Reference
A quick start guide to using the Tempest WebSocket API.
Endpoint

You can open a WebSocket connection with an API key or a token.

User Token

To open a WebSocket connection with a token, use the URL below.

wss://ws.weatherflow.com/swd/data?token=[your_access_token]

_See our Quickstart for instructions on how to obtain an access token.

API Key

To open a WebSocket connection with an API key, use the URL below.

wss://ws.weatherflow.com/swd/data?api_key=[your_api_key]

Request Messages

Listen Start

Start listening for observations and events for a specific device. Each new observation sent by the device will be pushed to the client as soon as possible.

Request Message

json

{
  "type":"listen_start",
  "device_id":1110,
  "id":"2098388936"
}
Response Messages

ack, obs_air, obs_sky, obs_st, evt_strike, evt_precip

Listen Stop

Stop listening for observations and events for a specific device.

JSON

{
  "type":"listen_stop",
  "device_id":1110,
  "id":"2098388936"
}
Response Messages

ack

Lightning Listen Start

JSON

{
  "type":"geo_strike_listen_start",
  "lat_min": 37.28,
  "lat_max": 41.32,
  "lon_min": -101.76,
  "lon_max": -91.00 ,

```
  "id": 12345
}
```
Cloud to Ground strike types are returned by default. Add strike_type to the geo_strike_listen_start message to specify the type of strikes you would like to be returned. cg returns Cloud to Ground strikes only, ic returns Cloud to Cloud strikes only and all returns all strike types.

Response Messages

ack, strike

Response Messages

Acknowledgment

JSON

```
{
  "type":"ack",
  "id":"2098388936"
}
```
Rain Start Event

JSON

```
{
  "type":"evt_precip",
  "device_id":1110
}
```
Device Lightning Strike Event

JSON

```
{
```

```
  "type":"evt_strike",
  "device_id":1110,
  "evt":[1493322445,27,3848]
}
```

evt value returned is a Lightning event

Rapid Wind

JSON


```
{
  "type":"rapid_wind",
  "device_id":1110,
  "ob":[1493322445,2.3,128]
}
```

obs value returned is a Rapid Wind observation

Tempest Observation

JSON


```
{
  "type":"obs_st",
  "device_id":62009,
  "obs":
[[1603481377,0,0.09,0.54,33,6,1014.8,28.8,71,16639,1.83,139,0,
0,0,0,2.42,1,0.07615,null,null,0]]
}
```

obs value returned is a Tempest observation

Air Observation

JSON


```
{
```

```
  "type":"obs_air",
  "device_id":1110,
  "obs":[[1493164835,835.0,10.0,45,0,0,3.46,1]]
}
```

obs value returned is an AIR observation

Sky Observation

JSON


```
{
  "type":"obs_sky",
  "device_id":1110,
  "obs":
[[1493321340,9000,10,0.0,2.6,4.6,7.4,187,3.12,1,130,1.034,0,3,0.
0,1.011,1]]
}
```

obs value returned is a SKY observation

Lightning Strike

JSON


```
{
        "type": "geo_strike",
  "time": 1656008011,
        "lat": 38.9981994,
        "lon": 99.3110134,
        "mag": 289,
  "strike_type": "cg"
}
```

Additional Information

A client should only open one WebSocket connection.
A client will be disconnected after 10 minutes of idle time.

All messages are JSON strings.

Stations
GET
https://swd.weatherflow.com/{basePath}/stations
RESPONSE

200
successful operation

Station
GET
https://swd.weatherflow.com/{basePath}/stations/{station_id}
Get metadata for a specific station owned by the user.
PATH PARAMS
station_id
int64
required
ID of Station to return
RESPONSES

200
successful operation

404
Station not found
Updated over 2 years ago

Observations for a Station
GET
https://swd.weatherflow.com/{basePath}/observations/stn/{station_id}

PATH PARAMS
station_id
integer
required
ID of the station to retrieve.
QUERY PARAMS
time_start
integer
Time range start in epoch seconds UTC.
time_end
integer
Time range end in epoch seconds UTC.
bucket
int32
Defaults to 1
Time resolution of observations

obs_fields
string
A comma separated list of data fields that are returned in the response. Index field order in the response will be the same as the request.
units_temp
string
Defaults to c
Units temperature data will be returned in.

units_wind
string
Defaults to mps
Units wind data will be returned in.

units_pressure
string
Defaults to mb

Units pressure data will be returned in.

units_precip
string
Defaults to mm
Units precipitation data will be returned in.

units_distance
string
Defaults to km
Units distance information will be returned in.

RESPONSES

200
Successful operation

404
Station not found
Observations for a Device
GET
https://swd.weatherflow.com/{basePath}/observations/device/{device_id}
Get observations for a device (Air, Sky, or Tempest) by using the device_id as the key. You can find device_id values in the response from the Stations service. You can get observations using several filters (e.g. latest obs, a time range, or day offset).

An obs array object is returned in this API response, which consists of a list of observations. The type field determines the order of the array elements, based off of the table below.

Device Device Type Observation Format

Tempest obs_st Tempest Observation
AIR obs_air AIR Observation
SKY obs_sky SKY Observation
The observations are returned in chronological order from the time_start to time_end query parameters. If no time_start or time_end is given, only the most recent observation is returned.

Generally, a user can only query data for their own devices, using the API token associated with their account. Commercial users may be able to query all devices associated with a mesonet.
PATH PARAMS
device_id
int64
required
ID of device
QUERY PARAMS
day_offset
int64
TIME FILTER - Get an entire day of observations by UTC day offset.
0 - Current day UTC 1 - Yesterday UTC
time_start
int64
TIME FILTER - Time range start time epoch seconds UTC. Observation data at a one minute time resolution is available for a time range that is five days or less. You also need to send "time_end". This field pair is optional. If the request does not contain any time filters only the latest observation will be returned.
time_end
int64
TIME FILTER - Time range start time epoch seconds UTC. Observation data at a one minute time resolution is available for a time range that is five days or less. You also need to send "time_start". This field pair is optional. If the request does not

contain any time filters only the latest observation will be returned.
format
string
Use format=csv to return a CSV response type.

Latest Station Observation
GET
https://swd.weatherflow.com/{basePath}/observations/station/{station_id}
Get the latest federated observation for a Station. This observation is made from the latest device observations that belong to the station. If a user has multiple devices of the same type they are able to designate one of them as primary. This primary device is the one used to make the federated observation.

A user can also designate each device as either indoor or outdoor. All indoor observation value fields will end with an _indoor suffix. Outdoor observations fields do not have a suffix.

The station_units values represent the units of the Station's owner, not the units of the observation values in the API response.
PATH PARAMS
station_id
int64
required
ID of Station to return

Statistics for a Station
GET
https://swd.weatherflow.com/{basePath}/stats/station/{station_id}
Get a summary of observation data and Statistics for a station. A

stats_day array is returned in the response object. The table below describes the values shown at each index location for each stats_day array returned in the date range given.

Index	Parameter	Description
0	Pressure	(mb)
1	Pressure (high)	(mb)
2	Pressure (low)	(mb)
3	Temperature	(°C)
4	Temperature (high)	(°C)
5	Temperature (low)	(°C)
6	Humidity	(%)
7	Humidity (high)	(%)
8	Humidity (low)	(%)
9	Lux	(lx)
10	Lux (high)	(lx)
11	Lux (low)	(lx)
12	UV	(index)
13	UV (high)	(index)
14	UV (low)	(index)
15	Solar radiation	(W/m^2)
16	Solar radiation (high)	(W/m^2)
17	Solar radiation (low)	(W/m^2)
18	Wind (average)	(m/s)
19	Wind (gust)	(m/s)
20	Wind (lull)	(m/s)
21	Wind direction	(°)
22	Wind interval	
23	Strike count	
24	Strike average distance	(km)
25	Record count	
26	Battery	
27	Local precipitation accumulation (today)	(mm)
28	Local precipitation accumulation (final)	(mm)
29	Local precipitation minutes (today)	

30 Local precipitation minutes (final)
31 Precipitation type 0 = none, 1 = rain, 2 = hail, 3 = rain + hail (experimental)
32 Precipitation analysis type 0 = none, 1 = Nearcast value with display on, 2 = Nearcast value with display off
PATH PARAMS
station_id
integer
required
ID of the station to retrieve.

Forecast
GET
https://swd.weatherflow.com/{basePath}/better_forecast
Get current conditions and forecast data for your station.
QUERY PARAMS
station_id
integer
ID of the station
units_temp
string
Defaults to c
Units temperature data will be returned in.

units_wind
string
Defaults to mps
Units wind data will be returned in.

units_pressure
string
Defaults to mb
Units pressure data will be returned in.

units_precip

string
Defaults to mm
Units precipitation data will be returned in.

units_distance
string
Defaults to km
Units distance information will be returned in.

OAuth
Overview

The Tempest API supports the Authorization Code grant type. For clients that are unable to maintain the confidentiality of the client secret, the API also supports the Authorization Code with PKCE grant type.

Creating a Client Application

Before you can begin using OAuth with the Tempest API, you must register your application with WeatherFlow. To do so, sign in to your Tempest account on the Tempest Website, and then go to the Developers page.

The information below is required to register your application.

APPLICATION NAME
The name of your application. This name will be displayed on the authorization page and should be a name that users will recognize and trust.

APPLICATION DESCRIPTION
A brief description of your application.

AUTHORIZATION CALLBACK URL

The endpoint that will receive authorization codes. Each application may have multiple callback URLs. For mobile applications, a custom URL scheme can be registered.

To register an application you must have a Tempest account.
Authorization Code Grant Type

STEP 1:
Request authorization from the user using the authorization endpoint below.
https://tempestwx.com/authorize.html

With the request include the following query string parameters:

client_id
Provided when your application was created.

response_type
Set this value to code to indicate that you would like an authorization code returned.

redirect_uri
The url you want the user to be redirected to after the authorization is completed.

The redirect URL provided in the query string must be registered with the Tempest API. If needed, you may register more than one redirect URL.
STEP 2:

Once redirected to the authorization page, the user will approve or deny the authorization request. If they approve the request they will be redirected back to the redirect URL you provided

along with an authorization code.

Exchange the authorization code for an access token by making a POST request to the API endpoint below.
https://swd.weatherflow.com/id/oauth2/token

In the URL Encoded Form body of the POST request include:

grant_type
Set this value to authorization_code

code
The authorization code received in the query string from the authorization server.

client_id
Provided when your application was created.

client_secrect
Provided when your application was created

Station vs Device
The Tempest API provides both station and device data. Here we will help you understand which observation type is best for your use case.
What is a device?

A device is a single piece of hardware in the Tempest system. Each device in the Tempest system must belong to a station. A device observation returns data for each sensor of the device.

What is a Station?

A station is made up of one or more devices in the same location. A station observation returns a federated observation

for all device sensors that are a part of the station. Since stations can have multiple devices with the same sensor type, station owners can designate which device sensor is the primary sensor that will be included as part of the station observation. For example, if a station has two devices and each one has a temperature sensor, the station observation will only return one temperature value and it will be the one from the device the user designated as the primary temperature device.

Should I use a device or a station observation?

In most cases, you should use station observations. Station observations ensure you are getting data back from the primary sensors for each station. Device observations should be used only if you know that you want data back from a specific device regardless of the user's primary sensor designations.

Observation and Event Definitions
To keep our observation records as compact as possible, we use arrays to return observation values. Each device type has a different observation format. The array definitions for each device and event type are below.
Tempest Observation

Denoted in API responses with type obs_st.

Index	Parameter	Description
0	timestamp	Epoch (seconds, UTC)
1	wind lull	(m/s)
2	wind average	(m/s)
3	wind gust	(m/s)
4	wind direction	(degrees)
5	wind sample interval	(seconds)
6	pressure	(mb)
7	air temperature	(°C)

8 relative humidity (%)
9 illuminance (lux)
10 uv (index)
11 solar radiation (W/m²)
12 rain accumulation rain accumulation during the reporting interval (mm)
13 precipitation type 0 = none, 1 = rain, 2 = hail, 3 = rain + hail (experimental)
14 lightning average distance (km)
15 lightning strike count number of strikes during the reporting interval
16 battery (volts)
17 reporting interval (minutes)
18 local day rain accumulation midnight to midnight rain accumulation in the station's timezone (mm)
19 Nearcast rain accumulation (mm)
20 local day Nearcast rain accumulation midnight to midnight Nearcast rain accumulation in the station's timezone (mm)
21 precipitation analysis type 0 = none, 1 = Nearcast value with display on, 2 = Nearcast value with display off

Tempest Daily Observation

A summary of observation data collected from midnight to midnight in the station's local timezone. Denoted in API responses with type obs_st_ext.

Index Parameter Description
0 timestamp Epoch (seconds, UTC)
1 average pressure (mb)
2 highest pressure (mb)
3 lowest pressure (mb)
4 average temperature (°C)
5 lowest temperature (°C)
6 highest temperature(°C)

7 average humidity (%)
8 highest humidity (%)
9 lowest humidity (%)
10 average illuminance (lux)
11 highest illuminance (lux)
12 lowest illuminance (lux)
13 average UV (index)
14 highest UV (index)
15 lowest UV (index)
16 average solar radiation (W/m²)
17 highest solar radiation (W/m²)
18 lowest solar radiation (W/m²)
19 average wind speed (m/s)
20 wind gust (m/s)
21 wind lull (m/s)
22 average wind direction (degrees)
23 wind sample interval (seconds)
24 strike count
25 average strike distance (km)
26 record count
27 battery (volts)
28 local day rain accumulation (mm)
29 local day Nearcast rain accumulation (mm)
30 local day precipitation minutes (minutes)
31 local day Nearcast precipitation minutes (minutes)
32 precipitation type 0 = none, 1 = rain, 2 = hail, 3 = rain + hail (experimental)
33 precipitation analysis type 0 = none, 1 = Nearcast value with display on, 2 = Nearcast value with display off

AIR Observation

Denoted in API responses with type obs_air.

Index	Parameter	Description
0	timestamp	Epoch (seconds, UTC)

1 pressure (mb)
2 air temperature (°C)
3 relative humidity (%)
4 lightning strike count number of strikes during the reporting interval
5 lightning average distance (km)
6 battery (volts)
7 reporting interval (minutes)

AIR Daily Observation

A summary of observation data collected from midnight to midnight in the station's local timezone. Denoted in API responses with type obs_air_ext.

Index	Parameter	Description
0	timestamp	Epoch (seconds, UTC)
1	average pressure	(mb)
2	average temperature	(°C)
3	average humidity	(%)
4	strike count	
5	average strike distance	(km)
6	highest temperature	(°C)
7	lowest temperature	(°C)
8	highest pressure	(mb)
9	lowest pressure	(mb)
10	highest humidity	(%)
11	lowest humidity	(%)
12	record count	
13	battery	(volts)

SKY Observation

Denoted in API responses with type obs_sky.

Index	Parameter	Description
0	timestamp	Epoch (seconds, UTC)

1 illuminance (lux)
2 uv (index)
3 rain accumulation rain accumulation during the reporting interval (mm)
4 wind lull (m/s)
5 wind average (m/s)
6 wind gust (m/s)
7 wind direction (degrees)
8 battery (volts)
9 reporting interval (minutes)
10 solar radiation (W/m^2)
11 local day rain accumulation midnight to midnight rain accumulation in the station's timezone (mm)
12 precipitation type 0 = none, 1 = rain, 2 = hail, 3 = rain + hail (experimental)
13 wind sample interval (seconds)
14 Nearcast rain accumulation Nearcastrain accumulation during the reporting interval (mm)
15 local day Nearcast rain accumulation midnight to midnight Nearcast rain accumulation in the station's timezone (mm)
16 precipitation analysis type 0 = none, 1 = Nearcast value with display on, 2 = Nearcast value with display off
SKY Daily Observation

A summary of observation data collected from midnight to midnight in the station's local timezone. Denoted in API responses with type obs_sky_ext.

Index Parameter Description
0 timestamp Epoch (seconds, UTC)
1 average illuminance (lux)
2 average UV (index)
3 local day rain accumulation (mm)
4 wind lull (m/s)

5 average wind speed (m/s)
6 wind gust (m/s)
7 average wind direction (degrees)
8 highest illuminance (lux)
9 lowest illuminance (lux)
10 highest UV (index)
11 lowest UV (index)
12 record count
13 average solar radiation (W/m^2)
14 highest solar radiation (W/m^2)
15 lowest solar radiation (W/m^2)
16 battery (volts)
17 local day Nearcast rain accumulation (mm)
18 precipitation analysis type 0 = none, 1 = Nearcast value with display on, 2 = Nearcast value with display off
19 local day precipitation minutes (minutes)
20 wind sample interval (seconds)
21 precipitation type 0 = none, 1 = rain, 2 = hail, 3 = rain + hail (experimental)
21 local day Nearcast precipitation minutes (minutes)

Lightning Event

Denoted in API responses with type evt_strike.

Index	Parameter	Description
0	timestamp	Epoch (seconds, UTC)
1	distance	(km)
2	energy	

Rapid Wind

Denoted in API responses with type rapid_wind.

Index	Parameter	Description
0	timestamp	Epoch (seconds, UTC)
1	wind speed	(m/s)

2 wind direction (degrees)