necessary, to ensure proper air flow. Remove the screw to access the filter (see the *Product Description* section).
- To ensure optimal sensor operation, avoid condensation.
- The sensor is affected by vibration and loud sounds. Do not mount the meter near machinery or other vibration and noise sources.

- Wide fluctuations in the ambient relative humidity can cause an increase in particle accumulation readings.

#### 8.4 Error Codes

The meter will display codes under certain conditions, refer to the table below.

CODE	DESCRIPTION	SOLUTION
E01	Sensor damage	Return meter for service
E02	Under-range reading	in CO <sub>2</sub> mode: Re-calibrate. For other modes: Place the meter at room temperature for 30 minutes and recheck. If issue persists, return for service.
E03	Over-range reading	in CO <sub>2</sub> mode: Place the meter in fresh air for 5 minutes. For other modes: Place the meter at room temperature for 30 minutes and recheck. If issue persists, return for service.
E17	Calibration failed	Return meter for service
E31...E34	Temperature/RH circuit failure	Return meter for service

#### 8.5 Reset Button

If the display locks or otherwise malfunctions, press the reset button on the back of the meter (see the *Product Description* section). Use a pin or similar tool to reach the recessed button. When the button is pressed, the meter will restart.

If problems persist, disconnect the meter from power for at least 2 hours and check again. Contact FLIR support if the device cannot be reset.

# 9 Specifications

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## 9.1 Measurement Ranges

Measurement	Range	Resolution
CO <sub>2</sub>	0 to 9999 ppm (parts per million)	1 ppm
PM <sub>2.5</sub>	0 to 999 µg/m <sup>3</sup> (micro grams per meters cubed)	1 µg/m <sup>3</sup>
Ambient temperature	14.0 to 140.0°F (-10.0 to 60.0°C)	0.1°
Relative humidity	0.1 to 99.9%	0.1%
Health Index (factor)	1 to 7	1

## 9.2 Accuracy

Measurement	Accuracy
CO <sub>2</sub>	± (40 ppm + 3% of reading) from 400 to 2000 ppm; otherwise 10% of reading
PM <sub>2.5</sub>	0 to 100: ± 10 µg/m <sup>3</sup> 101 to 999: ± 10% of reading
Ambient temperature	± 0.9°F (0.6°C)
Relative humidity	± 5% at 77°F (25°C) from 10 to 90% RH; otherwise ± 7%

## 9.3 Response Time

Measurement	Response Time
CO <sub>2</sub>	< 30 seconds (63% step change)
PM <sub>2.5</sub>	< 30 seconds (90% step change)
Ambient temperature	< 2 minutes (90% step change)
Relative humidity	< 20 minutes (90% step change)

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#### 9.4 General Specifications

Meter power	Supplied USB cable and universal AC adapter. Compatible with 100 to 240 V AC systems (50/60 Hz)
Power consumption	< 500 mA
Data logger memory	12,000 readings. Transferable to PC via USB connection
Operating temperature	32 to 122°F (0 to 50°C)
Storage temperature	-4 to 122°F (-20 to 50°C)
Operating/storage humidity	0 to 95%, non-condensing
Dimensions	10.1 x 6.6 x 1.8 in. (257 x 168 x 45.5 mm) L x W x D
Weight	1.3 lbs. (610 g)

# 10 Limited 2–Year Warranty

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FLIR Systems, Inc. warrants this Extech brand instrument to be free of defects in parts and workmanship for two (2) years from date of purchase. To view the full warranty, please visit the site below.

<https://www.extech.com/support/warranties>

# 11 Customer Support

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Customer Support Telephone List	<a href="https://support.flir.com/contact">https://support.flir.com/contact</a>
Repair, Calibration, and Technical Support	<a href="https://support.flir.com">https://support.flir.com</a>



**Website**

<http://www.flir.com>

**Customer support**

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Publ. No.: NAS100144  
Release: AC  
Commit: 95652  
Head: 95652  
Language: en-US  
Modified: 2024-01-19  
Formatted: 2024-01-19

