

Metadata for:
**„Meteorological data from Fraunhofer
Institute for Chemical Technology ICT in
Pfinztal, Germany“**

Pfinztal, 30.06.2025

General Information:

This document provides additional information for the dataset „Meteorological data from Fraunhofer Institute for Chemical Technology ICT in Pfinztal, Germany“ which is provided via Fraunhofer Publica.

Title: Meteorological data from Fraunhofer Institute for Chemical Technology ICT in Pfinztal, Germany

Authors: Weisenburger, Philipp; Kuglstatter, Michael

Collection date: 06.06.2024, 07.06.2025

Language: German / English

Subject: Measured weather data for validation of scientific experiments at Fraunhofer ICT in Pfinztal, Germany

Keywords: Weather data, meteorological data, temperature, solar radiation, wind speed, humidity

Abstract:

The following data set contains meteorological data measured at the Fraunhofer Institute for Chemical Technology ICT in Pfinztal, Germany. The measured values are available with a resolution of 15 minutes and grouped by year. The measurements were taken with a certified WS700 weather station from Lufft. The individual measurements, their ranges and the corresponding units are described below.

The station is used at the ICT for monitoring weather conditions during outdoor experiments. Each day's measurements are automatically stored as individual csv files on a data server. A manual download of the data sets took place on 06.06.2024 and 07.06.2025. For better usability, the individual measurements were combined into a single dataset for an entire year. This was done using a Python script.

List of revisions:

Only the latest version shall be considered as valid data.

| Revision | Date | Comment |
|----------|------------|--|
| 0 | 31.10.2024 | First version of dataset |
| 1 | 30.06.2025 | Update with weather data from 2024, minor typo corrections |
| | | |

Metadata for station and measurements:

Station type: Lufft WS700-UMB, see datasheet for more information

Installation date: 30.01.2020

Location: 49°00'57.9"N 8°31'01.8"E, 225m MSL (including pole)

Measured parameters and units:

The station collects a sum of 18 parameters. **Bold parameters** in the table below are measured directly, normal parameters are internally calculated. For measuring details, such as range and accuracy, see the datasheet and sensor description [1] attached to this document.

The timestamp is presented in German summertime (UTC+2) / German wintertime (UTC+1). The difference between UTC and the timestamp is given in the column "Differenz UTC".

| Parameter German | Parameter English | Unit |
|---------------------------------------|---|------------------|
| Globalstrahlung | Global radiation | W/m ² |
| Niederschlag | Precipitation quantity | mm |
| Nd-Intensität | Precipitation intensity | mm/h |
| Temperatur | Temperature | °C |
| Feuchte relativ | Relative humidity | % |
| Feuchte absolut | Absolute humidity | g/m ³ |
| Taupunkt | Dew point | °C |
| Windchill | Windchill | °C |
| Luftdruck absolut | Air pressure absolute | hPa |
| Windgeschwindigkeit | Wind speed | m/s |
| Windgeschwindigkeit | Wind speed | km/h |
| Windrichtung | Wind direction | ° (degree) |
| Heizungstemperatur Windmesser | Heating temperature anemometer | °C |
| Regensumme letzte Stunde | Total rain last hour | |
| Regensumme Tag | Total rain last day | |
| Regensumme Monat | Total rain last month | |
| Regensumme Jahr | Total rain last year | |
| Heizungstemperatur Regenmesser | Heating temperature precipitation sensor | °C |

Aerial view: [2]



Completeness and correctness of the data:

A complete dataset for one year contains 35.040 values for each of the parameters. Some basic completeness checks for the data has been carried out. It was discovered, that all measurements for the timestamp 19.10.23 14:15:00 (German summer time) are missing, including the actual timestamp. The missing row has NOT been inserted in the dataset provided here.

Visual and logical checks were made on the values for temperature, global radiation, relative humidity, wind speed and wind direction. The only indication of corrupt data was found in the 2022 wind direction, where there is no change in direction between 05.05.2022 13:00 UTC and 08.06.2022 07:00 UTC. The reason for this error is unknown, all other parameters do not have significant deviations in this period.

Validation with official DWD meteorological station:

In order to have a sense of the reliability of the data, a comparison was made with a nearby station of Deutscher Wetterdienst (DWD). The station used is called "Rheinstetten" (ID 04177, 48°96'71 'N 8°33'44 'E) and located south of Karlsruhe. [3] The distance between the DWD station and the ICT station is about 15.5 km.

A comparison of the hourly mean measurements for temperature, relative humidity, pressure, wind speed and wind direction was carried out for each year. The diagrams for each parameter and year are available in the attachments. The deviations in pressure can be explained by the difference in altitude between the stations. The local geographical and meteorological effects at Fraunhofer ICT are responsible for the deviations in temperature, relative humidity, wind speed and wind direction. However, the comparison of these parameters does not show a systematic deviation. Considering local weather conditions and the distance between the stations, the data is considered to be valid.

References:

- [1] Lufft (2024) - WS700-UMB Intelligente Wettersensorik, <https://www.lufft.com/de-de/produkte/intelligente-wettersensoren-309/ws700-umb-intelligente-wettersensorik-2269/>, last visited: 28.07.2024
- [2] Google Maps (2024) – Fraunhofer Institute for Chemical Technology, Satellite Map, <https://maps.app.goo.gl/xfEvgiP11X6t13Wf9>, last visited: 28.07.2024
- [3] Deutscher Wetterdienst (2024) - Climate Data Center: Historical weather data for station 04177 (Rheinstetten), https://opendata.dwd.de/climate_environment/CDC/, last visited: 28.07.2024

Attachments: (file name – description)

- 1) WS700_datasheet – General datasheet
- 2) Lufft_WS700-UMB_Smart_Weather_Sensor - Technical data
- 3) 2022_measurements – File with measured weather data
- 4) 2023_measurements – File with measured weather data
- 5) 2024_measurements - File with measured weather data
- 6) 2022_Temperature - Comparison Temperature ICT / DWD 2022
- 7) 2022_Relative_humidity - Comparison Relative humidity ICT / DWD 2022
- 8) 2022_Pressure - Comparison Pressure ICT / DWD 2022
- 9) 2022_Windspeed - Comparison Wind speed ICT / DWD 2022
- 10) 2022_Winddirection - Comparison Wind direction ICT / DWD 2022
- 11) 2023_Temperature - Comparison Temperature ICT / DWD 2023
- 12) 2023_Relative_humidity - Comparison Relative humidity ICT / DWD 2023
- 13) 2023_Pressure - Comparison Pressure ICT / DWD 2023
- 14) 2023_Windspeed - Comparison Wind speed ICT / DWD 2023
- 15) 2023_Winddirection - Comparison Wind direction ICT / DWD 2023
- 16) 2024_Temperature - Comparison Temperature ICT / DWD 2024
- 17) 2024_Relative_humidity - Comparison Relative humidity ICT / DWD 2024
- 18) 2024_Pressure - Comparison Pressure ICT / DWD 2024
- 19) 2024_Windspeed - Comparison Wind speed ICT / DWD 2024
- 20) 2024_Winddirection - Comparison Wind direction ICT / DWD 2024