



Fracsun Outbound API Documentation

June 20, 2022 Revision C

1.0 Introduction

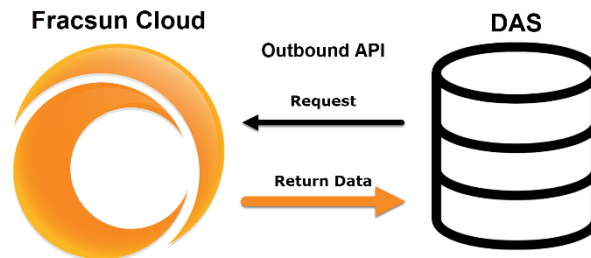
This document discusses how to download/transfer soiling sensor data from the Fracsun Cloud using the RESTful **Outbound API**. This is particularly useful for customers who prefer to store and view soiling sensor data on a data acquisition system (DAS) or other platform.

1.1 ARES Cellular mode

In the default state, ARES is an IoT cellular-enabled device that automatically connects to the nearest cellular base station and outputs data to the Fracsun cloud. The customer can view the data on Fracsun Dashboard. The Fracsun Cloud also performs additional data processing. For example, the *daily* soiling loss and insolation values are calculated (filtered and weighted) as a cloud process. This effectively cleans up the noise from the raw data to help visualize clear trends in soiling.

1.2 Integrating with a DAS

In order to effectively interface the DAS with the Fracsun cloud, a customized integration must be developed to get or request the soiling sensor data (irradiance, temperature, and soiling) using Fracsun's Outbound API.



The request can occur at whatever interval you design the integration around, but we would suggest to schedule *daily* API requests be sent at the end of each day.

Most of the charted data on the Fracsun Dashboard is available via the Outbound API. A list of all daily and raw datapoints is seen in the sections below.

2.0 Getting Started

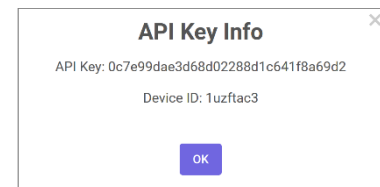
2.1 Outbound API Key

An Outbound API key is required to get sensor data from the Fracsun Cloud. This unique key must be added as a URL path parameter in the request. **Outbound API Keys are only available by request.** Please reach out to the Fracsun team for API key access.

Only *Outbound API Keys* can pull sensor data from the Fracsun Cloud. Do not confuse this with *Inbound API Keys*, which are intended for pushing sensor data from a DAS to the Fracsun Cloud .

To view the Outbound API key, perform the following steps:

1. Go to your Fracsun Dashboard: <https://portal.fracsun.com/>
2. Go to the “Device Data” page.
3. Locate the soiling sensor device in the list and click on the “API Key” button. The Outbound API Key is visible in the popup.



2.2 Device ID

A Device ID is also required to get sensor data from the Fracsun Cloud. This ID must be added as a URL query parameter in the request. Device IDs are typically 24 characters long and specific to Outbound API Devices. The Device ID identifies the soiling sensor on the Fracsun Portal and is what all data and configuration information is tied to.

To view the Device ID, perform the following steps:

1. Go to your Fracsun Dashboard: <https://portal.fracsun.com/>
2. Go to the “Device Data” page.
3. Locate the soiling sensor device in the list and click on the “View API Key” button. The Device ID is visible in the popup.

2.3 Rate Limiting

In general, the number of API requests should be kept to a minimum. Fracsun’s Outbound API was designed to provide bulk sets of data for each request. Fracsun’s Outbound API was *not* designed for constant API requests less than a minute apart.

The following rate limits are:

- 30 requests per minute
- 120 requests per day

2.4 Maximum data per response

Endpoint	Maximum date range in request
Get daily soiling and insolation values	5 years
Get raw irradiance and temperature values	1 month

Warning: For the “Get raw irradiance and temperature values” endpoint, requesting more than a month of data is not recommended due to the large JSON response size (One month of raw JSON data would average about 1MB for the response).

2.5 Errors

400	Bad request. Possible reasons: <ul style="list-style-type: none">• Malformed request parameters• Missing request parameters• Invalid JSON data provided
401	Unauthorized. Possible reasons: <ul style="list-style-type: none">• Basic Authentication failed• No Outbound API key was provided• Invalid Outbound API key provided
404	Endpoint not found. Possible reasons: <ul style="list-style-type: none">• URL endpoint is wrong• No Device ID provided• Invalid Device ID provided
405	Method not allowed (See the returned <code>Allow</code> header for the set of methods supported by the resource)
429	Too many requests (the rate limit was exceeded)

2.6 Key differences between the two API calls

- Daily soiling/insolation and raw irradiance/temp are completely different API calls.
- Each API call has a unique URL.
 - For daily soiling/insolation, it's <https://admin.fracsun.com/api/device/soiling/>
 - For raw irradiance/temp, it's: <https://admin.fracsun.com/api/device/data/>
- For daily soiling/insolation, the `START_DATE` and `END_DATE` arguments take a date timestamp, without time.
- For raw irradiance/temp, the `START_DATE` and `END_DATE` arguments must be a full timestamp with date and time.
- Daily soiling/insolation responses do not contain much data, so there is a very high limit (5 years) on the interval request. Irradiance/temp calls contain a lot of data, so it's recommended to only request for daily, weekly, or monthly intervals. If requesting raw data for longer than a month interval, multiple requests should be performed.

3.0 Endpoints

3.1 Get daily soiling and insolation values

GET /api/device/soiling/<deviceId>

Path Parameters

Property	Format	Description
deviceId required	24 characters	The device ID of the soiling station (provided from Fracsun by request).

Query Parameters

Property	Format	Description
apiKey required	32 characters	The Outbound API key of the device (provided from Fracsun by request)
startDate required	YYYY-MM-DD	The starting date in ISO format (use the date without time for best results)
endDate required	YYYY-MM-DD	The ending date in ISO format (use the date without time for best results)

Request Headers

Name	Type	Description
Content-Type required	application/json	

Response

Property	Type	Description
day	String	Day that the soiling/insolation occurred
device	String	The unique device ID for this ARES unit
insolC	Float	Calculated daily insolation for the clean reference cell
insolD	Float	Calculated daily insolation for the dirty reference cell
soiling	Float	Calculated daily soiling loss (transmission loss)
utc_calcTime	String	The UTC timestamp when the daily calculation occurred.
calculation_time	String	The local timestamp (timezone-adjusted) when the daily calculation occurred.

Example Request

Get all calculated daily soiling and insolation data from *August 12, 2018 to August 13, 2019* for CS2-0003

```
'https://admin.fracsun.com/api/device/soiling/2c0031001447373333353132/?apiKey=a07e212acf2ec0803807ce3eab2a3cca&startDate=2018-08-12&endDate=2019-08-13'
```

Example Response

The response is provided in JSON format. Between each { } is the soiling and insolation dataset for each day.

```
[
  {
    "calculation_time": "2019-08-13T00:02:07.080459+07:00",
    "day": "2018-08-12",
    "device": "2c0031001447373333353132",
    "insolC": "8.56",
    "insolD": "8.02",
    "soiling": "6.28",
    "utc_calcTime": "2019-08-13T07:02:07.080459+00:00"
  },
  {
    "calculation_time": "2019-08-14T00:02:07.080459+07:00",
    "day": "2019-08-13",
    "device": "2c0031001447373333353132",
    "insolC": "8.69",
    "insolD": "8.08",
    "soiling": "6.58",
    "utc_calcTime": "2019-08-14T07:02:07.080459+00:00"
  }
]
```

3.2 Get raw irradiance and temperature values

GET /api/device/data/<deviceId>

Path Parameters

Property	Format	Description
deviceId required	24 characters	The device ID of the soiling station (provided from Fracsun by request).

Query Parameters

Property	Format	Description
apiKey required	32 characters	The Outbound API key of the device (provided from Fracsun by request)
startDate required	YYYY-MM-DDTHH:MM:SSZ	The starting date in ISO format (UTC time, <i>not</i> timezone adjusted)
endDate required	YYYY-MM-DDTHH:MM:SSZ	The ending date in ISO format (UTC time, <i>not</i> timezone adjusted)

Request Headers

Name	Type	Description
Content-Type required	application/json	

Response

Property	Type	Description
b	Float	Battery voltage (health metric)
iC	Integer	Irradiance of clean cell
iD	Integer	Irradiance of dirty cell
r	Integer	Reset flag (n when a reset occurred)
sl	Float	Soiling loss (transmission loss)
sr	Float	Soiling ratio
tC	Float	Temperature of clean cell
tD	Float	Temperature of dirty cell
tE	Float	Temperature inside enclosure
ts	String	Timestamp in UTC

Example Request

Get raw soiling, irradiance, and temperature data for August 12, 2019 for CS2-0003

```
'https://admin.fracsun.com/api/device/data/2c0031001447373333353132/?apiKey=a07e212acf2ec0803807ce3eab2a3cca&startDate=2019-08-12T07:00:01Z&endDate=2019-08-13T07:00:00Z'
```

Example Response

The response is provided in JSON format. Between each { } is the dataset and included timestamp.

```
[
  {
    "b": 4.05,
    "iC": 1,
    "iD": 0,
    "r": 0,
    "s1": 1.2,
    "sr": 0.901,
    "tC": 15.1,
    "tD": 14.9,
    "tE": 17.6,
    "ts": "2019-08-12T13:22:40.839Z"
  },
  {
    "b": 4.05,
    "iC": 1,
    "iD": 1,
    "r": 0,
    "s1": 1.3,
    "sr": 0.903,
    "tC": 15,
    "tD": 14.9,
    "tE": 17.6,
    "ts": "2019-08-12T13:27:40.831Z"
  },
  {
    "b"..    ##continues until the END_DATE request argument
    ..
    ..
  }
]
```



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