HSRW Weather Station at Campus Kamp-Lintfort

Fig.: HSRW Weather Station, Campus Kamp-Lintfort

Interactive Grafana Dashboard for Real-Time Data

Fig.: Interactive real-time data plots. **Click on the image** or **here** to open the Grafana dashboard.

Sensors

Measurement	**Sensor**	**Datasheet**
Temperature	PT100 platinum wire, TF type 2018	TF type 2018
Temperature / Humidity	PT100 & capacitive element, TF type 3033	TF type 3033
Wind Speed	Cup anemometer, TF type 4035	TF type 4035
Wind Direction	Wind direction sensor, TF type 4123	TF type 4123
Barometer	Piezoresistive element, TF type 5004	TF type 5004
Precipitation	Tipping bucket rain gauge, TF type 7041	TF type 7041
Soil Moisture	Time Domain Reflectometer, IMKO TRIME-PICO64	TRIME-PICO64
Photosynthetically Active Radiation	Kipp & Zonen PQS 1 PAR Quantum Sensor	PQS 1 PAR
Solar Radiation	Pyranometer, Kipp & Zonen SMP10	SMP10

Access Real-Time Online Data

The data of our weather station is **freely available**!
We provide two main channels to access the data:

1. MQTT (trough our own broker),
2. RESTful API

The accessible variables:

Key	**Unit**	**Comment**
wind_speed	km/h	
wind_direction	degrees	
air_temperture	°C	
air_relhumidity	%	

Key	Unit	Comment
smp10	W/m2	
pqsl	µmol/m2s	
soil_moisture	%	Sensor not relevant
soil_tempblue	°C	Sensor not relevant
soil_tempred	°C	Sensor not relevant
air_pressure	hPa	
precipitation	mm	
created_at	ISO8601	UTC

MQTT Broker and Topic for Subscribing to Real-Time Online Data

We also publish our data on our own MQTT Server which doesn't need any authentication for receiving that kind of data.

MQTT Broker and Topic	
URL	eolab.de
PORT	1883
TOPIC	weather/hsrw-kali

RESTful API to Request Real-Time Online Data

The RESTful Application Programming Interface (API) is used to download data or retrieve data e.g. in own programs or scripts. The data is provided in a JSON-format.

Examples (response takes some time)

Retrieve the last 20 sensor data from all sensors since 12th Nov. 2021, 14:55:32, Central European Time (CET, Germany):
https://weather.eolab.de/api/weather/2021-11-12T14:55:32.000+0100

Retrieve every fifth measurement from all sensors between two timestamps (date + time):
https://weather.eolab.de/api/weather/2021-11-12T14:55:32.000+0100/2021-11-12T14:59:32.000+0100/5

Second timestamp in milliseconds since 1970-01-01 00:00:00 UTC (Universal Time Coordinates ~ Greenwich Mean Time)
https://weather.eolab.de/api/weather/2021-11-12T14:55:32.000+0100/1636734789719/5

API Documentation

The API is now available under `https://weather.eolab.de/api`.

Two different **timestamp (date + time) types** are supported:

- time in ms since 1970-01-01 00:00:00 UTC
- ISO8601

The ISO8601 date-time standards can have different formats. A common one is: `YYYY-MM-DD'T'hh:mm:ss.sss'Z'`
Z is the offset from the UTC timezone, e.g. `2020-12-31T21:45:10.500+0100` is Dec. 31, 2020, 21:45 plus 10.5 seconds in UTC +1h, i.e. Central European Time CET (not summer time CEST!).
The same timestamp in UTC: `2020-12-31T20:45:10.500+0000` (or `2020-12-31T20:45:10.500Z` or `2020-12-31T20:45:10.500UTC`. Time zone abbreviations such as CET, CEST, UTC, GMT are not supported in the API, yet).

The routes of the API:

- **`/`**
  Check if the server is online and has a database connection
- **`/weather`**
  Get the last 20 measurements
- **`/weather/:begin`**
  Get the 20 next measurements after begin
  `:begin` has to be replaced by the time in ms since 1970-01-01 00:00:00 UTC
- **`/weather/:begin/:end`**
  Get all measurements between begin and end
  `:begin` and `:end` in ms since 1970-01-01 00:00:00 UTC
    - do not misuse this route
- /weather/:begin/:end/:n
    - Get every nth measurement between begin and end
    - :begin and :end have to be replaced by the time in ms since 01.01.1970 00:00:00 UTC
    - :n has to be replaced with a number (ex.: get every 3rd measurement)

Example to retrieve every 5th data set between 627650252438 ms and 1627650855553 ms since 1970-01-01, i.e. from the Fri Jul 30 2021 15:04:12 GMT+0200 to Fri Jul 30 2021 15:14:15 GMT+0200:
`https://weather.eolab.de/api/weather/1627650252438/1627650855553/5`