

---

# AdafruitPM25 Library Documentation

*Release 1.0*

**ladyada**

**Jun 07, 2021**



---

## Contents

---

<b>1</b>	<b>Dependencies</b>	<b>3</b>
<b>2</b>	<b>Installing from PyPI</b>	<b>5</b>
<b>3</b>	<b>Usage Example</b>	<b>7</b>
<b>4</b>	<b>Contributing</b>	<b>9</b>
<b>5</b>	<b>Documentation</b>	<b>11</b>
<b>6</b>	<b>Table of Contents</b>	<b>13</b>
6.1	Simple test . . . . .	13
6.2	adafruit_pm25 . . . . .	15
6.2.1	Implementation Notes . . . . .	15
6.3	adafruit_pm25.i2c . . . . .	15
6.3.1	Implementation Notes . . . . .	15
6.4	adafruit_pm25.uart . . . . .	16
6.4.1	Implementation Notes . . . . .	16
<b>7</b>	<b>Indices and tables</b>	<b>19</b>
	<b>Python Module Index</b>	<b>21</b>
	<b>Index</b>	<b>23</b>



CircuitPython library for PM2.5 Air Quality Sensors



# CHAPTER 1

---

## Dependencies

---

This driver depends on:

- [Adafruit CircuitPython](#)
- [Bus Device](#)

Please ensure all dependencies are available on the CircuitPython filesystem. This is easily achieved by downloading the [Adafruit library and driver bundle](#).





## CHAPTER 2

---

### Installing from PyPI

---

---

**Note:** This library is not available on PyPI yet. Install documentation is included as a standard element. Stay tuned for PyPI availability!

---

On supported GNU/Linux systems like the Raspberry Pi, you can install the driver locally [from PyPI](#). To install for current user:

```
pip3 install adafruit-circuitpython-pm25
```

To install system-wide (this may be required in some cases):

```
sudo pip3 install adafruit-circuitpython-pm25
```

To install in a virtual environment in your current project:

```
mkdir project-name && cd project-name
python3 -m venv .env
source .env/bin/activate
pip3 install adafruit-circuitpython-pm25
```



## CHAPTER 3

---

### Usage Example

---

For example usage, see `examples/pm25_simpletest.py`



## CHAPTER 4

---

### Contributing

---

Contributions are welcome! Please read our [Code of Conduct](#) before contributing to help this project stay welcoming.



## CHAPTER 5

---

### Documentation

---

For information on building library documentation, please check out [this guide](#).





## 6.1 Simple test

Ensure your device works with this simple test.

Listing 1: examples/pm25\_simpletest.py

```
1 # SPDX-FileCopyrightText: 2021 ladyada for Adafruit Industries
2 # SPDX-License-Identifier: MIT
3
4 """
5 Example sketch to connect to PM2.5 sensor with either I2C or UART.
6 """
7
8 # pylint: disable=unused-import
9 import time
10 import board
11 import busio
12 from digitalio import DigitalInOut, Direction, Pull
13 from adafruit_pm25.i2c import PM25_I2C
14
15
16 reset_pin = None
17 # If you have a GPIO, its not a bad idea to connect it to the RESET pin
18 # reset_pin = DigitalInOut(board.G0)
19 # reset_pin.direction = Direction.OUTPUT
20 # reset_pin.value = False
21
22
23 # For use with a computer running Windows:
24 # import serial
25 # uart = serial.Serial("COM30", baudrate=9600, timeout=1)
26
27 # For use with microcontroller board:
```

(continues on next page)

```

28 # (Connect the sensor TX pin to the board/computer RX pin)
29 # uart = busio.UART(board.TX, board.RX, baudrate=9600)
30
31 # For use with Raspberry Pi/Linux:
32 # import serial
33 # uart = serial.Serial("/dev/ttyS0", baudrate=9600, timeout=0.25)
34
35 # For use with USB-to-serial cable:
36 # import serial
37 # uart = serial.Serial("/dev/ttyUSB0", baudrate=9600, timeout=0.25)
38
39 # Connect to a PM2.5 sensor over UART
40 # from adafruit_pm25.uart import PM25_UART
41 # pm25 = PM25_UART(uart, reset_pin)
42
43 # Create library object, use 'slow' 100KHz frequency!
44 i2c = busio.I2C(board.SCL, board.SDA, frequency=100000)
45 # Connect to a PM2.5 sensor over I2C
46 pm25 = PM25_I2C(i2c, reset_pin)
47
48 print("Found PM2.5 sensor, reading data...")
49
50 while True:
51     time.sleep(1)
52
53     try:
54         aqdata = pm25.read()
55         # print(aqdata)
56     except RuntimeError:
57         print("Unable to read from sensor, retrying...")
58         continue
59
60     print()
61     print("Concentration Units (standard)")
62     print("-----")
63     print(
64         "PM 1.0: %d\tPM2.5: %d\tPM10: %d"
65         % (aqdata["pm10 standard"], aqdata["pm25 standard"], aqdata["pm100 standard"])
66     )
67     print("Concentration Units (environmental)")
68     print("-----")
69     print(
70         "PM 1.0: %d\tPM2.5: %d\tPM10: %d"
71         % (aqdata["pm10 env"], aqdata["pm25 env"], aqdata["pm100 env"])
72     )
73     print("-----")
74     print("Particles > 0.3um / 0.1L air:", aqdata["particles 03um"])
75     print("Particles > 0.5um / 0.1L air:", aqdata["particles 05um"])
76     print("Particles > 1.0um / 0.1L air:", aqdata["particles 10um"])
77     print("Particles > 2.5um / 0.1L air:", aqdata["particles 25um"])
78     print("Particles > 5.0um / 0.1L air:", aqdata["particles 50um"])
79     print("Particles > 10 um / 0.1L air:", aqdata["particles 100um"])
80     print("-----")

```

## 6.2 adafruit\_pm25

CircuitPython library for PM2.5 Air Quality Sensors

- Author(s): ladyada

### 6.2.1 Implementation Notes

#### Hardware:

Works with most (any?) Plantower UART or I2C interfaced PM2.5 sensor.

- [PM2.5 Air Quality Sensor and Breadboard Adapter Kit - PMS5003](#)
- [PM2.5 Air Quality Sensor with I2C Interface - PMSA003I](#)
- [Adafruit PMSA003I Air Quality Breakout](#)

#### Software and Dependencies:

- Adafruit CircuitPython firmware for the supported boards: <https://github.com/adafruit/circuitpython/releases>
- Adafruit's Bus Device library: [https://github.com/adafruit/Adafruit\\_CircuitPython\\_BusDevice](https://github.com/adafruit/Adafruit_CircuitPython_BusDevice)

**class** `adafruit_pm25.PM25`  
Super-class for generic PM2.5 sensors.

---

**Note:** Subclasses must implement `_read_into_buffer` to fill `self._buffer` with a packet of data

---

**read()**  
Read any available data from the air quality sensor and return a dictionary with available particulate/quality data

## 6.3 adafruit\_pm25.i2c

I2C module for CircuitPython library for PM2.5 Air Quality Sensors

- Author(s): ladyada

### 6.3.1 Implementation Notes

#### Hardware:

- [PM2.5 Air Quality Sensor with I2C Interface - PMSA003I](#)
- [Adafruit PMSA003I Air Quality Breakout](#)

Works with most (any?) Plantower I2C interfaced PM2.5 sensor.

#### Software and Dependencies:

- Adafruit CircuitPython firmware for the supported boards: <https://github.com/adafruit/circuitpython/releases>
- Adafruit's Bus Device library: [https://github.com/adafruit/Adafruit\\_CircuitPython\\_BusDevice](https://github.com/adafruit/Adafruit_CircuitPython_BusDevice)

**class** `adafruit_pm25.i2c.PM25_I2C` (*i2c\_bus*, *reset\_pin=None*, *address=18*)  
A module for using the PM2.5 Air quality sensor over I2C

### Parameters

- **i2c\_bus** – The `busio.I2C` object to use.
- **reset\_pin** (*Pin*) – Pin use to reset the sensor. Defaults to `None`
- **address** (*int*) – The I2C address of the device. Defaults to `0x12`

### Quickstart: Importing and using the PMSA003I Air quality sensor

Here is one way of importing the `PM25_I2C` class so you can use it with the name `pm25`. First you will need to import the libraries to use the sensor

```
import board
import busio
from adafruit_pm25.i2c import PM25_I2C
```

Once this is done you can define your `busio.I2C` object and define your sensor object

```
i2c = busio.I2C(board.SCL, board.SDA, frequency=100000)
reset_pin = None
pm25 = PM25_I2C(i2c, reset_pin)
```

Now you have access to the air quality data using the class function `adafruit_pm25.PM25.read`

```
aqdata = pm25.read()
```

## 6.4 adafruit\_pm25.uart

UART module for CircuitPython library for PM2.5 Air Quality Sensors

- Author(s): ladyada

### 6.4.1 Implementation Notes

#### Hardware:

Works with most (any?) Plantower UART or I2C interfaced PM2.5 sensor.

- [PM2.5 Air Quality Sensor and Breadboard Adapter Kit - PMS5003](#)

#### Software and Dependencies:

- Adafruit CircuitPython firmware for the supported boards: <https://github.com/adafruit/circuitpython/releases>

**class** `adafruit_pm25.uart.PM25_UART` (*uart, reset\_pin=None*)  
 A driver for the PM2.5 Air quality sensor over UART

#### Parameters

- **uart** (*UART*) – The `busio.UART` object to use.
- **reset\_pin** (*Pin*) – Pin use to reset the sensor. Defaults to `None`

### Quickstart: Importing and using the PMS5003 Air quality sensor

Here is one way of importing the `PM25_UART` class so you can use it with the name `pm25`. First you will need to import the libraries to use the sensor

```
import board
import busio
from adafruit_pm25.uart import PM25_UART
```

Once this is done you can define your `busio.UART` object and define your sensor object

```
uart = busio.UART(board.TX, board.RX, baudrate=9600)
reset_pin = None
pm25 = PM25_UART(uart, reset_pin)
```

Now you have access to the air quality data using the class function `adafruit_pm25.PM25.read`

```
aqdata = pm25.read()
```



# CHAPTER 7

---

## Indices and tables

---

- `genindex`
- `modindex`
- `search`





**a**

`adafruit_pm25`, 14

`adafruit_pm25.i2c`, 15

`adafruit_pm25.uart`, 16



## A

`adafruit_pm25` (*module*), 14  
`adafruit_pm25.i2c` (*module*), 15  
`adafruit_pm25.uart` (*module*), 16

## P

`PM25` (*class in adafruit\_pm25*), 15  
`PM25_I2C` (*class in adafruit\_pm25.i2c*), 15  
`PM25_UART` (*class in adafruit\_pm25.uart*), 16

## R

`read()` (*adafruit\_pm25.PM25 method*), 15