Air Quality Data

|  |  |
| --- | --- |
| **Start Date** | 2019-01-01 00:00:00 |
| **End Date** | 2023-03-01 00:00:00  The period 2023-03-01 to 2023-06-30 will, hopefully, be provided during the event |
| **N. of Entries** | 1 003 440 |

# Origin

This data is collected by *Monitar* ([MonitarSense](https://sense.monitar.pt/)), the company responsible for the provision and maintenance of urban sensors scattered within Porto Municipality to monitor the air quality by measuring air pollutants concentrations.

The data was provided by the company mentioned above, in monthly *Excel Sheets*.

# Transformations

The data was transformed, in order to be read in a *csv* format:

* Columns were eliminated (empty) and others created (such as “*date\_observed*” and “*time\_observed*”);
* All data was aggregated into a single Dataframe;
* Columns format was changed in order to provide a clearer tabular format;
* Carbon Monoxide, Nitrogen Dioxide and Ozone have a 15-minutes frequency, whilst PM₁₀ and PM₂․₅ have a 5-minutes frequency measurement;

# Data Dictionary

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Name** | **Description** | **Type** | **Default** | **Example** |
| name | Sensors’ name | object | null | Porto – SmartAirSense – Arca dAgua |
| timestamp | Date & Time of measurement taken | object | null | 2019-01-01 00:00:00 |
| co | CO (Carbon Monoxide) measured (micrograms per cubic meter, µg/m³) | float64 | null | 874.7 |
| no2 | NO₂ (Nitrogen Dioxide) measured (micrograms per cubic meter, µg/m³) | float64 | null | 20.4 |
| o3 | O₃ (Ozone) measured (micrograms per cubic meter, µg/m³) | float64 | null | 7.1 |
| pm10 | PM₁₀ (Particulate Matter under 10 microns in width) measured (micrograms per cubic meter, µg/m³) | float64 | null | 60.8 |
| pm2.5 | PM₂․₅ (Particulate Matter under 2.5 microns in width) measured (micrograms per cubic meter, µg/m³) | float64 | null | 45.5 |
| date\_observed | Date of measurement taken | object | null | 2019-01-01 |
| time\_observed | Time of measurement taken | object | null | 00:00:00 |

# Urban Sensor Characteristics

|  |  |
| --- | --- |
| **Main Characteristics of CO Sensor from MONITARSENSE Station** | **Description** |
| Type | Electrochemical |
| Measuring Range | 0 – 15 mg/m³ |
| Resolution | 0.1 mg/m³ |
| Oₓ - Accuracy | ± 25 % |
| Temperature – Operating Range | -30 °C – +50 °C |
| Relative Humidity – Operating Range | 15 % - 90 % |
| Lifetime | > 24 Months |
| Response Variation | 0 – 100 ppb/year |

|  |  |
| --- | --- |
| **Main Characteristics of Oₓ (O₃ + NO₂) Sensor from MONITARSENSE Station** | **Description** |
| Type | Electrochemical |
| Measuring Range | 0 – 500 µg/m³ |
| Resolution | 0.1 µg/m³ |
| Oₓ - Accuracy | ± 25 % |
| Temperature – Operating Range | -30 °C – +40 °C |
| Relative Humidity – Operating Range | 15 % - 85 % |
| Lifetime | > 24 Months |
| Response Variation | 0 – 20 ppb/year |

|  |  |
| --- | --- |
| **Main Characteristics of PM₂․₅ and PM₁₀ Sensor from MONITARSENSE Station** | **Description** |
| Type | Optic - Laser |
| Measuring Range | 0 – 500 µg/m³ |
| Resolution | 1 µg/m³ |
| PM₂․₅ - Accuracy | 0 – 100 µg/m³ ± 15 µg/m³  101 ~ 500 µg/m³ ± 15 % of measurement |
| PM₁₀ - Accuracy | 0 – 100 µg/m³ ± 25 µg/m³  101 ~ 500 µg/m³ ± 25 % of measurement |
| Temperature – Operating Range | -10 °C – +50 °C |
| Relative Humidity – Operating Range | 0 % - 95 % |
| Lifetime | > 24 Months |

# Info

* There are missing values (measurements) and missing timestamps in the data.
* Some sensors were only brought offline during the time period. In those cases, first they do not appear in the data, and then they appear with the words “OFF” or “MANUTENCAO” (or both) in their names.