User Manual

Piera-1 Evaluation Kit (PEK)

(SenseiPM Software Guide)

Version 1.3

Piera Systems Inc.

User Manual for Piera-1 Evaluation Kit (PEK)
SenseiPM Software Guide
Document Version 1.3

Table of Contents

1. Introduction

Piera System's Intelligent Particulate Sensor (IPS), **Piera-1** uses a breakthrough approach for detecting and measuring the quantity and size of particles suspended in air with precision. Piera-1 has unparalleled accuracy, and can detect ultrafine submicron particles (PM0.1-PM10) in real-time, with low power consumption. Piera-1 uses a patented, photon-counting custom ASIC to deliver a highly sensitive optoelectronic particulate sensor. It can be programmed to detect a wide range of particle sizes allowing for a single sensor to be used in many applications.

Piera Systems also offer a software called **SenseiPM**, a dedicated software for viewing and logging data from Piera-1. The software allows users to obtain an intuitive real-time information of different sized airborne particles via plots of particle count and mass concentration data. SenseiPM features a data-logging capabilities and data can be exported to .csv file format with time stamp.

SenseiPM offers a function to let users to adjust some key electrical settings (threshold voltage and AFE gain) for Piera-1. This feature is protected by an access code, and not available for all customers. Please contact Piera Systems info@pierasystems.com for more information.

2. Piera-1 Evaluation Kit (PEK)

A PEK includes one Piera-1 unit, a USB cable, SenseiPM software along with this manual. The kit box contains Piera-1 and cable while SenseiPM and soft copies of other documentations can be found in the downloadable SenseiPM.zip file provided electronically.

Please refer to the ReadMe.txt in the SenseiPM.zip file to check the software version.

Piera-1 Evaluation Kit (PEK) box and its contents

3. Getting Started with SenseiPM

3.1. System Requirements

Windows 10, at least 4.1MB disk space is needed. SenseiPM version 1.0.0 runs only on PC, and does not support MacOS. Requires USB port (standard USB-A). The current manual is for SenseiPM V1.5.0.
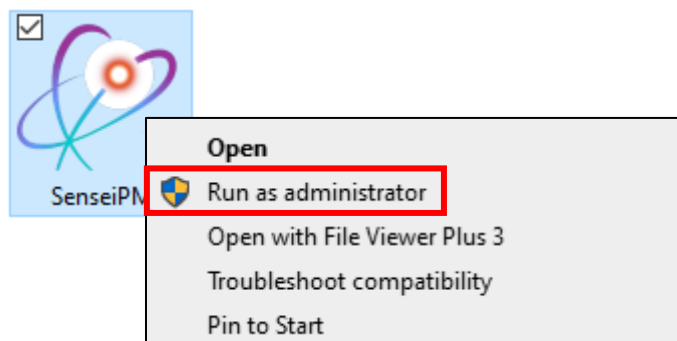
3.2. Installation

3.2.1. Download the SenseiPM.zip and unzip the file under a desired directory. In this example, the file is under "This PC > Downloads > SenseiPM" folder.
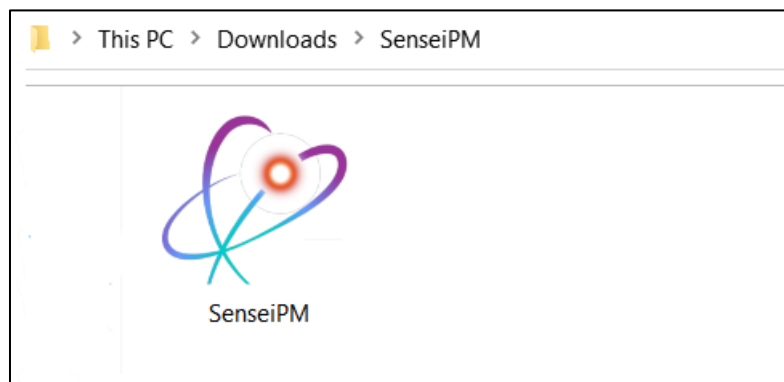

Step 1

3.2.2. Navigate to the directory where the file is saved. Run "SenseiPM.exe" it as administrator by right clicking the SenseiPM icon.
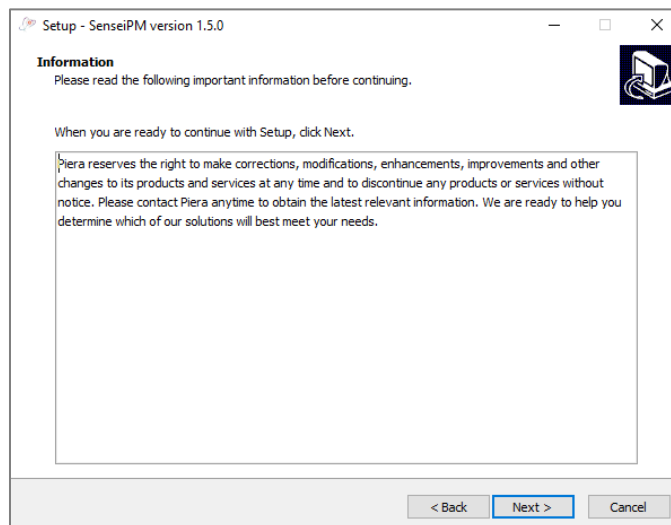

Step 2

3.2.3. Read through the software license agreement on the dialogue box, and select "I accept the agreement" checkbox to continue with the installation. Click "Next" to proceed. Click "Cancel" to quit the installation process any time.
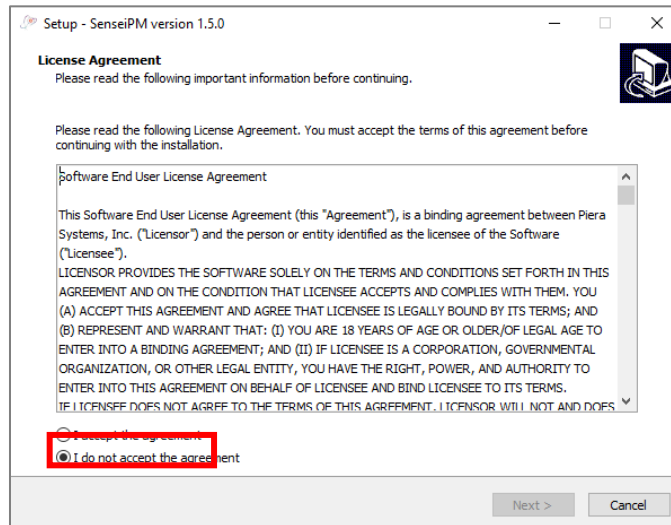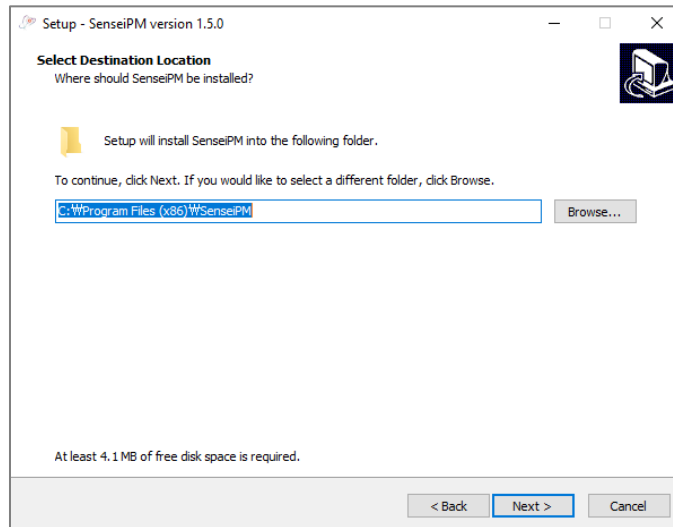

3.2.4. Next, a disclaimer will be presented. Read it carefully and click "Next" once ready.

3.2.5. SenseiPM will be installed under C:\Program Files (x86) by default. Choose a desired destination location by clicking "Browse." A folder named "SenseiPM" will be created at the target location, which will contain the application files. Click "Next."

3.2.6. Select "Create a desktop shortcut" checkbox (optional).
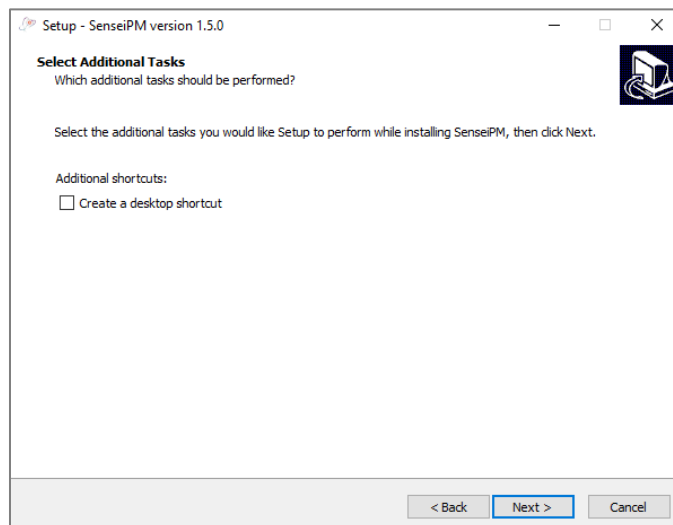
3.2.7. Confrim the current installation information, and click "Install." Click "Back" to change or review your installation settings.
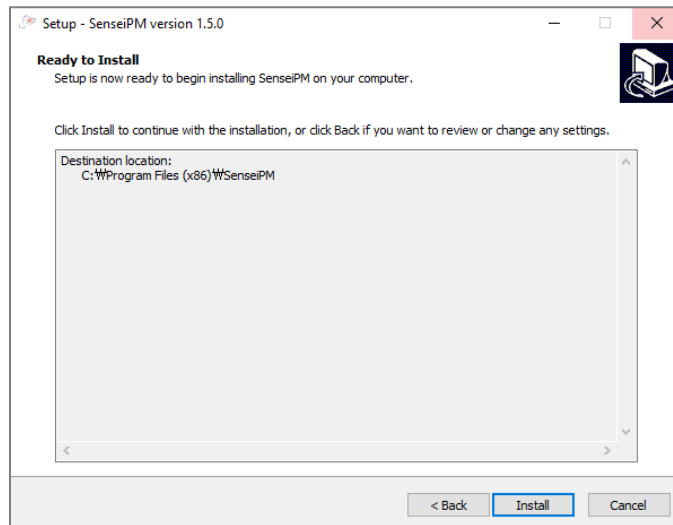
3.2.8. Click "Finish" to exit setup and launch the application once the installation is completed. Uncheck the "Launch SenseiPM" and click "Finish" to exit setup without launching.
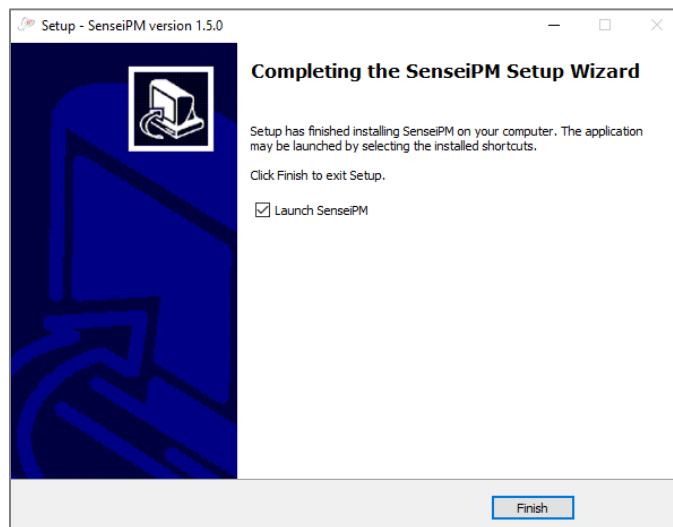
4. How to Use SenseiPM

Run SenseiPM application as administrator from your desktop shortcut. If the "Launch SenseiPM" box was unchecked, the application would need to be launched from your installation directory.

Click "Yes" on the Windows User Account Control dialogue box to allow Windows to run the application.

Home Screen as shown in Fig. 1 will appear.

4.1. SenseiPM

Fig. 1. illustrates the home screen of SenseiPM. The number labeled windows are explained below.

- Section 1: The local system's date and time display window.
- Section 2: Main control window.
- Sections 3-9: Real-time plotting windows for PM0.1, PM0.3, PM0.5, PM1.0, PM2.5, PM5.0, and PM10 respectively, either in particle counts or mass concentration.

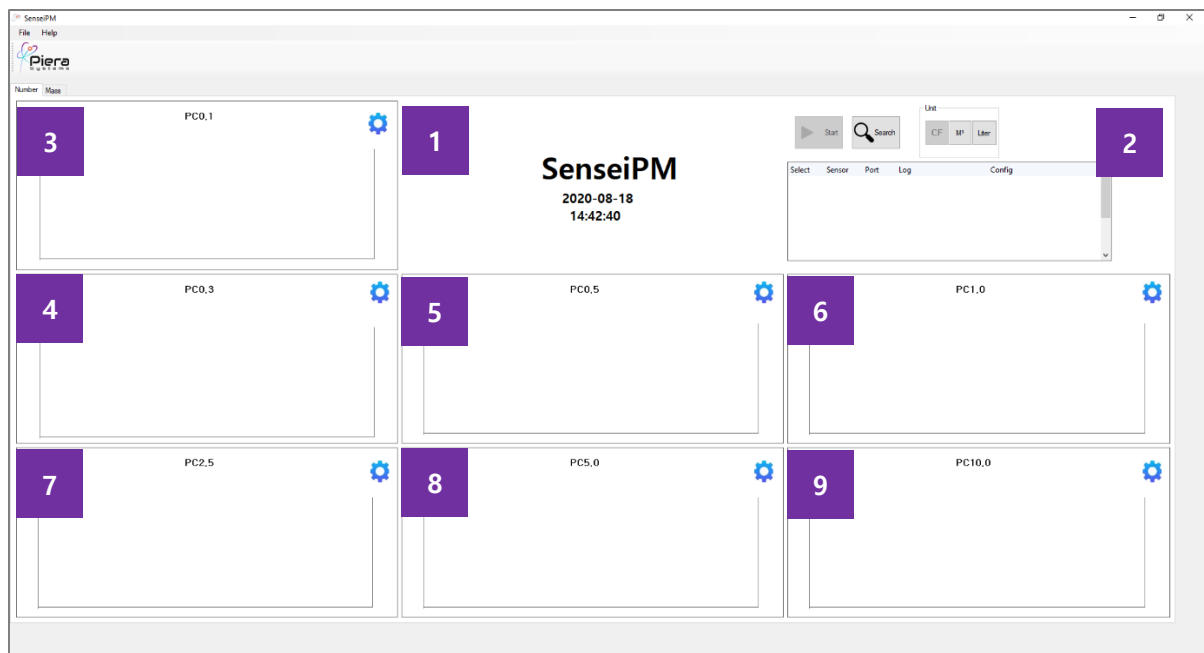Clicking the Piera Systems logo will take you to Piera Systems' website.

Fig. 1. Home screen of SenseiPM

4.2. Connecting Piera-1

Connect Piera-1 to the PC where SenseiPM is installed with a provided USB cable and sync the sensor with SenseiPM by clicking "Search" button on the section 2. A window will pop up confirming that SenseiPM has detected Piera-1 as shown in Fig. 2. Press "Ok" to finish syncing. A "Failure" window will pop up if no sensor is connected or there is a problem with the connection. Please contact Piera Systems support team at support@pierasystems.com for trouble shooting.

Once a Piera-1 is detected and synced, the "Start" button will become active, and the systems is ready for data gathering.
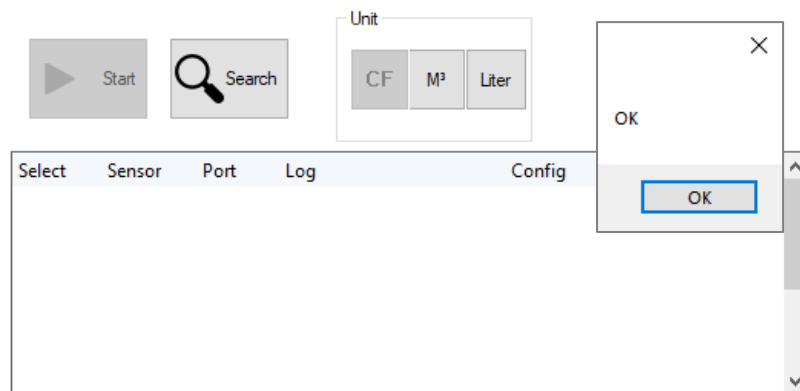

Fig. 2. Main control window before connecting Piera-1

4.3. SenseiPM Functions

4.3.1. Main Control Window:

The window on section 2 shows the list of sensors connected. More than 1 Piera-1 units can be connected simultaneously using a multi USB port. The user can choose to enable or disable data transfer from any connected sensor with the checkbox under "Select."

Click the "Start" button to start reading data from Piera-1. Allow approximately 8 seconds before SenseiPM starts reading. The button will change to "Stop," if "Start" button is clicked. Click the "Stop" button to halt data gathering, and "Stop" button will change back to "Start."

If the box under "Select" is unchecked, plots will not be displayed. Checking the "Log" checkbox will record the data in .csv format, which will be saved under "data" folder in the installation directory. Refer to Fig. 3.

The blue gear icon under "Config" is for modifying various parameters for each sensor. This parameter configuration feature is not available for all customers. User is not permitted to reconfigure the default system settings of each sensor without a Piera Systems' consent and the password.

Clicking on the icon will open a pop-up login window asking for an access password. If you have the password, enter it and press "Ok" to change the sensor parameters that allow Piera-1 to be more versatile by changing its sensitivity and detection range depending on applications.
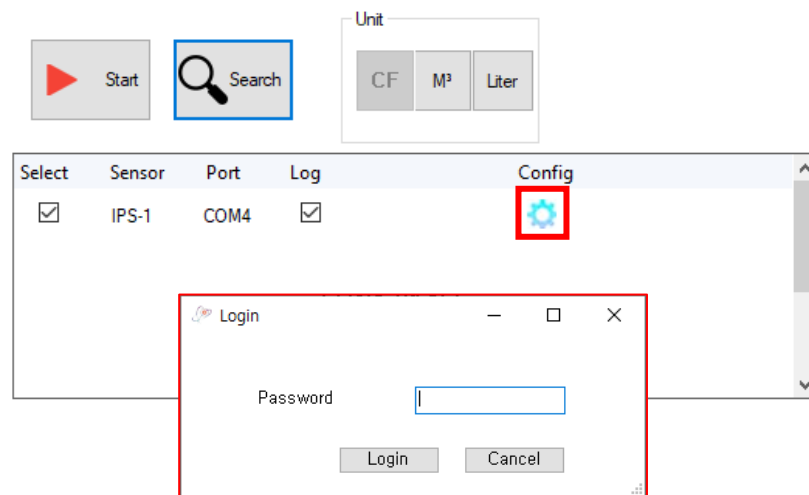

Fig. 3. Main control window after connecting Piera-1, and Config login window

Always press "Stop" before disconnecting Piera-1 from your PC. Severing the connection between Piera-1 and your PC while data being transmitted may cause damage to your sensor. An error window will pop up if the connection is broken as shown in Fig. 4.
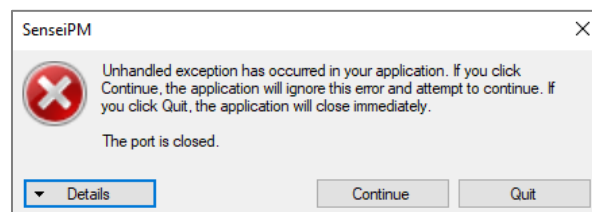

Fig. 4. Error window

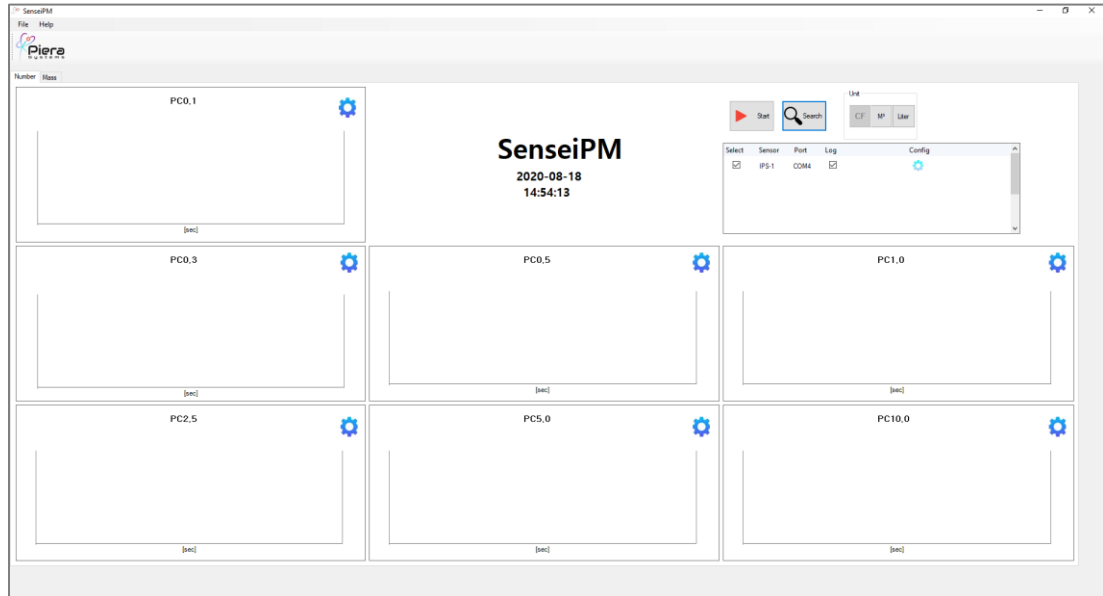Fig. 6 below is an example of SenseiPM in action with one Piera-1 unit connected.

Fig. 6. Home screen of SenseiPM plotting data

4.3.2. Changing Output Units:

Navigate to the top left of the home screen and select either "Number" or "Mass." By default "Number" tab is selected, which plots data in number of particles per cubic feet (displays as N/CF). If "Mass" tab is chosen, the plots will display the results in micrograms per cubic feet (ug/CF) by default. Refer to Fig. 7, reference number 1.

The resulting output unit can be changed (per Cubic Feet – CF, cubic meter – M^3, or Liter) by selecting the respective buttons on the main control window, reference number 2.

Note that the mass concentration values should only be considered as indicative values. It should also be noted that PC0.1 and PM0.1 are not fully calibrated yet. Please contact Piera Systems for more details.

Always evaluate Piera-1 based on particle count readings for 0.3um and above.

4.3.3. Display Settings:

Click on the blue gear icon next to each of the plot windows (Section 3-9) to change axis settings for respective bins. Refer to Fig. 7, reference number 2.

- X-axis interval: Set the major axis spacing (default 10 seconds)
- X-axis X range: Set the range of X-axis in seconds (default time span is 50s).
- Y-axis AutoScale: Selected by default. Turn this feature off by unchecking the box.
- Y-axis Y min: Set the minimum value of the Y-axis.
- Y-axis Y max: Set the maximum value of the Y-axis.
- Chart Line color: Change color of the plot by selecting different colors on the dropdown menu. Red is selected by default.
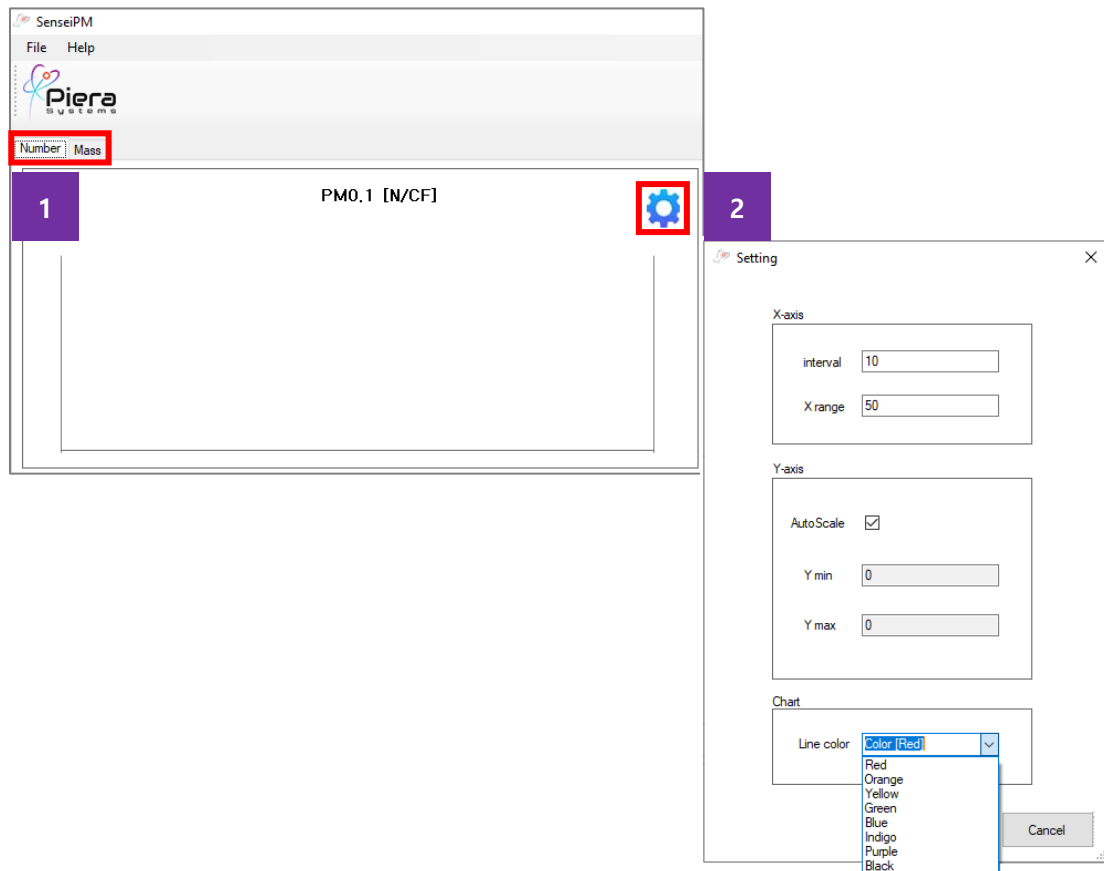

Fig. 7. Settings

4.3.4. Accessing Data Log File:

Click on the "File" menu on the top left corner, and select "Open Logging Folder." The folder SenseiPM will open, and there will be a folder named "data" where .csv data log files can be found. Data will be stored with time stamp. Log file will only be generated if the checkbox under "Log" on the main control window is selected.

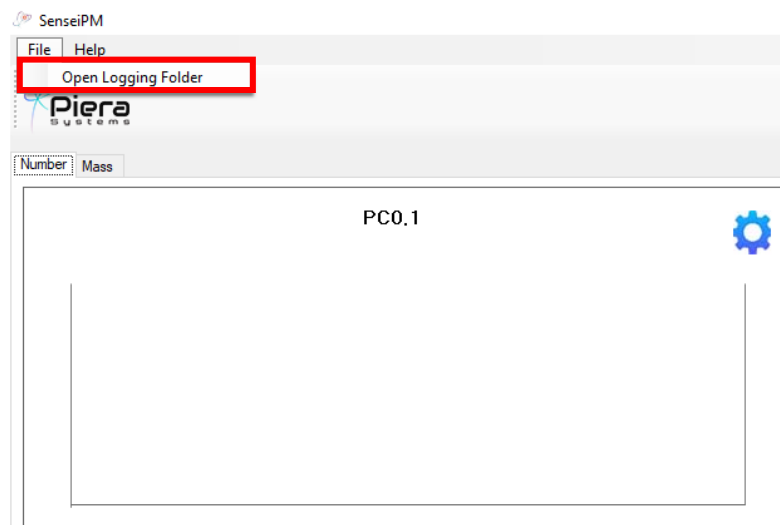The generated .csv files will contain sensor ID information and time stamp as shown in Fig. 8.

Fig. 7. Accessing data log folder

Fig. 8. Example data log file

4.3.5. Version Information:

Click on the "Help" menu and select "About" to find out the current version of SenseiPM. A dialogue box with the current version information will appear.
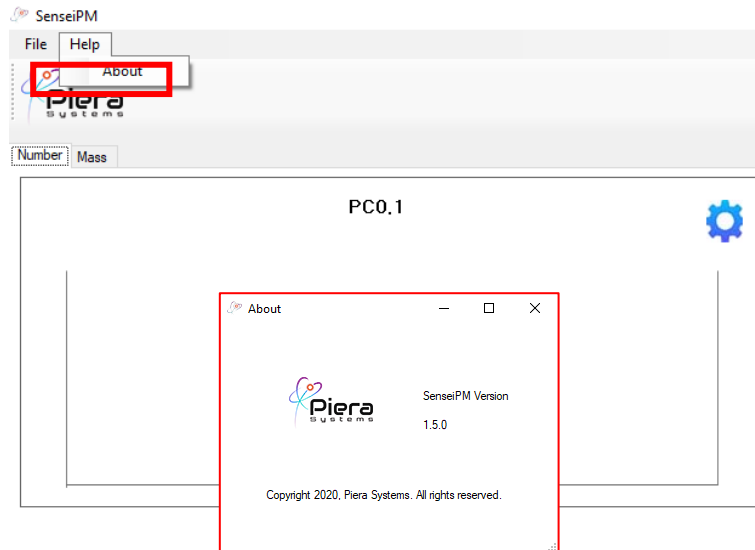

Fig. 9. Version information

4.3.6. Cleaning:

The module cleaning feature will be implemented in the upcoming versions of SenseiPM. A compressed air duster can be used on Piera-1's air inlet for cleaning. Must keep the distance from the duster nozzle tip from Piera-1 air inlet more than 15cm, and apply it for less than 2 seconds. The sensor must be turned off during cleaning. Run the sensor again for at least 10s.

4.3.7. Notes:

Fully functional programmable bin size adjusting feature will be available on the next versions of Piera Systems' IPS products.

4.3.8. Troubleshooting:

Please send your inquiries to support@pierasystems.com.

5. Appendix – Brief Application Note

It is possible to test or integrate Piera-1 sensor module without SenseiPM or a provided USB cable. The user is required to build a custom cable to connect Piera-1 to a PC, and will have to get a serial data monitoring software such as PuTTY.

5.1. Requirements

5.1.1.   A USB to RS232 TTL UART PL2303HX auto converter cable adapter module (5V). 5-pin female connector head (1.5mm pitch) is recommended for secure connection.

5.1.2.   A serial data monitoring software.

5.2. Configuration

5.2.1.   Connect Piera-1 sensor module and PC using a custom USB cable.

5.2.2.   Run serial data monitoring software.

5.2.3.   Select the right COM port and set the speed or baud rate to 115,200 with standard configuration – 1 stop, no parity and 8-bit to establish connection.

5.2.4.   The system is ready once device is connected to the PC successfully.

5.3. Commands

A table of command lines will be provided with the configuration access code for a qualified customer. Please contact Piera Systems for more information.

5.4. Remarks

Piera-1 is primarily designed for indoor use. User is advised to operate Piera-1 under the standard room environment.

It is not recommended to use a custom cable that exceeds 6ft in length. Piera Systems will not be responsible for any inaccurate data nor interpretation of such data obtained with longer than 6ft cable.

Version Control

Version	Date	Description
0.1	06/01/2020	Document created
0.2	06/05/2020	Edited for formatting
0.3	06/06/2020	Updated contents and changed design
0.4	06/06/2020	Added contents and font changed
1.0	06/07/2020	Official document release
1.1	06/07/2020	Minor content edited
1.2	06/10/2020	Some contents updated/added such as error window, other dialogue boxes
1.3	08/18/2020	Contents updated for the new version of SenseiPM software

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