iMaster NetEco
V600R023C00

# Northbound Interface Reference-V6(SmartPVMS)

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|---|---|
| **Issue** | 01 |
| **Date** | 2023-01-19 |

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# About This Document

## Purpose

This document provides auxiliary description for the northbound interface (NBI) function of the Smart PV Management System (SmartPVMS). This document describes the design and usage of the NBIs, and how authorized third-party users (applications) use the interfaces to obtain data within the authorization scope. In addition, it describes the function, URL, parameter format, and usage of each interface for third-party users to obtain related data.

## Intended Audience

This document is intended for:

- Development engineers
- Technical support engineers
- Maintenance engineers

## Symbol Conventions

The symbols that may be found in this document are defined as follows.

| Symbol | Description |
| --- | --- |
| DANGER | Indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury. |
| WARNING | Indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury. |
| CAUTION | Indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury. |
| NOTICE | Indicates a potentially hazardous situation which, if not avoided, could result in equipment damage, data loss, performance deterioration, or unanticipated results.<br>NOTICE is used to address practices not related to personal injury. |

| Symbol | Description |
| --- | --- |
| NOTE | Supplements the important information in the main text. NOTE is used to address information not related to personal injury, equipment damage, and environment deterioration. |

# Change History

| Issue | Release Date | Description |
| --- | --- | --- |
| 01 | 2023-01-19 | This issue is the first official release. |

# Contents



# 1 Overview

## 1.1 Interface Description

### RESTful NBIs

RESTful NBIs are open interfaces based on the Representational State Transfer (REST) standard, facilitating quick integration of third-party systems.

Third-party systems can use RESTful NBIs to access the resources authorized by the SmartPVMS, such as access authentication, configuration, alarm, and performance data.

Interfaces can be used only after authorization and the access is secure. Only HTTPS access is supported.

The JavaScript Object Notation (JSON) data format is used for data interaction. The data format is simple, easy to read and write, and occupies less network traffic than XML.

### Application Scenario

The NBI is an open authentication mode. It uses asymmetric encryption technology to authenticate users, obtain resources, and share data between different platforms, enterprises, and entities.

Currently, the NBI is open only to the company administrator. A maximum of five northbound accounts can be created. Owners cannot apply for northbound accounts.

**NOTE**

An installer account registered through **Installer Registration** on the login page is called the company administrator account.

### Interface Traffic Limiting

The system provides the interface traffic limiting mechanism to prevent system performance deterioration caused by improper interface invoking.

For example, the number of traffic limiting times for each northbound user is five times every 10 minutes. That is, each northbound user can invoke the login interface for a maximum of five times every 10 minutes. If the maximum number is exceeded, the interface cannot be invoked and error code 407 is returned.

**NOTICE**

The traffic limiting mechanism may be modified without notice as the system evolves in the future. Users can obtain the latest interface documentation to view the mechanism.

## What Is REST?

REST, short for Representational State Transfer, is a design and development mode for network applications. It simplifies development and improves system scalability.

REST uses resources as its core, and resources are uniquely identified by a uniform resource identifier (URI), for example, /rest/openapi/pvms/v1/plants.

REST uses four types of standard operations to access resources: POST, GET, PUT, and DELETE.

- POST: creates resources.
- GET: queries resources.
- PUT: updates resources.
- DELETE: deletes resources.

The SmartPVMS provides external services using URIs. Users obtain SmartPVMS resources through URIs and obtain services.

## HTTP Status Codes

The first line of all HTTP responses is the status line, which contains the current HTTP version number, the status code consisting of three digits, and the phrase that describes the status, which are separated by spaces.

The first digit of the status code indicates the type of the current response.

- 1xx message: The request has been received by the server and continues to be processed.
- 2xx success: The request has been received, understood, and accepted by the server.
- 3xx redirection: This request can be completed only after subsequent operations are performed.
- 4xx request error: The request contains a syntax error or cannot be executed.
- 5xx server error: An error occurs when the server processes a correct request.

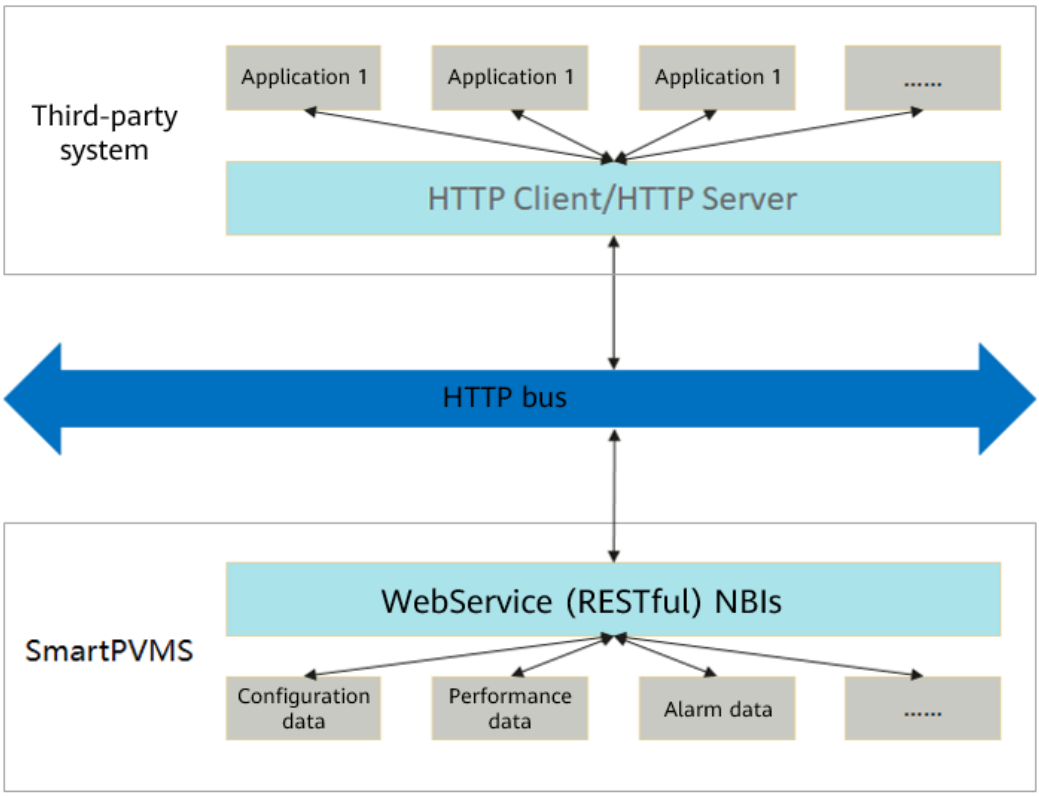
  

# 1.2 Interface Architecture

## Interface Architecture

The SmartPVMS provides a set of WebService interfaces for third-party systems and third-party developers, who can construct HTTPS requests to invoke APIs and obtain SmartPVMS resources and data.

**Figure 1-1** WebService NBI architecture




# 1.3 Interconnection Method

## Access Format and Path

Access format: https://Domain name of the management system/*Specific API name+Access request parameter*

## Access Permission

The northbound API access permission must be applied for separately and assigned by the administrator. Perform the following steps:

**Step 1** Choose **System** > **Business Configuration** > **Northbound Management** from the main menu.

**Step 2** On the **Northbound Management** page, click **Add**.

**Step 3** On the displayed **Add** tab page, set basic information such as the system name, deadline, user name, and password.

**Step 4** Select the **Plant list** interface from the interface list, select the plant associated with the user, and bind the plant instance that the northbound API user has access to.

**Step 5** (Optional) Select the **Device list** interface from the interface list, select the device associated with the user, and bind the device instance that the northbound API user has access to.

**Step 6** (Optional) Select other interfaces from the interface list and select the required information as prompted.

**Step 7** Click **OK** to save the settings.

**----End**

## Traffic Limiting Policy

The number of northbound API users and the number of plants and devices managed by each northbound API user are increasing. To better meet user requirements, the northbound API traffic limiting policy is adjusted. The new traffic limiting policy dynamically limits the traffic based on the number of resources owned by northbound API users. A user who manages a larger number of plants and devices is allowed to initiate more northbound API calls in a unit time.

**Existing users:** For northbound API users created on June 30, 2022 or earlier, the original traffic limiting policy applies, and the allowed frequency of API calls cannot be increased.

**New users**: For northbound API users created after June 30, 2022, the new traffic limiting policy applies. If a user exceeds the allowed frequency of API calls defined in the new traffic limiting policy, rate limiting is performed, the API calls may fail, and the consequences shall be borne by the user.

To avoid improper API calls, a rate limiting threshold is configured. If the threshold is exceeded, an error message is returned, and the API call is blocked.

In this case, adjust your API call frequency based on the error code. Huawei shall not bear any responsibilities or consequences.

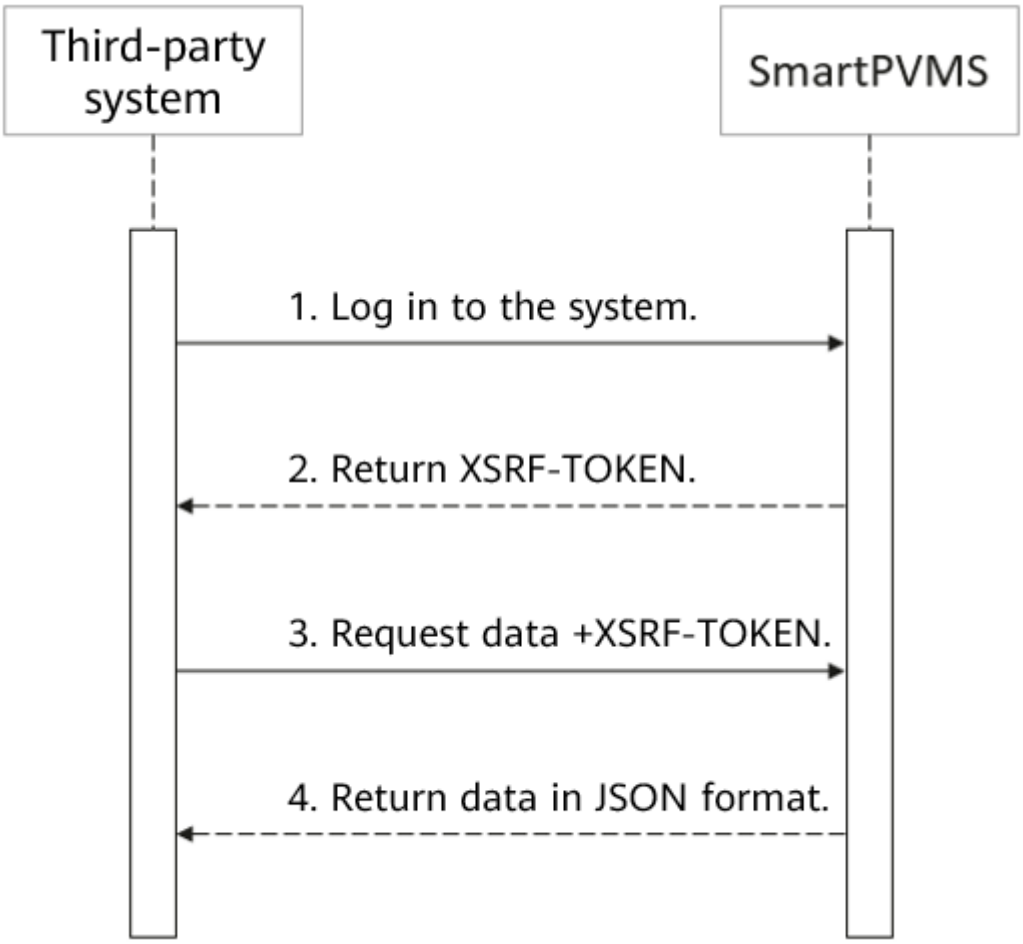
The system has two traffic limiting-related error messages:

Error code 407: The number of API calls of a single user exceeds the upper limit. For details about the limits on API calls, see "Access Restrictions" in the corresponding interface description. When this message is returned by an API, lower your frequency of calls to this API until the frequency drops to the allowed range.

Error code 403 or 429: When a large number of users initiate calls to the same API, the total number of calls to the API exceeds the upper limit at the system level. If this error message is received, wait for 1 minute and try again. If the error persists, wait for a longer time and try again. You can also minimize the number of calls.

### Communication Between a Third-party System and the SmartPVMS

**Figure 1-2** Communication between a third-party system and the SmartPVMS




NOTE

1. After the third-party system information is configured on the management system, use the username and password to log in to the management system from the third-party system.
2. After successful login, send requests to obtain data.
3. XSRF-TOKEN is a cross-site request token. After a user logs in to the system using the username and password, the system returns this token to the user. If the user adds the token to a subsequent request, it indicates that the request is initiated by a logged-in user.

## 1.4 Interface Change Description

- All new and modified APIs are described in the change description.
- APIs that are reaching the end of lifecycle will be declared in this document so that you can be prepared.

- New northbound users cannot invoke the APIs whose end-of-lifecycle is declared in this document. Otherwise, an error will be returned during the system upgrade.

# 2 Changes from iMaster NetEco V600R023C00SPC110 to iMaster NetEco V600R023C00SPC210

## 2.1 New Interfaces

| Interface Name | Interface Method and Path | Description |
| --- | --- | --- |
| Interface for Creating a Plant | https://*Domain name of the management system*/thirdData/createStation | Creates a plant. |
| Plant list | https://*Domain name of the management system*/thirdData/stations | Queries the plant list based on the grid connection time. |

## 2.2 Deleted Interfaces

None

## 2.3 Modified Interfaces

| Interface Name | Interface Method and Path | Description |
| --- | --- | --- |
| Interface for 5-minute Device Data | https://https://Domain name of the management system/thirdData/getDevFiveMinutes | Modified the interface access restriction (traffic limiting policy). |

| Interface Name | Interface Method and Path | Description |
| --- | --- | --- |
| Device alarm | https://https://Domain name of the management system/thirdData/getAlarmList | Added the function of querying device alarms based on the device serial number (SN) list. |
| Plant list | https://Domain name of the management system/thirdData/getStationList | The interface is about to go offline, and the new interface location is moved here. |
| Plant DRM Setting Interface | https://Domain name of the management system/rest/openapi/pvms/v1/vpp/drm | The **remoteId** parameter is added to the returned packet. This interface only delivers the DRM setting task. The task execution status needs to be obtained through the plant DRM setting query interface. |

# 3 Changes from iMaster NetEco V600R023C00SPC001 to iMaster NetEco V600R023C00SPC110

## 3.1 New Interfaces

None

## 3.2 Deleted Interfaces

None

## 3.3 Modified Interfaces

| Interface Name | Interface Method and Path | Description |
| --- | --- | --- |
| Plant List Interface | https://*Domain name of the management system*/thirdData/getStationList | Added the pagination query capability. |

# 4 Changes from iMaster NetEco V600R022C00CP1202 to iMaster NetEco V600R023C00SPC001

## 4.1 New Interfaces

None

## 4.2 Deleted Interfaces

None

## 4.3 Modified Interfaces

None

# 5 Changes from iMaster NetEco V600R022C00 to iMaster NetEco V600R022C00CP1202

## 5.1 New Interfaces

| Interface Name | Interface Method and Path | Description |
| --- | --- | --- |
| Historical Device Data Interface | https://Domain name of the management system/thirdData/getDevHistoryKpi | Obtains 5-minute statistical data of a device in a specified period. |
| Device Convergence Data Interface | https://Domain name of the management system/thirdData/cs/getInventerRealKpi | Obtains inverter running and alarm data. |

## 5.2 Deleted Interfaces

None

## 5.3 Modified Interfaces

None

# 6 Changes from V600R021C10 to V600R021C10SPC010

## 6.1 New Interfaces

None.

## 6.2 Deleted Interfaces

None.

## 6.3 Modified Interfaces

The V6 query interface of device data supports LUNA 2000 residential battery and C&I, Utility ESS. The involved interfaces are as follows:

| Interface Name | Interface Method and Path | Description |
| --- | --- | --- |
| Real-Time Device Data Interface | https://Domain name of the management system/thirdData/getDevRealKpi | Deleted "only LG batteries are supported" because devices of ID 39 support LUNA 2000. Added 41 device types to support C&I, Utility ESS. |
| 5-minute Device Data Interface | https://*Domain name of the management system*/thirdData/getDevFiveMinutes | Deleted "only LG batteries are supported" because devices of ID 39 support LUNA 2000. Added 41 device types to support C&I, Utility ESS. |

| Interface Name | Interface Method and Path | Description |
| --- | --- | --- |
| Daily Device Data Interface | https://*Domain name of the management system*/thirdData/getDevKpiDay | Deleted "only LG batteries are supported" because devices of ID 39 support LUNA 2000. Added 41 device types to support C&I, Utility ESS. |
| Monthly Device Data Interface | https://*Domain name of the management system*/thirdData/getDevKpiMonth | Deleted "only LG batteries are supported" because devices of ID 39 support LUNA 2000. Added 41 device types to support C&I, Utility ESS. |
| Yearly Device Data Interface | https://*Domain name of the management system*/thirdData/getDevKpiYear | Deleted "only LG batteries are supported" because devices of ID 39 support LUNA 2000. Added 41 device types to support C&I, Utility ESS. |

# 7 Changes from iMaster NetEco V600R022C00 to SmartPVMS V600R021C10SPC010

## 7.1 New Interfaces

None.

## 7.2 Deleted Interfaces

None.

## 7.3 Modified Interfaces

The device data query interface of the V6 version supports the LUNA 2000 residential energy storage system (ESS) and industrial and commercial string ESSs. The following table lists the involved interfaces.

| Interface Name | Interface Method and Path | Description |
| --- | --- | --- |
| Real-Time Device Data Interface | https://*Domain name of the management system*/thirdData/getDevRealKpi | Deleted the description that only the data of LG batteries is supported because the value **39** of the device type supports LUNA 2000. Added the value **41** of the device type to support the industrial and commercial string ESSs. |

| Interface Name | Interface Method and Path | Description |
| --- | --- | --- |
| 5-minute Device Data Interface | https://*Domain name of the management system*/thirdData/getDevFiveMinutes | Deleted the description that only the data of LG batteries is supported because the value **39** of the device type supports LUNA 2000. Added the value **41** of the device type to support the industrial and commercial string ESSs. |
| Daily Device Data Interface | https://*Domain name of the management system*/thirdData/getDevKpiDay | Deleted the description that only the data of LG batteries is supported because the value **39** of the device type supports LUNA 2000. Added the value **41** of the device type to support the industrial and commercial string ESSs. |
| Monthly Device Data Interface | https://*Domain name of the management system*/thirdData/getDevKpiMonth | Deleted the description that only the data of LG batteries is supported because the value **39** of the device type supports LUNA 2000. Added the value **41** of the device type to support the industrial and commercial string ESSs. |
| Yearly Device Data Interface | https://*Domain name of the management system*/thirdData/getDevKpiYear | Deleted the description that only the data of LG batteries is supported because the value **39** of the device type supports LUNA 2000. Added the value **41** of the device type to support the industrial and commercial string ESSs. |

# 8 Changes from V500R007C00SPC200 to V600R021C10

## 8.1 New Interfaces

None

## 8.2 Deleted Interfaces

None.

## 8.3 Modified Interfaces

None.

# 9 V6 Interface Reference

The following interfaces are inherited from SmartPVMS V300R006C00/V300R006C10/V500R007C00.

## 9.1 New Interfaces

None.

### 9.1.1 Login Interface

#### Interface Description

- Before obtaining data, the login interface must be invoked to obtain the XSRF-TOKEN. The validity period of XSRF-TOKEN is 30 minutes.
- If the XSRF-TOKEN does not expire, it can be reused. If the XSRF-TOKEN has expired, the login interface needs to be invoked again to obtain a new XSRF-TOKEN.
- After this interface is invoked to log in to the system, XSRF-TOKEN is returned in the response header.

#### Request URL

https://Domain name of the management system/thirdData/login

#### Request Mode

HTTP method: POST

#### Access Restrictions

If a user enters incorrect passwords for five consecutive times within 10 minutes, the user will be locked out for 30 minutes.

Number of traffic limiting times for each northbound user: five times every 10 minutes.

If the access frequency exceeds the limit, the interface returns error code 407.

## Request Parameters

| Parameter | Description | Data Type | Mandatory/ Optional |
| --- | --- | --- | --- |
| userName | Username | String | Mandatory |
| systemCode | Password | String | Mandatory |

## Response Packet

| Parameter | | Description | Data Type | Remarks |
| --- | --- | --- | --- | --- |
| success | | Request success or failure flag<br>true: The request succeeded.<br>false: The request failed. | Boolean | Request success or failure flag |
| failCode | | Error code<br>0 indicates that the status is normal. For definitions of other error codes, see **10 Error Code List**. | Integer | - |
| params | Parameters | - | - | - |
| | currentTime | Current system time, in milliseconds | Long | - |
| message | | Optional message | String | - |
| data | | Returned data | Object | - |

## Example

Request example:

```
{
    "userName":"admin4",
    "systemCode":"Admin@1234"
}
```

Response example:

Example 1: successful login

```
{
    "success":true,
    "data":null,
    "failCode":0,
    "params":null,
    "message":null
}
```

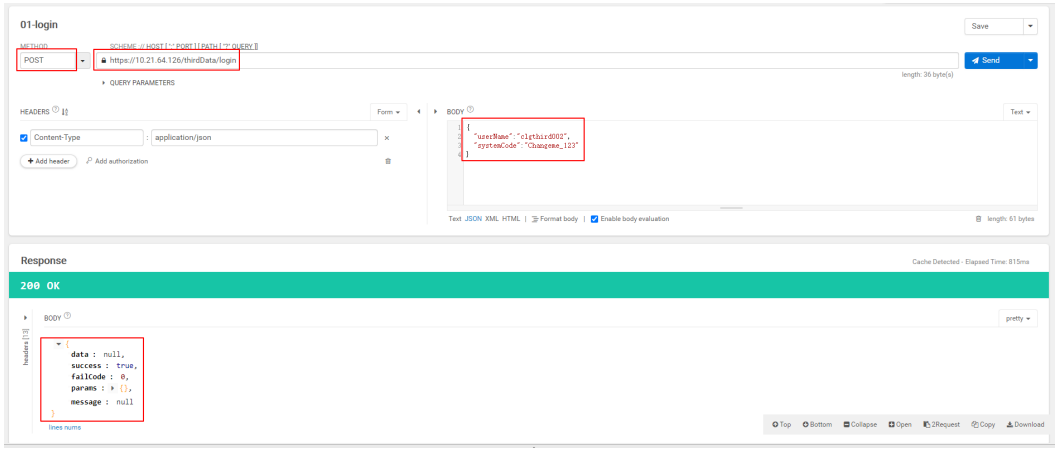
Example 2: failed login

```
{
    "data":null,
    "failCode":20001,
    "message":"",
    "params":{
        "currentTime":1593777870514
    },
    "success":false
}
```

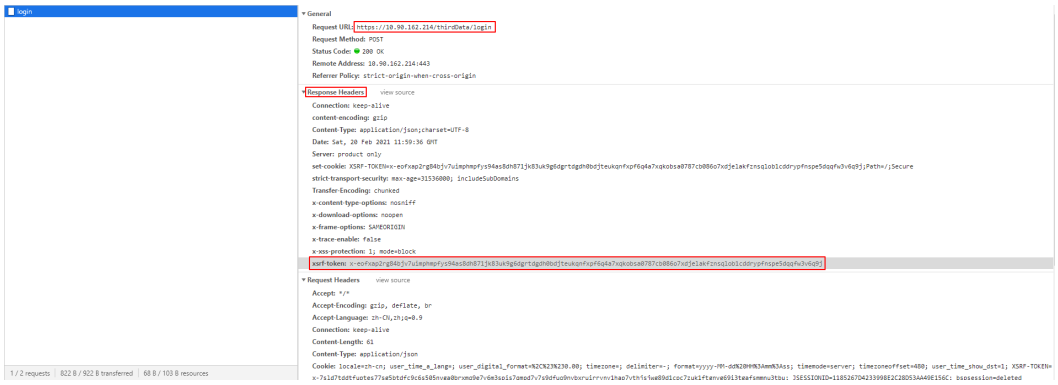
**NOTICE**

The header of the login success response contains the XSRF-TOKEN that must be retained. In subsequent data interface requests, this parameter and its value must be added to the request header and sent to the management system.

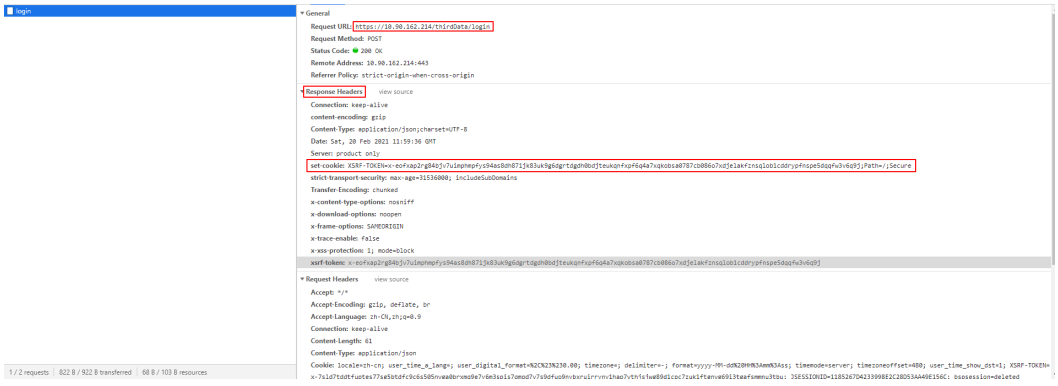
Login example:



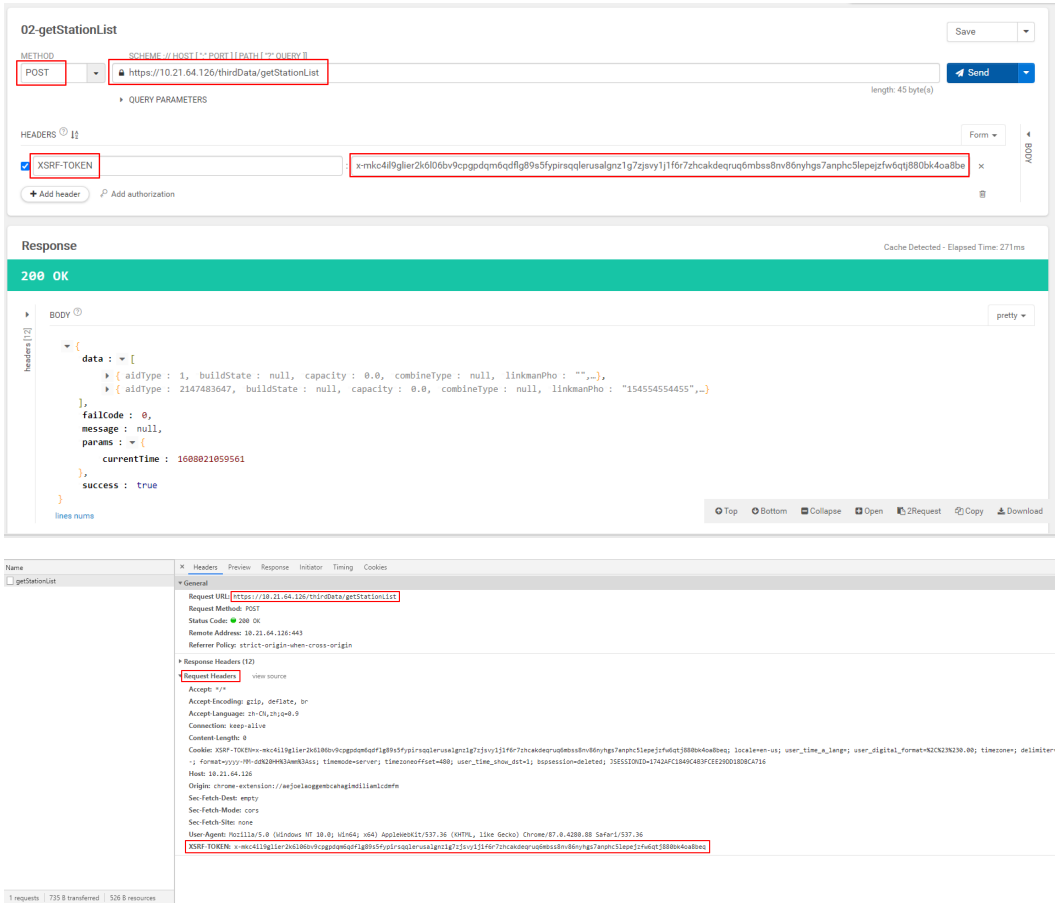

The following are examples of the XSRF-TOKEN returned after a successful login. You can obtain the XSRF-TOKEN using either of the following methods. The first one is recommended.




The following is an example compatible with earlier versions.




The following figure shows an example of the XSRF-TOKEN carried in the request header of the data interface.




## 9.1.2 Logout Interface

### Interface Description

If you want the XSRF-TOKEN to expire immediately, you can invoke this interface.

### Request URL

https://Domain name of the management system/thirdData/logout

### Request Mode

HTTP method: POST

### Access Restrictions

Number of traffic limiting times for each northbound user: five times every 10 minutes.

You are advised to invoke this interface only when necessary.

If the access frequency exceeds the limit, the interface returns error code 407.

## Request Parameters

| Parameter | Description | Data Type | Mandatory/ Optional |
| --- | --- | --- | --- |
| xsrfToken | XSRF-TOKEN returned in the response header after a successful login through the login interface. | String | Mandatory |

## Response Packet

| Parameter | | Description | Data Type | Remarks |
| --- | --- | --- | --- | --- |
| success | | Request success or failure flag<br>true: The request succeeded.<br>false: The request failed. | Boolean | Request success or failure flag |
| failCode | | Error code<br>0 indicates that the status is normal. For definitions of other error codes, see **10 Error Code List**. | Integer | - |
| params | Parameters | - | - | - |
| | currentTime | Current system time, in milliseconds | Long | - |
| message | | Optional message | String | - |
| data | | Returned data | Object | - |

## Example

Request example:

```
{
    "xsrfToken":"x-
apepjy1fpd2ptete1f7zuqimep7wuqen9hkb3xaourelbyrx9jio7s09hgk6ca2mdlksjdglasdhjaklsdfhhdsahwedyuio
qwehjkd"
}
```

Response example:

Example 1: successful logout

```
{
    "success":true,
    "data":null,
    "failCode":0,
    "params":{
```

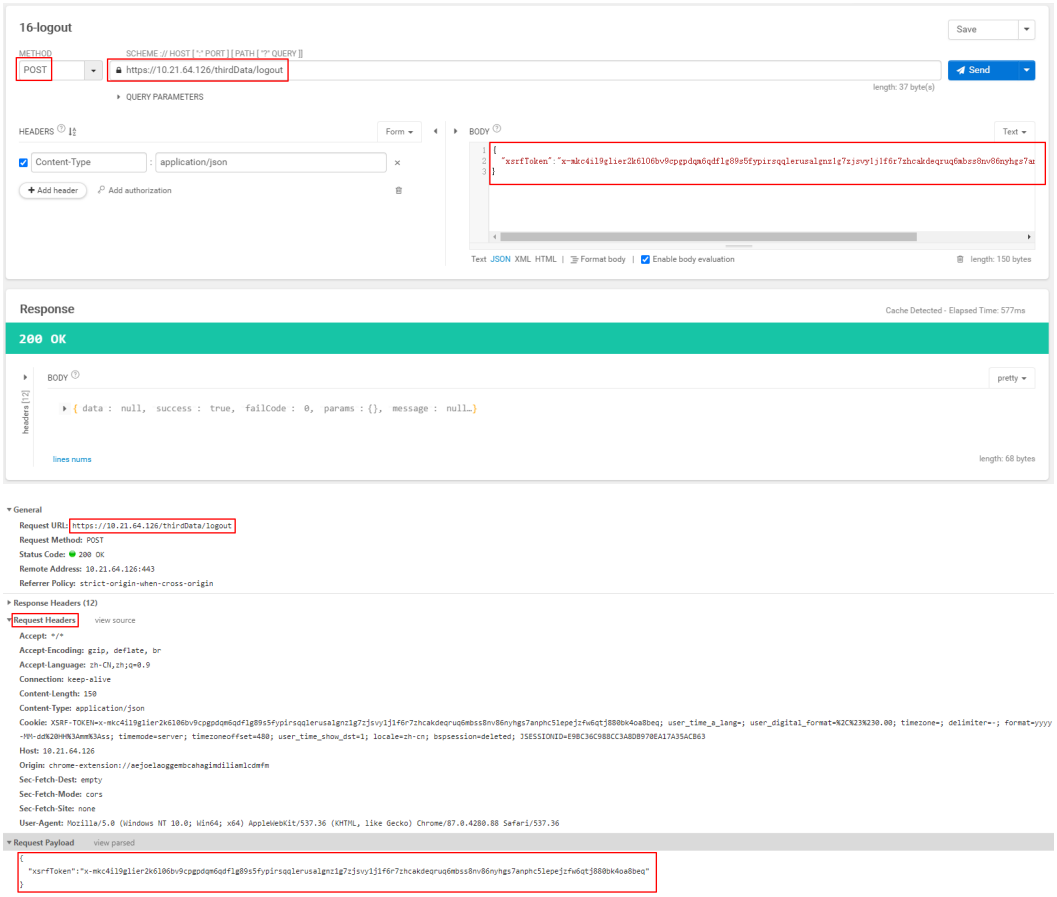
```
        "currentTime":1503046597854
    },
    "message":null
}
```


Example 2: failed logout


```
{
    "data":null,
    "success":false,
    "failCode":20001,
    "params":{
        "currentTime":1503046597854
    },
    "message":null
}
```


**NOTE**

Logout example:




# 9.1.3 Plant List Interface

## Interface Description

This interface is used to query the plant list. When the pagination parameters (a maximum of 100 records can be displayed on each page) and grid connection time are transferred (if only the grid connection start time is transferred, the grid connection end time is the current time by default; if only the grid connection end time is transferred, the default grid connection start time is 1970-01-01 08:00:00),

the plant list is queried in pages based on the grid connection time. When only the pagination parameter is transferred, the plant list is queried in pages.

## Request URL

https://*Domain name of the management system*/thirdData/stations

## Request Mode

HTTP method: POST

## Access Restrictions

Maximum number of northbound API calls per user per day = Roundup (Number of plants/100) x 10 + 24

If the access frequency exceeds the limit, the interface returns error code 407.

Example:

If a user manages 20 plants, the maximum number of API calls per day = Roundup (20/100) x 10 + 24 = 1 x 10 + 24 = 34.

If a user manages 120 plants, the maximum number of API calls per day = Roundup (120/100) x 10 + 24 = 2 x 10 + 24 = 44.

## Request Parameters

| Parameter | Description | Data Type | Mandatory/ Optional |
| --- | --- | --- | --- |
| pageNo | Page No. of the results | Integer | Mandatory |
| gridConnectedStartTime | Grid connection start time (ms) | Long | Optional |
| gridConnectedEndTime | Grid connection end time (ms) | Long | Optional |

## Response Packet

| Parameter | Description | Data Type | Remarks |
| --- | --- | --- | --- |
| success | Request success or failure flag<br>true: The request succeeded.<br>false: The request failed. | Boolean | Request success or failure flag |

| Parameter | Description | Data Type | Remarks |
| --- | --- | --- | --- |
| failCode | Error code<br>Value 0 indicates that the status is normal. For definitions of other error codes, see **10 Error Code List**. | Integer | - |
| message | Optional response message | - | - |
| data | Returned data, which contains the following information: | Map | - |
| > total | Total number of results | Long | - |
| > pageCount | Total number of pages | Long | - |
| > pageNo | Page No. of the results | Integer | - |
| > pageSize | Number of query results displayed on each page | Integer | - |
| > list | Plant information list. The plant information is as follows: | List | Plant information |
| >> plantCode | Plant ID, which uniquely identifies a plant. | String | - |
| >> plantName | Plant name | String | - |
| >> plantAddress | Detailed address of the plant | String | - |
| >> longitude | Plant longitude | Double | - |
| >> latitude | Plant latitude | Double | - |
| >> capacity | Total string capacity | Double | kWp |
| >> contactPerson | Plant contact | String | - |
| >> contactMethod | Contact information of the plant contact, such as the mobile phone number or email address | String | - |
| >> gridConnectionDate | Grid connection time of the plant, including the time zone | String | 2020-02-06T00:00:00+08:00 |

## Examples

Request example:

```
{
  "pageNo": 1,
  "gridConnectedStartTime":1664718569000,
  "gridConnectedEndTime":1667396969000
}
```

Response examples:

Example 1: An error code is returned.

```
{
  "success": false,
  "data": null,
  "failCode": 20605,
  "message": "The time cannot be a negative number."
}
```

Example 2: The plant list data is returned.

```
{
  "success": true,
  "data": {
    "list": [
      {
        "plantCode": "NE=12345678",
        "plantName": "NMplant1",
        "plantAddress": null,
        "longitude": null,
        "latitude": null,
        "capacity": 146.5,
        "contactPerson": "",
        "contactMethod": "",
        "gridConnectionDate": "2022-11-21T16:23:00+08:00"
      },
      {
        "plantCode": "NE=23456789",
        "plantName": "plant2",
        "plantAddress": null,
        "longitude": null,
        "latitude": null,
        "capacity": 123.3,
        "contactPerson": "",
        "contactMethod": "",
        "gridConnectionDate": "2022-11-21T16:30:28-12:00"
      }
    ],
    "pageCount": 1,
    "pageNo": 1,
    "pageSize": 100,
    "total": 2
  },
  "failCode": 0,
  "message": "get plant list success"
  }
```

# 9.1.4 Plant Data Interfaces

Before invoking the following plant data interfaces, you need to invoke the plant list interface to obtain the plant ID.

### 9.1.4.1 Real-Time Plant Data Interface

## Interface Description

This interface is used to obtain real-time plant data by plant ID set. Data of a maximum of 100 plants can be queried at a time.

For details about the data list that can be queried using this interface, see **9.2.1 Interface for Real-time Plant Data**.

## Request URL

https://Domain name of the management system/thirdData/getStationRealKpi

## Request Mode

HTTP method: POST

## Access Restrictions

Traffic limiting is performed based on the number of plants managed by northbound API users. Number of northbound API calls per user every 5 minutes = Roundup (Number of plants/100)

Only one concurrent request is supported per minute.

If the access frequency exceeds the limit, the interface returns error code 407.

Example:

If a northbound API user manages 20 plants: Maximum number of northbound API calls per user every five minutes = Roundup (20/100) = 1

If a northbound API user manages 120 plants: Maximum number of northbound API calls per user every five minutes = Roundup (120/100) = 2

## Request Parameters

| Parameter | Description | Data Type | Mandatory/ Optional |
| --- | --- | --- | --- |
| stationCodes | Plant ID list. Multiple plant IDs are separated by commas (,). The plant IDs are obtained from **9.4.2 Plant List Interface**. | String | Mandatory |

## Response Packet

| Parameter | | Description | Data Type | Remarks |
| --- | --- | --- | --- | --- |
| success | | Request success or failure flag<br>true: The request succeeded.<br>false: The request failed. | Boolean | Request success or failure flag |
| failCode | | Error code<br>Value 0 indicates that the status is normal. For definitions of other error codes, see **10 Error Code List**. | Integer | - |
| params | Parameters | - | - | - |
| | stationCodes | Plant ID list in the request parameter | String | - |
| | currentTime | Current system time, in milliseconds | Long | - |
| message | | Optional message | String | - |
| data | Parameters | Returned data. The data contains the real-time data object list of each plant. | List | - |
| | stationCode | Plant ID | String | - |
| | dataItemMap | Content of each data item, which is returned in the key-value format. For details about the data item list, see **9.2.1 Interface for Real-time Plant Data**. | Map | - |

## Example

Request example:

```
{
    "stationCodes":"BA4372D08E014822AB065017416F254C,5D02E8B40AD342159AC8D8A2BCD4FAB5"
}
```

Response example:

Example 1: An error code is returned.

```
{
    "success":false,
    "data":null,
    "failCode":20009,
```

```
  "params":{
    "stationCodes":"BA4372D08E014822AB065017416F254C,5D02E8B40AD342159AC8D8A2BCD4FAB5",
    "currentTime":1503046597854
  },
  "message":null
}
```

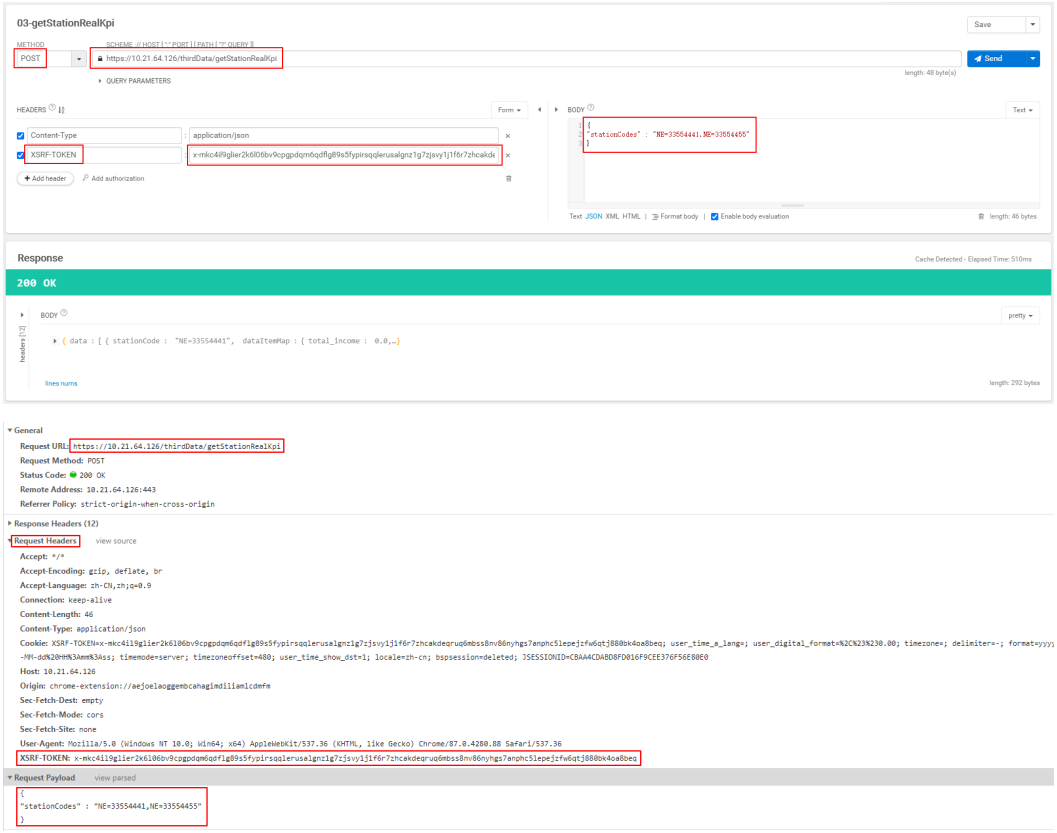

Example 2: Real-time plant data is returned.


```
{
  "success":true,
  "data":[
    {
      "dataItemMap":{
        "real_health_state":"3",
        "day_power":"10000",
        "total_power":"900.000",
        "day_income":"0.000",
        "month_power":"900.000",
        "total_income":"2088.000"
      },
      "stationCode":"BA4372D08E014822AB065017416F254C"
    },
    {
      "dataItemMap":{
        "real_health_state":"1",
        "day_power":"16770.000",
        "total_power":"35100.000",
        "day_income":"26832.000",
        "month_power":"35100.000",
        "total_income":"61152.000"
      },
      "stationCode":"5D02E8B40AD342159AC8D8A2BCD4FAB5"
    }
  ],
  "failCode":0,
  "params":{
    "stationCodes":"BA4372D08E014822AB065017416F254C,5D02E8B40AD342159AC8D8A2BCD4FAB5",
    "currentTime":1503046597854
  },
  "message":null
}
```

**NOTE**

Prerequisites for obtaining data: The user has the permission to access this interface.

Request example:




## 9.1.4.2 Hourly Plant Data Interface

## Interface Description

This interface is used to obtain hourly plant data. Data of a maximum of 100 plants can be queried at a time.

The backend calculates the date of the collection time based on the request parameter **collectTime** (collection time in milliseconds) and the time zone where the plant is located. Then, you can query the hourly data of the plant by plant ID in the current day. If data is generated for $n$ ($0 \le n \le 24$) hours of the day, $n$ ($0 \le n \le 24$) results are returned.

For details about the data list that can be queried using this interface, see **9.2.2 Hourly Plant Data Interface**.

## Request URL

https://Domain name of the management system/thirdData/getKpiStationHour

## Request Mode

HTTP method: POST

## Access Restrictions

Traffic limiting is performed based on the number of plants managed by northbound API users. Number of northbound API calls per user per day = Roundup (Number of plants/100) + 24

Only one concurrent request is supported per minute.

If the access frequency exceeds the limit, the interface returns error code 407.

Example:

If a user manages 20 plants, the maximum number of API calls per day = Roundup (20/100) + 24 = 1 + 24 = 25.

If a user manages 120 plants, the maximum number of API calls per day = Roundup (120/100) + 24 = 2 + 24 = 26.

## Request Parameters

| Parameter | Description | Data Type | Mandatory/ Optional |
| --- | --- | --- | --- |
| stationCodes | Plant ID list. Multiple plant IDs are separated by commas (,). | String | Mandatory |
| collectTime | Collection time, in milliseconds | Long | Mandatory |

## Response Packet

| Parameter | | Description | Data Type | Remarks |
| --- | --- | --- | --- | --- |
| success | | Request success or failure flag<br>true: The request succeeded.<br>false: The request failed. | Boolean | Request success or failure flag |
| failCode | | Error code<br>Value 0 indicates that the status is normal. For definitions of other error codes, see **10 Error Code List**. | Integer | - |
| params | Parameters | - | - | - |
| | stationCodes | Plant ID list in the request parameter | String | - |

| Parameter | | Description | Data Type | Remarks |
| --- | --- | --- | --- | --- |
| | collectTime | Collection time in milliseconds in the request parameter | Long | - |
| | currentTime | Current system time, in milliseconds | Long | - |
| message | | Optional message | String | - |
| data | Parameters | Returned data. The data contains the hourly data object list of each plant. | List | List of hourly plant data in a day |
| | stationCode | Plant ID | String | - |
| | collectTime | Collection time, in milliseconds | Long | - |
| | dataItemMap | Content of each data item, which is returned in the key-value format. For details about the data item list, see **9.2.2 Hourly Plant Data Interface**. | Map | - |

## Example

Request example:

```
{
   "stationCodes":"BA4372D08E014822AB065017416F254C,5D02E8B40AD342159AC8D8A2BCD4FAB5",
   "collectTime":1501862400000
}
```

Response example:

Example 1: An error code is returned.

```
{
   "success":false,
   "data":null,
   "failCode":20009,
   "params":{
      "stationCodes":"BA4372D08E014822AB065017416F254C,5D02E8B40AD342159AC8D8A2BCD4FAB5",
      "collectTime":1501862400000,
      "currentTime":1503046597854
   },
   "message":null
}
```

Example 2: Hourly plant data is returned.

```
{
   "success":true,
```

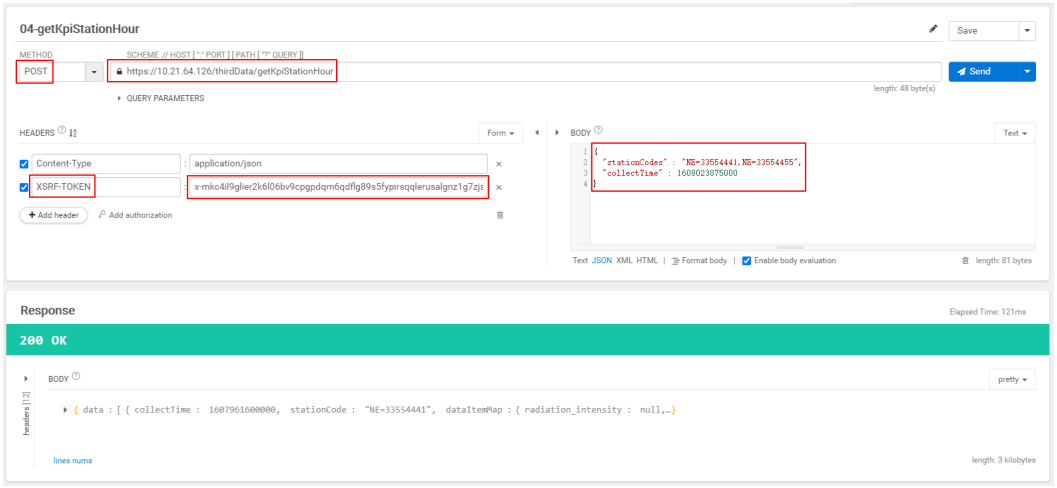
```
"data":[
    {
        "dataItemMap":{
            "radiation_intensity":null,
            "theory_power":null,
            "inverter_power":0,
            "ongrid_power":null,
            "power_profit":0
        },
        "stationCode":"5D02E8B40AD342159AC8D8A2BCD4FAB5",
        "collectTime":1501862400000
    },
    {
        "dataItemMap":{
            "radiation_intensity":null,
            "theory_power":null,
            "inverter_power":0,
            "ongrid_power":null,
            "power_profit":0
        },
        "stationCode":"5D02E8B40AD342159AC8D8A2BCD4FAB5",
        "collectTime":1501866000000
    },
    {
        "dataItemMap":{
            "radiation_intensity":null,
            "theory_power":null,
            "inverter_power":0,
            "ongrid_power":null,
            "power_profit":0
        },
        "stationCode":"BA4372D08E014822AB065017416F254C",
        "collectTime":1501873200000
    },
    {
        "dataItemMap":{
            "radiation_intensity":null,
            "theory_power":null,
            "inverter_power":0,
            "ongrid_power":null,
            "power_profit":0
        },
        "stationCode":"5D02E8B40AD342159AC8D8A2BCD4FAB5",
        "collectTime":1501876800000
    },
    {
        "dataItemMap":{
            "radiation_intensity":null,
            "theory_power":null,
            "inverter_power":0,
            "ongrid_power":null,
            "power_profit":0
        },
        "stationCode":"5D02E8B40AD342159AC8D8A2BCD4FAB5",
        "collectTime":1501880400000
    },
    {
        "dataItemMap":{
            "radiation_intensity":null,
            "theory_power":null,
            "inverter_power":0,
            "ongrid_power":null,
            "power_profit":0
        },
        "stationCode":"5D02E8B40AD342159AC8D8A2BCD4FAB5",
        "collectTime":1501884000000
    },
    {
        "dataItemMap":{
```

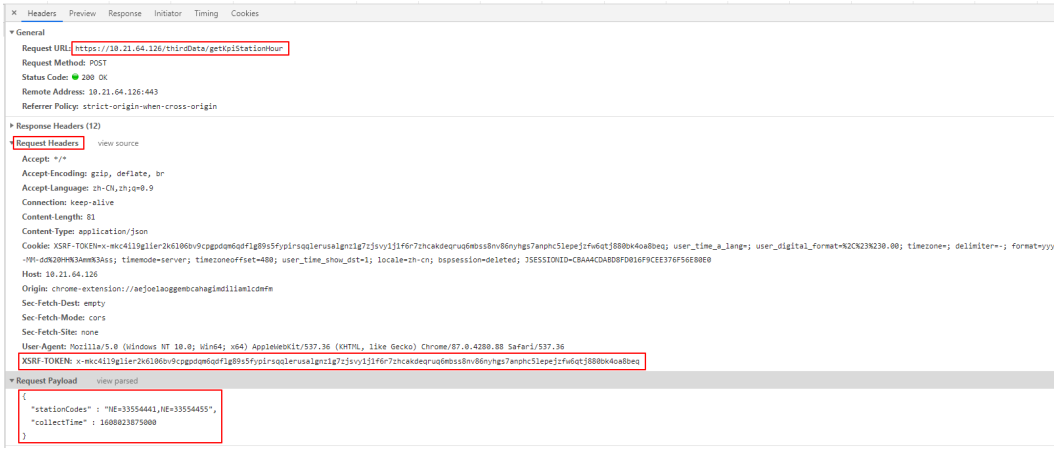
```
            "radiation_intensity":null,
            "theory_power":null,
            "inverter_power":0,
            "ongrid_power":null,
            "power_profit":0
         },
         "stationCode":"5D02E8B40AD342159AC8D8A2BCD4FAB5",
         "collectTime":1501887600000
      },
      {
         "dataItemMap":{
            "radiation_intensity":null,
            "theory_power":null,
            "inverter_power":0,
            "ongrid_power":null,
            "power_profit":0
         },
         "stationCode":"BA4372D08E014822AB065017416F254C",
         "collectTime":1501887600000
      }
   ],
   "failCode":0,
   "params":{
      "stationCodes":"BA4372D08E014822AB065017416F254C,5D02E8B40AD342159AC8D8A2BCD4FAB5",
      "collectTime":1501862400000,
      "currentTime":1503046597854
   },
   "message":null
}
```

**NOTE**

Prerequisites for obtaining data: The user has the permission to access this interface.

Request example:




## 9.1.4.3 Daily Plant Data Interface

## Interface Description

This interface is used to obtain daily plant data. Data of a maximum of 100 plants can be queried at a time.

The backend calculates the month of the collection time based on the request parameter **collectTime** (collection time in milliseconds) and the time zone where the plant is located. Then, you can query the daily data of the plant by plant ID in the current month. If data is generated for *n* ($0 \le n \le 31$) days of the month, *n* ($0 \le n \le 31$) results are returned.

For details about the data list that can be queried using this interface, see **9.2.3 Daily Plant Data Interface**.

## Request URL

https://Domain name of the management system/thirdData/getKpiStationDay

## Request Mode

HTTP method: POST

## Access Restrictions

Traffic limiting is performed based on the number of plants managed by northbound API users. Number of northbound API calls per user per day = Roundup (Number of plants/100) + 24

Only one concurrent request is supported per minute.

If the access frequency exceeds the limit, the interface returns error code 407.

Example:

If a user manages 20 plants, the maximum number of API calls per day = Roundup (20/100) + 24 = 1 + 24 = 25.

If a user manages 120 plants, the maximum number of API calls per day = Roundup (120/100) + 24 = 2 + 24 = 26.

## Request Parameters

| Parameter | Description | Data Type | Mandatory/ Optional |
| --- | --- | --- | --- |
| stationCodes | Plant ID list. Multiple plant IDs are separated by commas (,). | String | Mandatory |
| collectTime | Collection time, in milliseconds | Long | Mandatory |

## Response Packet

| Parameter | Description | Data Type | Remarks |
| --- | --- | --- | --- |
| success | Request success or failure flag<br>true: The request succeeded.<br>false: The request failed. | Boolean | Request success or failure flag |
| failCode | Error code<br>Value 0 indicates that the status is normal. For definitions of other error codes, see **10 Error Code List**. | Integer | - |

| Parameter | | Description | Data Type | Remarks |
| --- | --- | --- | --- | --- |
| params | Parameters | - | - | - |
| | stationCodes | Plant ID list in the request parameter | String | - |
| | collectTime | Collection time in milliseconds in the request parameter | Long | - |
| | currentTime | Current system time, in milliseconds | Long | - |
| message | | Optional message | String | - |
| data | Parameters | Returned data. The data contains the daily data object list of each plant. | List | Daily data list of a plant in a month |
| | stationCode | Plant ID | String | - |
| | collectTime | Collection time, in milliseconds | Long | - |
| | dataItemMap | Content of each data item, which is returned in the key-value format. For details about the data item list, see **9.2.3 Daily Plant Data Interface**. | Map | - |

## Example

Request example:

```
{
   "stationCodes":"BA4372D08E014822AB065017416F254C,5D02E8B40AD342159AC8D8A2BCD4FAB5",
   "collectTime":1501862400000
}
```

Response example:

Example 1: An error code is returned.

```
{
   "stationCodes":"BA4372D08E014822AB065017416F254C,5D02E8B40AD342159AC8D8A2BCD4FAB5",
   "collectTime":1501862400000
}
```

Example 2: Daily plant data is returned.

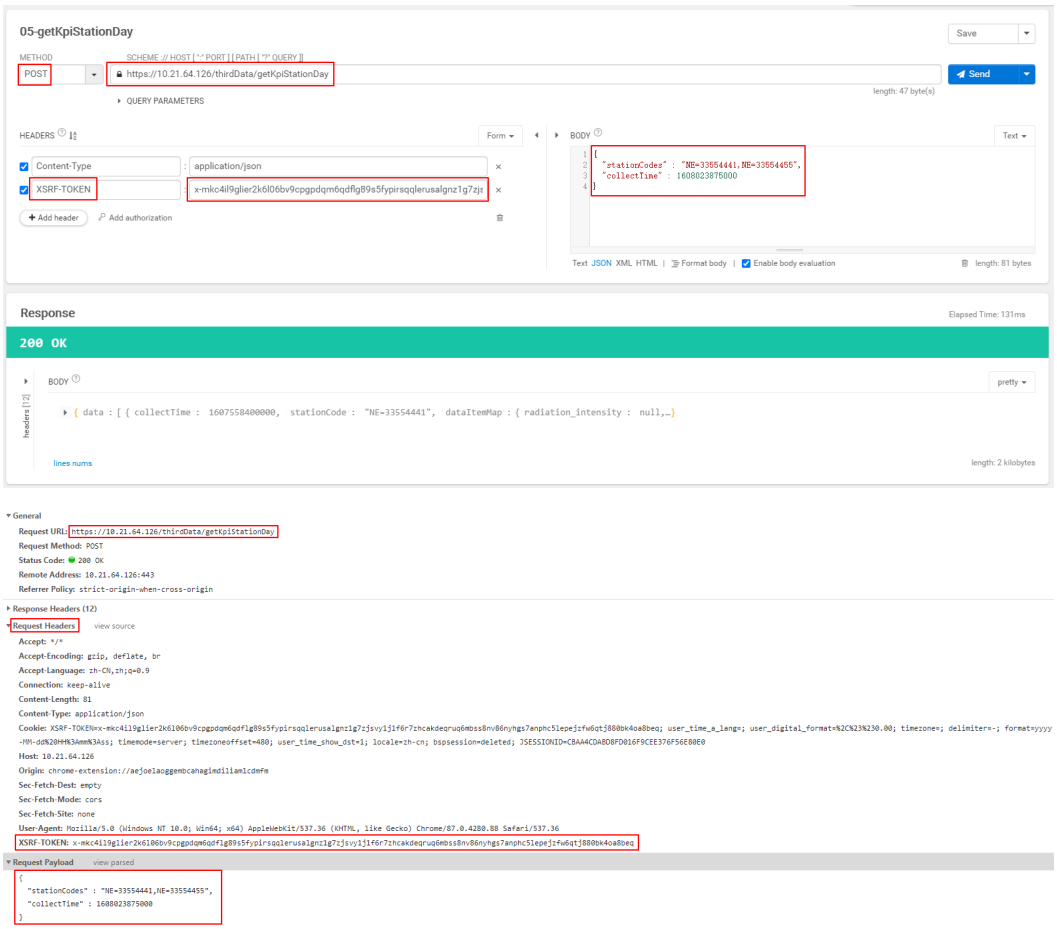
```
{
   "success":true,
   "data":[
      {
```

```
            "dataItemMap":{
                "use_power":288760,
                "radiation_intensity":0.6968,
                "reduction_total_co2":18.275,
                "reduction_total_coal":7.332,
                "theory_power":17559.36,
                "ongrid_power":18330,
                "power_profit":34320,
                "installed_capacity":25200,
                "perpower_ratio":0.727,
                "inverter_power":18330,
                "reduction_total_tree":999,
                "performance_ratio":89
            },
            "stationCode":"5D02E8B40AD342159AC8D8A2BCD4FAB5",
            "collectTime":1501776000000
        },
        {
            "dataItemMap":{
                "use_power":null,
                "radiation_intensity":1.4123,
                "reduction_total_co2":0.897,
                "reduction_total_coal":0.36,
                "theory_power":659.6,
                "ongrid_power":null,
                "power_profit":2088,
                "installed_capacity":467.04,
                "perpower_ratio":1.927,
                "inverter_power":18330,
                "reduction_total_tree":49,
                "performance_ratio":89
            },
            "stationCode":"BA4372D08E014822AB065017416F254C",
            "collectTime":1501776000000
        }
    ],
    "failCode":0,
    "params":{
        "stationCodes":"BA4372D08E014822AB065017416F254C,5D02E8B40AD342159AC8D8A2BCD4FAB5",
        "collectTime":1501862400000,
        "currentTime":1503046597854
    },
    "message":null
}
```

**NOTE**

Prerequisites for obtaining data: The user has the permission to access this interface.

Request example:




## 9.1.4.4 Monthly Plant Data Interface

## Interface Description

This interface is used to obtain monthly plant data. Data of a maximum of 100 plants can be queried at a time.

The backend calculates the year of the collection time based on the request parameter **collectTime** (collection time in milliseconds) and the time zone where the plant is located. Then, you can query the monthly data of the plant by plant ID in the current year. If data is generated for $n$ ($0 \le n \le 12$) months of the year, $n$ ($0 \le n \le 12$) results are returned.

For details about the data list that can be queried using this interface, see **9.2.4 Monthly Plant Data Interface**.

## Request URL

https://Domain name of the management system/thirdData/getKpiStationMonth

## Request Mode

HTTP method: POST

## Access Restrictions

Traffic limiting is performed based on the number of plants managed by northbound API users. Number of northbound API calls per user per day = Roundup (Number of plants/100) + 24

Only one concurrent request is supported per minute.

If the access frequency exceeds the limit, the interface returns error code 407.

Example:

If a user manages 20 plants, the maximum number of API calls per day = Roundup (20/100) + 24 = 1 + 24 = 25.

If a user manages 120 plants, the maximum number of API calls per day = Roundup (120/100) + 24 = 2 + 24 = 26.

## Request Parameters

| Parameter | Description | Data Type | Mandatory/ Optional |
| --- | --- | --- | --- |
| stationCodes | Plant ID list. Multiple plant IDs are separated by commas (,). | String | Mandatory |
| collectTime | Collection time, in milliseconds | Long | Mandatory |

## Response Packet

| Parameter | Description | Data Type | Remarks |
| --- | --- | --- | --- |
| success | Request success or failure flag<br>true: The request succeeded.<br>false: The request failed. | Boolean | Request success or failure flag |
| failCode | Error code<br>Value 0 indicates that the status is normal. For definitions of other error codes, see **10 Error Code List**. | Integer | - |

| Parameter | | Description | Data Type | Remarks |
| --- | --- | --- | --- | --- |
| params | Parameters | - | - | - |
| | stationCodes | Plant ID list in the request parameter | String | - |
| | collectTime | Collection time in milliseconds in the request parameter | Long | - |
| | currentTime | Current system time, in milliseconds | Long | - |
| message | | Optional message | String | - |
| data | Parameters | Returned data. The data contains the monthly data object list of each plant. | List | Monthly data list of a plant in a year |
| | stationCode | Plant ID | String | - |
| | collectTime | Collection time, in milliseconds | Long | - |
| | dataItemMap | Content of each data item, which is returned in the key-value format. For details about the data item list, see **9.2.4 Monthly Plant Data Interface**. | Map | - |

## Example

Request example:

```
{
   "stationCodes":"BA4372D08E014822AB065017416F254C,5D02E8B40AD342159AC8D8A2BCD4FAB5",
   "collectTime":1501862400000
}
```

Response example:

Example 1: An error code is returned.

```
{
   "stationCodes":"BA4372D08E014822AB065017416F254C,5D02E8B40AD342159AC8D8A2BCD4FAB5",
   "collectTime":1501862400000
}
```

Example 2: Monthly plant data is returned.

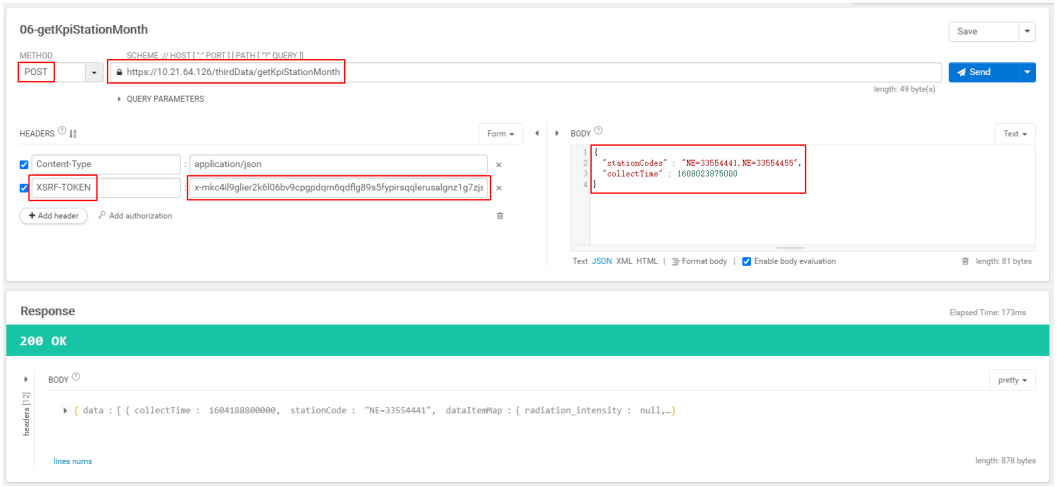
```
{
   "success":true,
   "data":[
      {
```

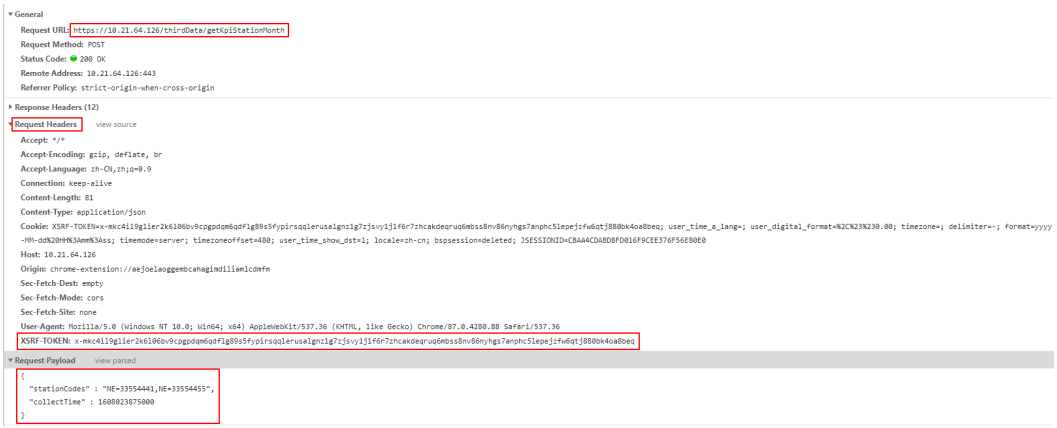
```
            "dataItemMap":{
                "use_power":288760,
                "radiation_intensity":0.6968,
                "reduction_total_co2":18.275,
                "reduction_total_coal":7.332,
                "inverter_power":null,
                "theory_power":17559.36,
                "ongrid_power":18330,
                "power_profit":34320,
                "installed_capacity":25200,
                "perpower_ratio":0.727,
                "reduction_total_tree":999,
                "performance_ratio":89
            },
            "stationCode":"5D02E8B40AD342159AC8D8A2BCD4FAB5",
            "collectTime":1501516800000
        },
        {
            "dataItemMap":{
                "use_power":null,
                "radiation_intensity":1.4123,
                "reduction_total_co2":0.897,
                "reduction_total_coal":0.36,
                "inverter_power":null,
                "theory_power":659.6,
                "ongrid_power":null,
                "power_profit":2088,
                "installed_capacity":467.04,
                "perpower_ratio":1.927,
                "reduction_total_tree":49,
                "performance_ratio":89
            },
            "stationCode":"BA4372D08E014822AB065017416F254C",
            "collectTime":1501516800000
        }
    ],
    "failCode":0,
    "params":{
        "stationCodes":"BA4372D08E014822AB065017416F254C,5D02E8B40AD342159AC8D8A2BCD4FAB5",
        "collectTime":1501862400000,
        "currentTime":1503046597854
    },
    "message":null
}
```

**NOTE**

Prerequisites for obtaining data: The user has the permission to access this interface.

Request example:




## 9.1.4.5 Yearly Plant Data Interface

## Interface Description

This interface is used to obtain yearly plant data. Data of a maximum of 100 plants can be queried at a time.

Based on the plant ID, the backend queries the data of each year since the plant was constructed (including the current year).

For details about the data list that can be queried using this interface, see **9.2.5 Yearly Plant Data Interface**.

## Request URL

https://Domain name of the management system/thirdData/getKpiStationYear

## Request Mode

HTTP method: POST

## Access Restrictions

Traffic limiting is performed based on the number of plants managed by northbound API users. Number of northbound API calls per user per day = Roundup (Number of plants/100) + 24

Only one concurrent request is supported per minute.

If the access frequency exceeds the limit, the interface returns error code 407.

Example:

If a user manages 20 plants, the maximum number of API calls per day = Roundup (20/100) + 24 = 1 + 24 = 25.

If a user manages 120 plants, the maximum number of API calls per day = Roundup (120/100) + 24 = 2 + 24 = 26.

## Request Parameters

| Parameter | Description | Data Type | Mandatory/ Optional |
| --- | --- | --- | --- |
| stationCodes | Plant ID list. Multiple plant IDs are separated by commas (,). | String | Mandatory |
| collectTime | Collection time, in milliseconds | Long | Mandatory |

## Response Packet

| Parameter | | Description | Data Type | Remarks |
| --- | --- | --- | --- | --- |
| success | | Request success or failure flag<br>true: The request succeeded.<br>false: The request failed. | Boolean | Request success or failure flag |
| failCode | | Error code<br>Value 0 indicates that the status is normal. For definitions of other error codes, see **10 Error Code List**. | Integer | - |
| params | Parameters | - | - | - |
| | stationCodes | Plant ID list in the request parameter | String | - |

| Parameter | | Description | Data Type | Remarks |
| --- | --- | --- | --- | --- |
| | collectTime | Collection time in milliseconds in the request parameter | Long | - |
| | currentTime | Current system time, in milliseconds | Long | - |
| message | | Optional message | String | - |
| data | Parameters | Returned data. The data contains the yearly data object list of each plant. | List | Yearly data list of the plant since its construction |
| | stationCode | Plant ID | String | - |
| | collectTime | Collection time, in milliseconds | Long | - |
| | dataItemMap | Content of each data item, which is returned in the key-value format. For details about the data item list, see **9.2.5 Yearly Plant Data Interface**. | Map | - |

## Example

Request example:

```
{
   "stationCodes":"BA4372D08E014822AB065017416F254C,5D02E8B40AD342159AC8D8A2BCD4FAB5",
   "collectTime":1501862400000
}
```

Response example:

Example 1: An error code is returned.

```
{
   "success":false,
   "data":null,
   "failCode":20009,
   "params":{
      "stationCodes":"BA4372D08E014822AB065017416F254C,5D02E8B40AD342159AC8D8A2BCD4FAB5",
      "collectTime":1501862400000,
      "currentTime":1503046597854
   },
   "message":null
}
```

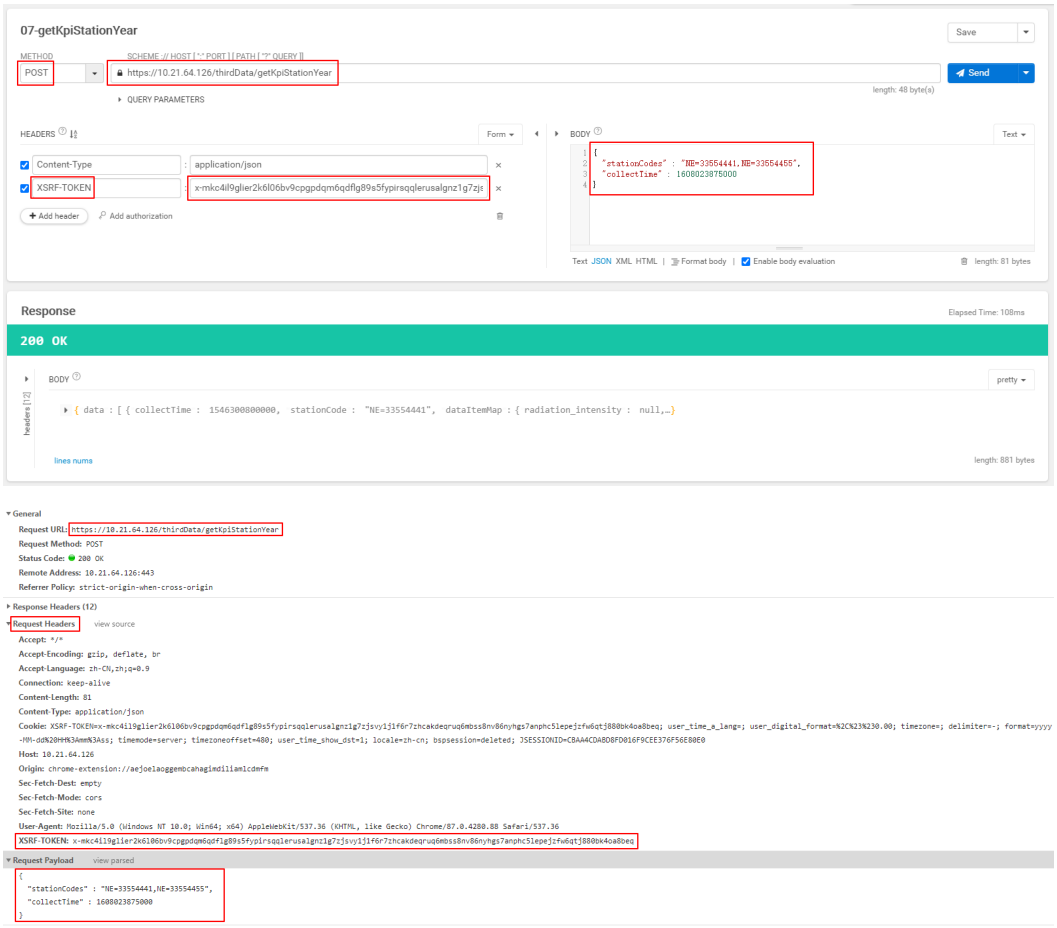
Example 2: Yearly plant data is returned.

```
{
    "success":true,
    "data":[
        {
            "dataItemMap":{
                "use_power":288760,
                "radiation_intensity":0.6968,
                "reduction_total_co2":18.275,
                "reduction_total_coal":7.332,
                "inverter_power":null,
                "theory_power":17559.36,
                "ongrid_power":18330,
                "power_profit":34320,
                "installed_capacity":25200,
                "perpower_ratio":0.727,
                "reduction_total_tree":999,
                "performance_ratio":89
            },
            "stationCode":"5D02E8B40AD342159AC8D8A2BCD4FAB5",
            "collectTime":1483200000000
        },
        {
            "dataItemMap":{
                "use_power":null,
                "radiation_intensity":1.4123,
                "reduction_total_co2":0.897,
                "reduction_total_coal":0.36,
                "inverter_power":null,
                "theory_power":659.6,
                "ongrid_power":null,
                "power_profit":2088,
                "installed_capacity":467.04,
                "perpower_ratio":1.927,
                "reduction_total_tree":49,
                "performance_ratio":89
            },
            "stationCode":"BA4372D08E014822AB065017416F254C",
            "collectTime":1483200000000
        }
    ],
    "failCode":0,
    "params":{
        "stationCodes":"BA4372D08E014822AB065017416F254C,5D02E8B40AD342159AC8D8A2BCD4FAB5",
        "collectTime":1501862400000,
        "currentTime":1503046597854
    },
    "message":null
}
```

**NOTE**

Prerequisites for obtaining data: The user has the permission to access this interface.

Request example:




# 9.1.5 Device List Interface

## Interface Description

This interface is used to obtain basic device information. Before invoking other interfaces to obtain device data, you need to invoke this interface to obtain the device ID.

When you query devices by plant ID set, devices of a maximum of 100 plants can be queried at a time.

## Request URL

https://Domain name of the management system/thirdData/getDevList

## Request Mode

HTTP method: POST

## Access Restrictions

Traffic limiting is performed based on the number of plants managed by northbound API users. Number of northbound API calls per user per day = Roundup (Number of plants/100) + 24

Only one concurrent request is supported per minute.

If the access frequency exceeds the limit, the interface returns error code 407.

Example:

If a user manages 20 plants, the maximum number of API calls per day = Roundup (20/100) + 24 = 1 + 24 = 25.

If a user manages 120 plants, the maximum number of API calls per day = Roundup (120/100) + 24 = 2 + 24 = 26.

## Request Parameters

| Parameter | Description | Data Type | Mandatory/ Optional |
| --- | --- | --- | --- |
| stationCodes | Plant ID list. Multiple plant IDs are separated by commas (,). | String | Mandatory |

## Response Packet

| Parameter | | Description | Data Type | Remarks |
| --- | --- | --- | --- | --- |
| success | | Request success or failure flag<br>true: The request succeeded.<br>false: The request failed. | Boolean | Request success or failure flag |
| failCode | | Error code<br>Value 0 indicates that the status is normal. For definitions of other error codes, see **10 Error Code List**. | Integer | - |
| params | Parameters | - | - | - |
| | stationCodes | Plant ID list in the request parameter | String | - |
| | currentTime | Current system time, in milliseconds | Long | - |
| message | | Optional message | String | - |

| Parameter | | Description | Data Type | Remarks |
| --- | --- | --- | --- | --- |
| data | Parameters | Returned data. The data contains the object parameter list of each device. | List | - |
| | id | Device ID | Long | - |
| | devName | Device name | String | - |
| | stationCode | Plant ID | String | - |
| | esnCode | Device SN | String | - |
| | devTypeId | Device type ID<br>The following device types are supported:<br>1: string inverter<br>2: SmartLogger<br>8: STS<br>10: EMI<br>13: protocol converter<br>16: general device<br>17: grid meter<br>22: PID<br>37: Pinnet data logger<br>38: residential inverter<br>39: battery<br>40: backup box<br>41: ESS<br>45: PLC<br>46: optimizer<br>47: power sensor<br>62: Dongle<br>63: distributed SmartLogger<br>70: safety box | Integer | - |
| | softwareVersion | Software version | String | - |
| | invType | Inverter model (only applicable to inverters) | String | - |
| | longitude | Longitude | Double | - |
| | latitude | Latitude | Double | - |

## Example

Request example:

```
{
   "stationCodes":"BA4372D08E014822AB065017416F254C,5D02E8B40AD342159AC8D8A2BCD4FAB5"
}
```

Response example:

Example 1: An error code is returned.

```
{
   "success":false,
   "data":null,
   "failCode":20009,
   "params":{
      "stationCodes":"BA4372D08E014822AB065017416F254C,5D02E8B40AD342159AC8D8A2BCD4FAB5",
      "currentTime":1503046597854
   },
   "message":null
}
```

Example 2: The device list is returned.

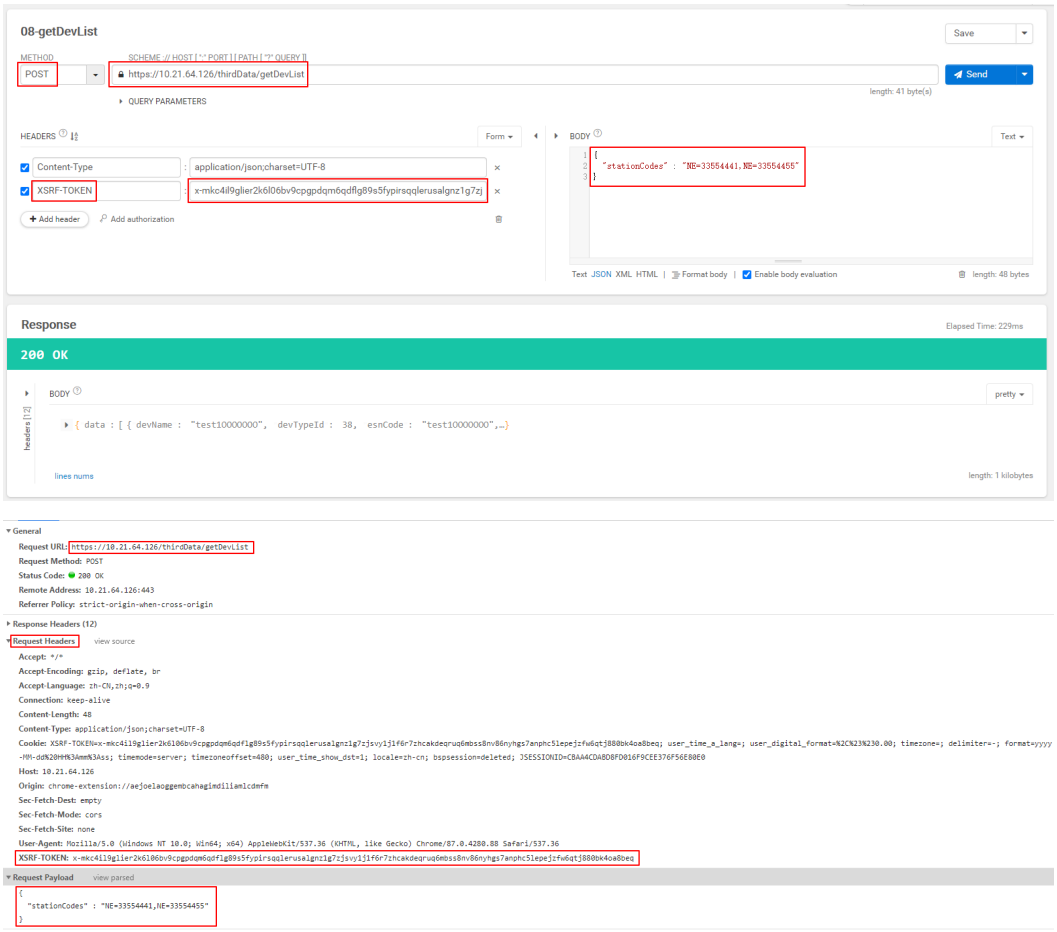
```
{
   "success":true,
   "data":[
      {
         "id":-214543629611879,
         "devName":"5fbfk4",
         "stationCode":"5D02E8B40AD342159AC8D8A2BCD4FAB5",
         "esnCode":"5fbfk4",
         "devTypeId":1,
         "softwareVersion":"V100R001PC666",
         "invType":"SUN2000-17KTL",
         "longitude":null,
         "latitude":null
      },
      {
         "id":-214091680973855,
         "devName":"6fbfk11",
         "stationCode":"5D02E8B40AD342159AC8D8A2BCD4FAB5",
         "esnCode":"6fbfk11",
         "devTypeId":1,
         "softwareVersion":"V100R001PC666",
         "invType":"SUN2000-17KTL",
         "longitude":null,
         "latitude":null
      }
   ],
   "failCode":0,
   "params":{
      "stationCodes":"BA4372D08E014822AB065017416F254C,5D02E8B40AD342159AC8D8A2BCD4FAB5",
      "currentTime":1503046597854
   },
   "message":null
}
```

**NOTE**

Prerequisites for obtaining data: The user has the permission to access this interface.

Request example:




# 9.1.6 Device Data Interfaces

Before invoking the following device data interfaces, you need to invoke the device list interface to obtain the device ID.

## 9.1.6.1 Real-Time Device Data Interface

### Interface Description

This interface is used to obtain real-time device data by device type and device ID set. The data varies depending on device types. Data of a maximum of 100 devices of the same type can be queried at a time.

For details about the data list that can be queried using this interface, see **9.2.6 Real-Time Device Data Interface**.

### Request URL

https://*Domain name of the management system*/thirdData/getDevRealKpi

## Request Mode

HTTP method: POST

## Access Restrictions

Traffic limiting is performed based on the number of devices of each type managed by a northbound API user. Maximum number of northbound API calls per user every 5 minutes = ∑ Roundup (Number of devices of each type/100).

If the access frequency exceeds the limit, the interface returns error code 407.

Example:

- If a northbound API user manages 20 inverters and 20 meters, the maximum number of API calls every 5 minutes is calculated as follows:

  Inverters: Roundup (20/100) = 1

  Meters: Roundup (20/100) = 1

  Total: Number of API calls for inverters + Number of API calls for meters = 1 + 1 = 2
- If a northbound API user manages 120 inverters and 120 meters, the maximum number of API calls every 5 minutes is calculated as follows:

  Inverters: Roundup (120/100) = 2

  Meters: Roundup (120/100) = 2

  Total: Number of API calls for inverters + Number of API calls for meters = 2 + 2 = 4

## Request Parameters

| Parameter | Description | Data Type | Mandatory/ Optional |
| --- | --- | --- | --- |
| devIds | Device ID list. Multiple device IDs are separated by commas (,). Either **sns** or **devIds** must be set. | String | Optional |
| sns | Device SN list. Multiple device SNs are separated by commas (,). Either **sns** or **devIds** must be set. | String | Optional |

| Parameter | Description | Data Type | Mandatory/ Optional |
| --- | --- | --- | --- |
| devTypeId | Device type ID. Use the device type ID obtained in **9.1.5 Device List Interface**.<br>The following device types are supported:<br>1: string inverter<br>10: EMI<br>17: grid meter<br>38: residential inverter<br>39: battery<br>41: ESS<br>47: power sensor | Integer | Mandatory |

## Response Packet

| Parameter | | Description | Data Type | Remarks |
| --- | --- | --- | --- | --- |
| success | | Request success or failure flag<br>true: The request succeeded.<br>false: The request failed. | Boolean | Request success or failure flag |
| failCode | | Error code<br>Value 0 indicates that the status is normal. For definitions of other error codes, see **10 Error Code List**. | Integer | - |
| params | Parameters | - | - | - |
| | devIds | Device ID list in the request parameter | String | - |
| | sns | Device SN list in the request parameter | String | - |
| | devTypeId | Device type ID in the request parameter | Integer | - |
| | currentTime | Current system time, in milliseconds | Long | - |
| message | | Optional message | String | - |

| Parameter | | Description | Data Type | Remarks |
| --- | --- | --- | --- | --- |
| data | Parameters | Returned data. The data contains the real-time data object list of each device. | List | - |
| | devId | Device ID | Long | - |
| | sn | Device SN | String | |
| | dataItemMap | Content of data items, which are returned in the key-value format. The content of data items varies according to device types. For details about the data item list, see **9.2.6 Real-Time Device Data Interface**. | Map | Real-time device data |

## Examples

Request example:

```
{
   "devIds":"214060404588862,213472461631079",
   "devTypeId":"1"
}
```

Example 1: An error code is returned.

```
{
   "success":false,
   "data":null,
   "failCode":20006,
   "params":{
      "devIds":"214233501711677,214060404588862",
      "devTypeId":"1",
      "currentTime":1503046597854
   },
   "message":null
}
```

Example 2: Real-time data of devices is returned.

```
{
   "success":true,
   "data":[
      {
         "dataItemMap":{
            "pv7_u":0,
            "pv1_u":0,
            "b_u":0,
            "c_u":0,
            "pv6_u":0,
            "temperature":0,
            "open_time":0,
            "b_i":0,
            "bc_u":0,
            "pv9_u":0,
            "pv8_u":0,
```

```
"c_i":0,
"mppt_total_cap":0,
"pv9_i":0,
"mppt_3_cap":0,
"run_state":0,
"mppt_2_cap":0,
"inverter_state":0,
"pv8_i":0,
"mppt_1_cap":0,
"pv6_i":0,
"mppt_power":0,
"pv1_i":0,
"total_cap":0,
"ab_u":0,
"pv7_i":0,
"pv13_u":0,
"reactive_power":0,
"pv10_u":0,
"pv12_i":0,
"pv11_i":0,
"pv3_i":0,
"pv11_u":0,
"pv2_i":0,
"pv13_i":0,
"power_factor":0,
"pv12_u":0,
"pv5_i":0,
"active_power":0,
"elec_freq":0,
"pv10_i":0,
"pv4_i":0,
"mppt_4_cap":0,
"mppt_5_cap":0,
"mppt_6_cap":0,
"mppt_7_cap":0,
"mppt_8_cap":0,
"mppt_9_cap":0,
"mppt_10_cap":0,
"pv4_u":0,
"close_time":0,
"day_cap":0,
"ca_u":0,
"a_i":0,
"pv5_u":0,
"a_u":0,
"pv3_u":0,
"pv14_u":0,
"pv14_i":0,
"pv15_u":0,
"pv15_i":0,
"pv16_u":0,
"pv16_i":0,
"pv17_u":0,
"pv17_i":0,
"pv18_u":0,
"pv18_i":0,
"pv19_u":0,
"pv19_i":0,
"pv20_u":0,
"pv20_i":0,
"pv21_u":0,
"pv21_i":0,
"pv22_u":0,
"pv22_i":0,
"pv23_u":0,
"pv23_i":0,
"pv24_u":0,
"pv24_i":0,
"pv25_u":0,
```

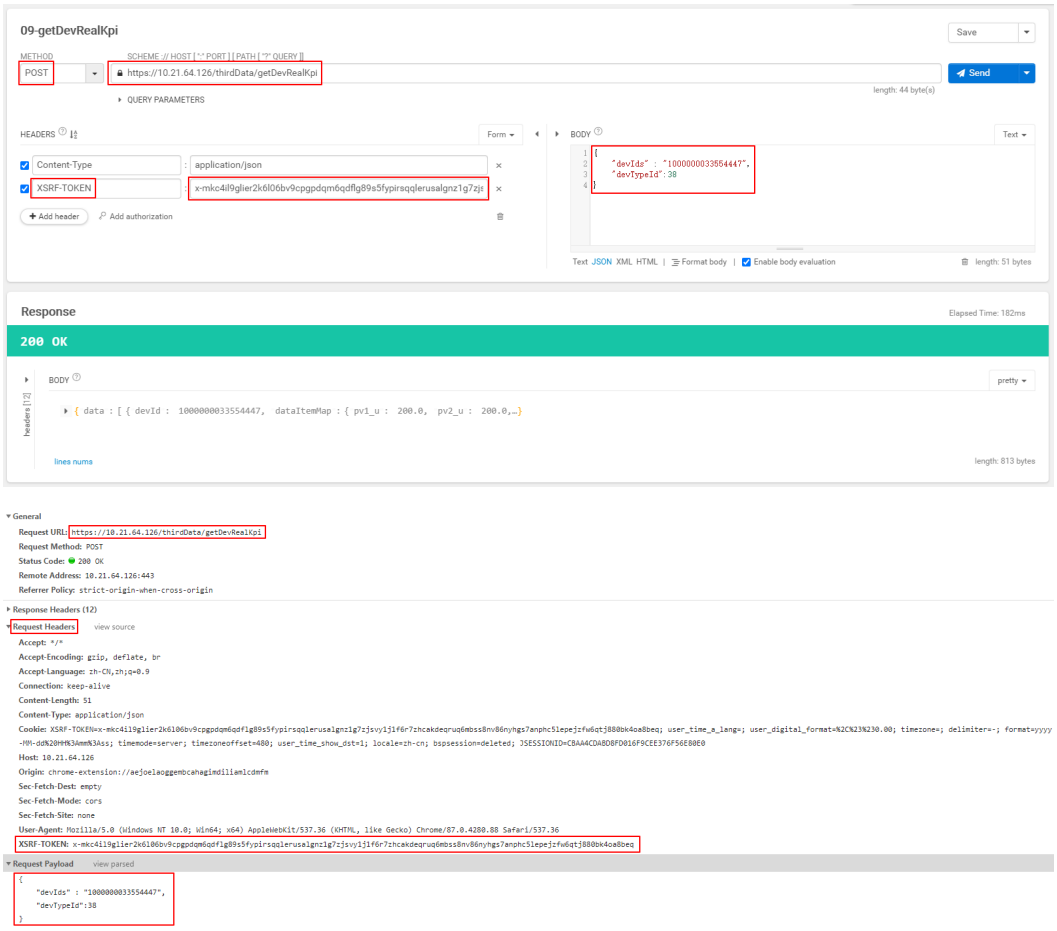
```
            "pv25_i":0,
            "pv26_u":0,
            "pv26_i":0,
            "pv27_u":0,
            "pv27_i":0,
            "pv28_u":0,
            "pv28_i":0,
            "efficiency":0,
            "pv2_u":0
        },
        "devId":213472461631079
    },
    {
        "dataItemMap":{
            "pv7_u":0,
            "pv1_u":0,
            "b_u":0,
            "c_u":0,
            "pv6_u":0,
            "temperature":0,
            "open_time":0,
            "b_i":0,
            "bc_u":0,
            "pv9_u":0,
            "pv8_u":0,
            "c_i":0,
            "mppt_total_cap":0,
            "pv9_i":0,
            "mppt_3_cap":0,
            "run_state":0,
            "mppt_2_cap":0,
            "inverter_state":0,
            "pv8_i":0,
            "mppt_1_cap":0,
            "pv6_i":0,
            "mppt_power":0,
            "pv1_i":0,
            "total_cap":0,
            "ab_u":0,
            "pv7_i":0,
            "pv13_u":0,
            "reactive_power":0,
            "pv10_u":0,
            "pv12_i":0,
            "pv11_i":0,
            "pv3_i":0,
            "pv11_u":0,
            "pv2_i":0,
            "pv13_i":0,
            "power_factor":0,
            "pv12_u":0,
            "pv5_i":0,
            "active_power":0,
            "elec_freq":0,
            "pv10_i":0,
            "pv4_i":0,
            "mppt_4_cap":0,
            "mppt_5_cap":0,
            "mppt_6_cap":0,
            "mppt_7_cap":0,
            "mppt_8_cap":0,
            "mppt_9_cap":0,
            "mppt_10_cap":0,
            "pv4_u":0,
            "close_time":0,
            "day_cap":0,
            "ca_u":0,
            "a_i":0,
            "pv5_u":0,
```

```
                "a_u":0,
                "pv3_u":0,
                "pv14_u":0,
                "pv14_i":0,
                "pv15_u":0,
                "pv15_i":0,
                "pv16_u":0,
                "pv16_i":0,
                "pv17_u":0,
                "pv17_i":0,
                "pv18_u":0,
                "pv18_i":0,
                "pv19_u":0,
                "pv19_i":0,
                "pv20_u":0,
                "pv20_i":0,
                "pv21_u":0,
                "pv21_i":0,
                "pv22_u":0,
                "pv22_i":0,
                "pv23_u":0,
                "pv23_i":0,
                "pv24_u":0,
                "pv24_i":0,
                "pv25_u":0,
                "pv25_i":0,
                "pv26_u":0,
                "pv26_i":0,
                "pv27_u":0,
                "pv27_i":0,
                "pv28_u":0,
                "pv28_i":0,
                "efficiency":0,
                "pv2_u":0
            },
            "devId":214060404588862
        }
    ],
    "failCode":0,
    "params":{
        "devIds":"214060404588862,213472461631079",
        "devTypeId":"1",
        "currentTime":1503046597854
    },
    "message":null
}
```

**NOTE**

Prerequisites for obtaining data: The user has the permission to access this interface.

Request example:




## 9.1.6.2 Historical Device Data Interface

## Interface Description

This interface is used to obtain 5-minute device data in a specified time period. The 5-minute data of a maximum of 10 devices of the same type in three days can be queried at a time.

For details about the data list that can be queried using this interface, see **9.2.8 Historical Device Data Interface**.

## Request URL

https://Domain name of the management system/thirdData/getDevHistoryKpi

## Request Mode

HTTP method: POST

## Access Restrictions

Traffic limiting is performed based on the number of devices of each type managed by a northbound API user. Maximum number of northbound API calls per user per day = ∑ Roundup (Number of devices of each type/10) + 24.

Only one concurrent request is supported per minute.

If the access frequency exceeds the limit, the interface returns error code 407.

Example:

- If a northbound API user manages 20 inverters and 20 meters, the maximum number of API calls per day is calculated as follows:

  Inverters: Roundup (20/10) = 2

  Meters: Roundup (20/10) = 2

  Total: Number of API calls for inverters + Number of API calls for meters = 2 + 2 + 24 = 28
- If a northbound API user manages 120 inverters and 120 meters, the maximum number of API calls per day is calculated as follows:

  Inverters: Roundup (120/10) = 12

  Meters: Roundup (120/10) = 12

  Total: Number of API calls for inverters + Number of API calls for meters = 12 + 12 + 24 = 48

## Request Parameters

| Parameter | Description | Data Type | Mandatory/ Optional |
| --- | --- | --- | --- |
| devIds | Device ID list. Multiple device IDs are separated by commas (,). Either **sns** or **devIds** must be set. | String | Optional |
| sns | Device SN list. Multiple device SNs are separated by commas (,). Either **sns** or **devIds** must be set. | String | Optional |
| devTypeId | Device type ID. Use the device type ID obtained in **9.1.5 Device List Interface**.<br>The following device types are supported:<br>1: string inverter<br>10: EMI<br>17: grid meter<br>38: residential inverter<br>39: battery<br>41: ESS<br>47: power sensor | Integer | Mandatory |

| Parameter | Description | Data Type | Mandatory/ Optional |
| --- | --- | --- | --- |
| startTime | Start time, in milliseconds | Long | Mandatory |
| endTime | End time, in milliseconds | Long | Mandatory |

## Response Packet

| Parameter | | Description | Data Type | Remarks |
| --- | --- | --- | --- | --- |
| success | | Request success or failure flag<br>true: The request succeeded.<br>false: The request failed. | Boolean | Request success or failure flag |
| failCode | | Error code<br>Value 0 indicates that the status is normal. For definitions of other error codes, see **10 Error Code List**. | Integer | - |
| params | Parameters | - | - | - |
| | devIds | Device ID list in the request parameter | String | - |
| | sns | Device SN list in the request parameter | String | - |
| | devTypeId | Device type ID in the request parameter | Integer | - |
| | collectTime | Collection time in milliseconds in the request parameter | Long | - |
| | currentTime | Current system time, in milliseconds | Long | - |
| message | | Optional message | String | - |
| data | Parameters | Returned data. The data contains the 5-minute data object list of each device. | List | 5-minute data of a device in a day |

| Parameter | | Description | Data Type | Remarks |
| --- | --- | --- | --- | --- |
| | devId | Device ID | Long | - |
| | sn | Device SN | String | |
| | startTime | Start time, in milliseconds | Long | - |
| | endTime | End time, in milliseconds | Long | |
| | dataItemMap | Content of each data item, which is returned in the key-value format. The data item content varies depending on the device type. For details about the data item list, see **9.2.8 Historical Device Data Interface**. | Map | 5-minute device data |

## Example

Request example:

```
{
   "devIds":"214060404588862,213472461631079",
   "devTypeId":1,
   "startTime":1501862400000,
   "endTime":1501872400000
}
```

Response example:

Example 1: An error code is returned.

```
{
   "success":false,
   "data":null,
   "failCode":20009,
   "params":{
      "devIds":"214060404588862,213472461631079",
      "devTypeId":1,
      "startTime":1501862400000,
      "endTime":1501872400000,
      "currentTime":1503046597854
   },
   "message":null
}
```

Example 2: 5-minute device data is returned.

```
{
   "success":true,
   "data":[
      {
         "dataItemMap":{
            "pv7_u":null,
            "pv1_u":575.3,
            "b_u":286.1,
            "c_u":286.9,
            "pv6_u":576.1,
            "temperature":44.6,
```

```
"open_time":null,
"b_i":24.9,
"bc_u":495.6,
"pv9_u":null,
"pv8_u":null,
"c_i":25,
"mppt_total_cap":null,
"pv9_i":null,
"mppt_3_cap":null,
"mppt_2_cap":null,
"inverter_state":512,
"pv8_i":null,
"mppt_1_cap":null,
"pv6_i":7.1,
"mppt_power":21.962,
"pv1_i":7.1,
"total_cap":655.37,
"ab_u":495.4,
"pv7_i":null,
"pv13_u":null,
"reactive_power":20.95,
"pv10_u":null,
"pv12_i":null,
"pv11_i":null,
"pv3_i":7.1,
"pv11_u":null,
"pv2_i":7.1,
"pv13_i":null,
"power_factor":0,
"pv12_u":null,
"pv5_i":7.2,
"active_power":21.05,
"elec_freq":50.05,
"pv10_i":null,
"pv4_i":7,
"mppt_4_cap":null,
"mppt_5_cap":0,
"mppt_6_cap":0,
"mppt_7_cap":0,
"mppt_8_cap":0,
"mppt_9_cap":0,
"mppt_10_cap":0,
"pv4_u":577.8,
"close_time":null,
"day_cap":159.26,
"ca_u":496.9,
"a_i":24.9,
"pv5_u":576.1,
"a_u":286,
"pv3_u":577.8,
"pv14_u":null,
"pv14_i":null,
"pv15_u":0,
"pv15_i":0,
"pv16_u":0,
"pv16_i":0,
"pv17_u":0,
"pv17_i":0,
"pv18_u":0,
"pv18_i":0,
"pv19_u":0,
"pv19_i":0,
"pv20_u":0,
"pv20_i":0,
"pv21_u":0,
"pv21_i":0,
"pv22_u":0,
"pv22_i":0,
"pv23_u":0,
```

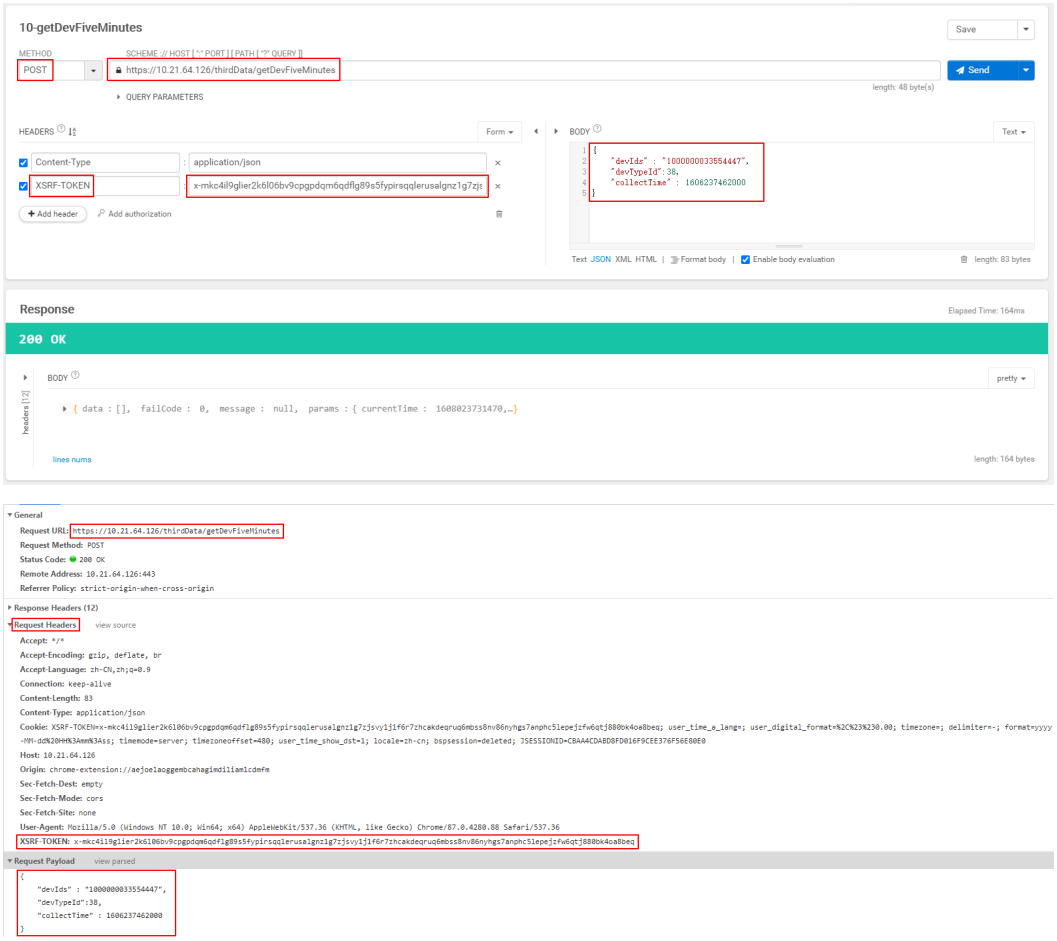
```
            "pv23_i":0,
            "pv24_u":0,
            "pv24_i":0,
            "pv25_u":0,
            "pv25_i":0,
            "pv26_u":0,
            "pv26_i":0,
            "pv27_u":0,
            "pv27_i":0,
            "pv28_u":0,
            "pv28_i":0,
            "efficiency":null,
            "pv2_u":575.3
        },
        "devId":213472461631079,
        "collectTime":1501862400000
    },
    {
        "dataItemMap":{
            "pv7_u":null,
            "pv1_u":575.3,
            "b_u":286.1,
            "c_u":286.9,
            "pv6_u":576.1,
            "temperature":44.6,
            "open_time":null,
            "b_i":24.9,
            "bc_u":495.6,
            "pv9_u":null,
            "pv8_u":null,
            "c_i":25,
            "mppt_total_cap":null,
            "pv9_i":null,
            "mppt_3_cap":null,
            "mppt_2_cap":null,
            "inverter_state":512,
            "pv8_i":null,
            "mppt_1_cap":null,
            "pv6_i":7.1,
            "mppt_power":21.962,
            "pv1_i":7.1,
            "total_cap":655.37,
            "ab_u":495.4,
            "pv7_i":null,
            "pv13_u":null,
            "reactive_power":20.95,
            "pv10_u":null,
            "pv12_i":null,
            "pv11_i":null,
            "pv3_i":7.1,
            "pv11_u":null,
            "pv2_i":7.1,
            "pv13_i":null,
            "power_factor":0,
            "pv12_u":null,
            "pv5_i":7.2,
            "active_power":21.05,
            "elec_freq":50.05,
            "pv10_i":null,
            "pv4_i":7,
            "mppt_4_cap":null,
            "mppt_5_cap":0,
            "mppt_6_cap":0,
            "mppt_7_cap":0,
            "mppt_8_cap":0,
            "mppt_9_cap":0,
            "mppt_10_cap":0,
            "pv4_u":577.8,
            "close_time":null,
```

```
            "day_cap":159.26,
            "ca_u":496.9,
            "a_i":24.9,
            "pv5_u":576.1,
            "a_u":286,
            "pv3_u":577.8,
            "pv14_u":null,
            "pv14_i":null,
            "pv15_u":0,
            "pv15_i":0,
            "pv16_u":0,
            "pv16_i":0,
            "pv17_u":0,
            "pv17_i":0,
            "pv18_u":0,
            "pv18_i":0,
            "pv19_u":0,
            "pv19_i":0,
            "pv20_u":0,
            "pv20_i":0,
            "pv21_u":0,
            "pv21_i":0,
            "pv22_u":0,
            "pv22_i":0,
            "pv23_u":0,
            "pv23_i":0,
            "pv24_u":0,
            "pv24_i":0,
            "pv25_u":0,
            "pv25_i":0,
            "pv26_u":0,
            "pv26_i":0,
            "pv27_u":0,
            "pv27_i":0,
            "pv28_u":0,
            "pv28_i":0,
            "efficiency":null,
            "pv2_u":575.3
         },
         "devId":213472461631079,
         "collectTime":1501862700000
      }
   ],
   "failCode":0,
   "params":{
      "devIds":"214060404588862,213472461631079",
      "devTypeId":1,
      "startTime":1501862400000,
      "endTime":1501872400000,
      "currentTime":1503046597854
   },
   "message":null
}
```

**NOTE**

Prerequisites for obtaining data: The user has the permission to access this interface.

Request example:




## 9.1.6.3 Daily Device Data Interface

## Interface Description

This interface is used to obtain daily device data. The daily data of a maximum of 100 devices of the same type can be queried at a time.

The backend calculates the month of the collection time based on the request parameter **collectTime** (collection time in milliseconds) and the time zone where the device is located. Then, you can query the daily data of the device by device ID in the current month. If data is generated for *n* ($0 \le n \le 31$) days of the month, *n* ($0 \le n \le 31$) results are returned.

For details about the data list that can be queried using this interface, see **9.2.9 Daily Device Data Interface**.

## Request URL

https://*Domain name of the management system*/thirdData/getDevKpiDay

## Request Mode

HTTP method: POST

## Access Restrictions

Traffic limiting is performed based on the number of devices of each type managed by a northbound API user. Maximum number of northbound API calls per user per day = ∑ Roundup (Number of devices of each type/100) + 24.

Only one concurrent request is supported per minute.

If the access frequency exceeds the limit, the interface returns error code 407.

Example:

- If a northbound API user manages 20 inverters and 20 meters, the maximum number of API calls per day is calculated as follows:

  Inverters: Roundup (20/100) = 1

  Meters: Roundup (20/100) = 1

  Total: Number of API calls for inverters + Number of API calls for meters = 1 + 1 + 24 = 26
- If a northbound API user manages 120 inverters and 120 meters, the maximum number of API calls per day is calculated as follows:

  Inverters: Roundup (120/100) = 2

  Meters: Roundup (120/100) = 2

  Total: Number of API calls for inverters + Number of API calls for meters = 2 + 2 + 24 = 28

## Request Parameters

| Parameter | Description | Data Type | Mandatory/ Optional |
| --- | --- | --- | --- |
| devIds | Device ID list. Multiple device IDs are separated by commas (,). Either **sns** or **devIds** must be set. | String | Optional |
| sns | Device SN list. Multiple device SNs are separated by commas (,). Either **sns** or **devIds** must be set. | String | Optional |
| devTypeId | Device type ID. Use the device type ID obtained in **9.1.5 Device List Interface**.<br>The following device types are supported:<br>1: string inverter<br>38: residential inverter<br>39: battery<br>41: ESS | Integer | Mandatory |

| Parameter | Description | Data Type | Mandatory/ Optional |
| --- | --- | --- | --- |
| collectTime | Collection time, in milliseconds | Long | Mandatory |

## Response Packet

| Parameter | | Description | Data Type | Remarks |
| --- | --- | --- | --- | --- |
| success | | Request success or failure flag<br>true: The request succeeded.<br>false: The request failed. | Boolean | Request success or failure flag |
| failCode | | Error code<br>Value 0 indicates that the status is normal. For definitions of other error codes, see **10 Error Code List**. | Integer | - |
| params | Parameters | - | - | - |
| | devIds | Device ID list in the request parameter | String | - |
| | sns | Device SN list in the request parameter | String | - |
| | devTypeId | Device type ID in the request parameter | Integer | - |
| | collectTime | Collection time in milliseconds in the request parameter | Long | - |
| | currentTime | Current system time, in milliseconds | Long | - |
| message | | Optional message | String | - |
| data | Parameters | Returned data. The data contains the daily data object list of each device. | List | List of daily device data in a month |
| | devId | Device ID | Long | - |
| | sn | Device SN | String | |

| Parameter | | Description | Data Type | Remarks |
| --- | --- | --- | --- | --- |
| | collectTime | Collection time, in milliseconds | Long | - |
| | dataItemMap | Content of data items, which are returned in the key-value format. The content of data items varies according to device types. For details about the data item list, see **9.2.9 Daily Device Data Interface**. | Map | Data of a device in a day |

## Examples

Request example:

```
{
   "devIds":"214060404588862,213472461631079",
   "devTypeId":1,
   "collectTime":1501862400000
}
```

Response example:

Example 1: An error code is returned.

```
{
   "success":false,
   "data":null,
   "failCode":20009,
   "params":{
      "devIds":"214060404588862,213472461631079",
      "devTypeId":1,
      "collectTime":1501862400000,
      "currentTime":1503046597854
   },
   "message":null
}
```

Example 2: Daily device data is returned.

```
{
   "success":true,
   "data":[
      {
         "dataItemMap":{
            "aoc_ratio":39.931,
            "yield_deviation":0,
            "installed_capacity":30.24,
            "perpower_ratio":9.921,
            "product_power":300,
            "total_aop":5
         },
         "devId":213472461631079,
         "collectTime":1501776000000
      },
      {
         "dataItemMap":{
            "aoc_ratio":35.069,
```

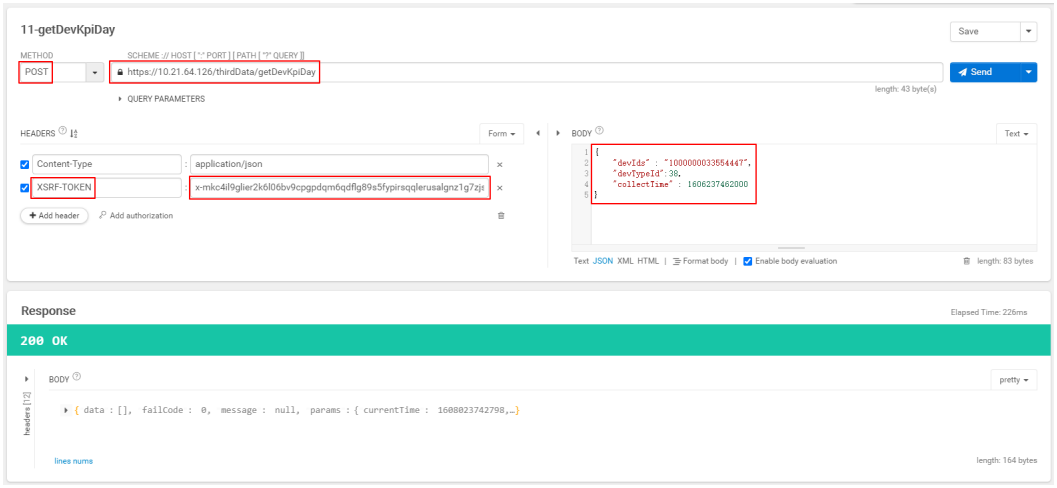
  

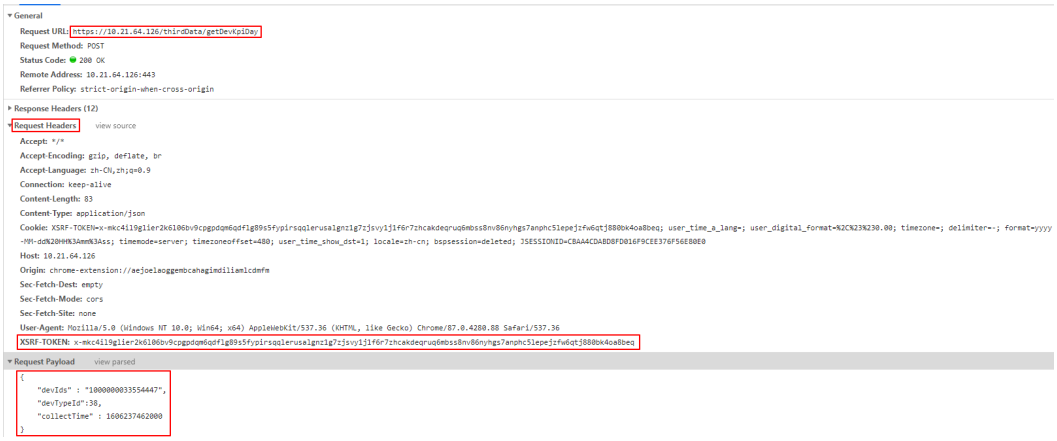
```
            "yield_deviation":0,
            "installed_capacity":30.24,
            "perpower_ratio":0.543,
            "product_power":16.43,
            "total_aop":88.889
        },
        "devId":214060404588862,
        "collectTime":1501776000000
    }
  ],
  "failCode":0,
  "params":{
    "devIds":"214060404588862,213472461631079",
    "devTypeId":1,
    "collectTime":1501862400000,
    "currentTime":1503046597854
  },
  "message":null
}
```


**NOTE**

Prerequisites for obtaining data: The user has the permission to access this interface.

Request example:



### 9.1.6.4 Monthly Device Data Interface

## Interface Description

This interface is used to obtain monthly device data. The monthly data of a maximum of 100 devices of the same type can be queried at a time.

The backend calculates the year of the collection time based on the request parameter **collectTime** (collection time in milliseconds) and the time zone where the device is located. Then, you can query the monthly data of the device by device ID in the current year. If data is generated for $n$ ($0 \le n \le 12$) months of the year, $n$ ($0 \le n \le 12$) results are returned.

For details about the data list that can be queried using this interface, see **9.2.10 Monthly Device Data Interface**.

## Request URL

https://*Domain name of the management system*/thirdData/getDevKpiMonth

## Request Mode

HTTP method: POST

## Access Restrictions

Traffic limiting is performed based on the number of devices of each type managed by a northbound API user. Maximum number of northbound API calls per user per day = ∑ Roundup (Number of devices of each type/100) + 24.

Only one concurrent request is supported per minute.

If the access frequency exceeds the limit, the interface returns error code 407.

Example:

- If a northbound API user manages 20 inverters and 20 meters, the maximum number of API calls per day is calculated as follows:

  Inverters: Roundup (20/100) = 1

  Meters: Roundup (20/100) = 1

  Total: Number of API calls for inverters + Number of API calls for meters = 1 + 1 + 24 = 26
- If a northbound API user manages 120 inverters and 120 meters, the maximum number of API calls per day is calculated as follows:

  Inverters: Roundup (120/100) = 2

  Meters: Roundup (120/100) = 2

  Total: Number of API calls for inverters + Number of API calls for meters = 2 + 2 + 24 = 28

## Request Parameters

| Parameter | Description | Data Type | Mandatory/ Optional |
| --- | --- | --- | --- |
| devIds | Device ID list. Multiple device IDs are separated by commas (,). Either **sns** or **devIds** must be set. | String | Optional |
| sns | Device SN list. Multiple device SNs are separated by commas (,). Either **sns** or **devIds** must be set. | String | Optional |
| devTypeId | Device type ID. Use the device type ID obtained in **9.1.5 Device List Interface**.<br>The following device types are supported:<br>1: string inverter<br>38: residential inverter<br>39: battery<br>41: ESS | Integer | Mandatory |
| collectTime | Collection time, in milliseconds | Long | Mandatory |

## Response Packet

| Parameter | | Description | Data Type | Remarks |
| --- | --- | --- | --- | --- |
| success | | Request success or failure flag<br>true: The request succeeded.<br>false: The request failed. | Boolean | Request success or failure flag |
| failCode | | Error code<br>Value 0 indicates that the status is normal. For definitions of other error codes, see **10 Error Code List**. | Integer | - |
| params | Parameters | - | - | - |
| | devIds | Device ID list in the request parameter | String | - |
| | sns | Device SN list in the request parameter | String | - |

| Parameter | | Description | Data Type | Remarks |
| --- | --- | --- | --- | --- |
| | devTypeId | Device type ID in the request parameter | Integer | - |
| | collectTime | Collection time in milliseconds in the request parameter | Long | - |
| | currentTime | Current system time, in milliseconds | Long | - |
| message | | Optional message | String | - |
| data | Parameters | Returned data. The data contains the monthly data object list of each device. | List | List of monthly device data in a year |
| | devId | Device ID | Long | - |
| | sn | Device SN | String | |
| | collectTime | Collection time, in milliseconds | Long | - |
| | dataItemMap | Content of data items, which are returned in the key-value format. The content of data items varies according to device types. For details about the data item list, see **9.2.10 Monthly Device Data Interface**. | Map | Data of a device in a month |

## Examples

Request example:

```
{
   "devIds":"214060404588862,213472461631079",
   "devTypeId":1,
   "collectTime":1501862400000
}
```

Response example:

Example 1: An error code is returned.

```
{
   "success":false,
   "data":null,
   "failCode":20009,
   "params":{
      "devIds":"214060404588862,213472461631079",
```

```
        "devTypeId":1,
        "collectTime":1501862400000,
        "currentTime":1503046597854
    },
    "message":null
}
```

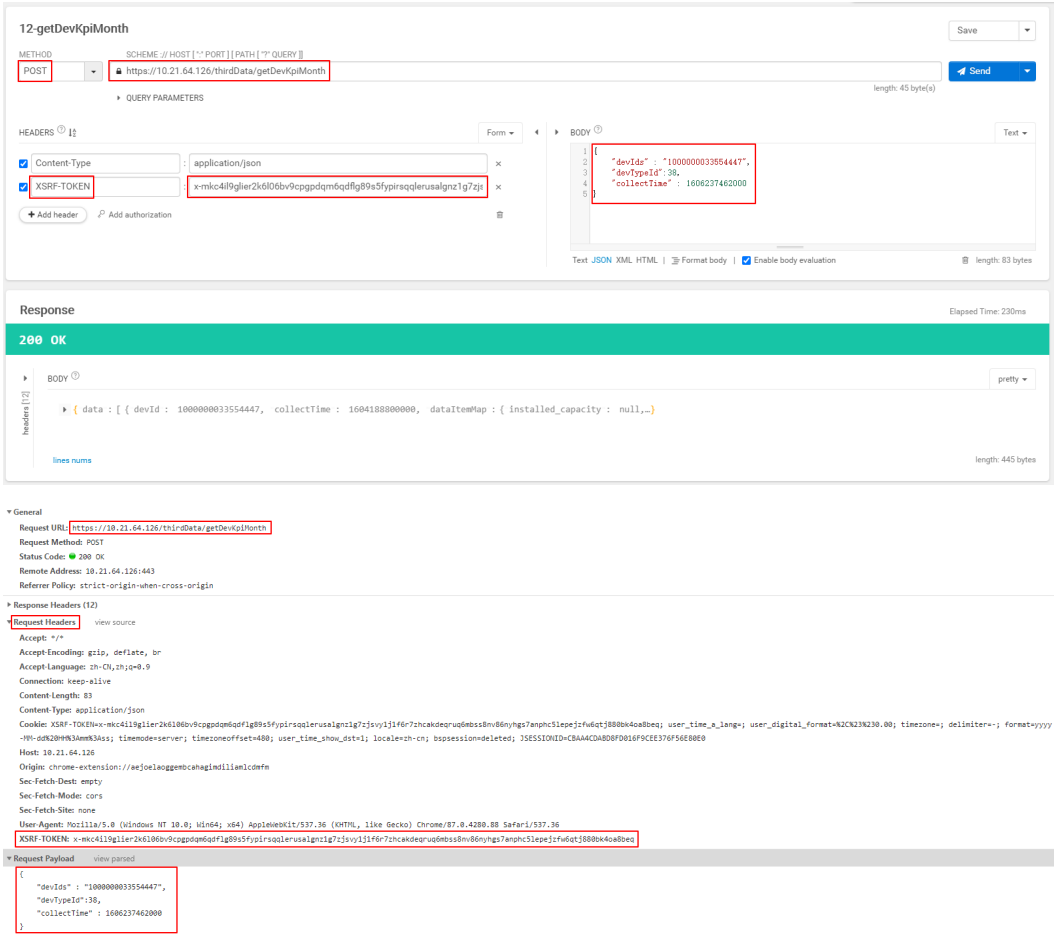

Example 2: Monthly device data is returned.


```
{
    "success":true,
    "data":[
        {
            "dataItemMap":{
                "installed_capacity":30.24,
                "perpower_ratio":null,
                "product_power":300
            },
            "devId":213472461631079,
            "collectTime":1501516800000
        },
        {
            "dataItemMap":{
                "installed_capacity":30.24,
                "perpower_ratio":null,
                "product_power":16.43
            },
            "devId":214060404588862,
            "collectTime":1501516800000
        }
    ],
    "failCode":0,
    "params":{
        "devIds":"214060404588862,213472461631079",
        "devTypeId":1,
        "collectTime":1501862400000,
        "currentTime":1503046597854
    },
    "message":null
}
```

**NOTE**

Prerequisites for obtaining data: The user has the permission to access this interface.

Request example:




## 9.1.6.5 Yearly Device Data Interface

## Interface Description

This interface is used to obtain yearly device data. The yearly data of a maximum of 100 devices of the same type can be queried at a time.

The backend queries the data of each year since the device was connected based on the device ID.

For details about the data list that can be queried using this interface, see **9.2.11 Yearly Device Data Interface**.

## Request URL

https://*Domain name of the management system*/thirdData/getDevKpiYear

## Request Mode

HTTP method: POST

## Access Restrictions

Traffic limiting is performed based on the number of devices of each type managed by a northbound API user. Maximum number of northbound API calls per user per day = ∑ Roundup (Number of devices of each type/100) + 24.

Only one concurrent request is supported per minute.

If the access frequency exceeds the limit, the interface returns error code 407.

Example:

- If a northbound API user manages 20 inverters and 20 meters, the maximum number of API calls per day is calculated as follows:

  Inverters: Roundup (20/100) = 1

  Meters: Roundup (20/100) = 1

  Total: Number of API calls for inverters + Number of API calls for meters = 1 + 1 + 24 = 26
- If a northbound API user manages 120 inverters and 120 meters, the maximum number of API calls per day is calculated as follows:

  Inverters: Roundup (120/100) = 2

  Meters: Roundup (120/100) = 2

  Total: Number of API calls for inverters + Number of API calls for meters = 2 + 2 + 24 = 28

## Request Parameters

| Parameter | Description | Data Type | Mandatory/ Optional |
| --- | --- | --- | --- |
| devIds | Device ID list. Multiple device IDs are separated by commas (,). Either **sns** or **devIds** must be set. | String | Optional |
| sns | Device SN list. Multiple device SNs are separated by commas (,). Either **sns** or **devIds** must be set. | String | Optional |
| devTypeId | Device type ID<br>The following device types are supported:<br>1: string inverter<br>38: residential inverter<br>39: battery<br>41: ESS | Integer | Mandatory |
| collectTime | Collection time, in milliseconds | Long | Mandatory |

NOTE

Before obtaining data, you must configure related counters.

## Response Packet

| Parameter | | Description | Data Type | Remarks |
| --- | --- | --- | --- | --- |
| success | | Request success or failure flag<br>true: The request succeeded.<br>false: The request failed. | Boolean | Request success or failure flag |
| failCode | | Error code<br>Value 0 indicates that the status is normal. For definitions of other error codes, see **10 Error Code List**. | Integer | - |
| params | Parameters | - | - | - |
| | devIds | Device ID list in the request parameter | String | - |
| | sns | Device SN list in the request parameter | String | - |
| | devTypeId | Device type ID in the request parameter | Integer | - |
| | collectTime | Collection time in milliseconds in the request parameter | Long | - |
| | currentTime | Current system time, in milliseconds | Long | - |
| message | - | Optional message | String | - |
| data | Parameters | Returned data. The data contains the yearly data object list of each device. | List | Data list of each year since the device is connected |
| | devId | Device ID | Long | - |
| | sn | Device SN | String | |

| Parameter | | Description | Data Type | Remarks |
| --- | --- | --- | --- | --- |
| | collectTime | Collection time, in milliseconds | Long | - |
| | dataItemMap | Content of data items, which are returned in the key-value format. The content of data items varies according to device types. For details about the data item list, see **9.2.11 Yearly Device Data Interface**. | Map | Data of a device in a year |

## Examples

Request example:

```
{
   "devIds":"214060404588862,213472461631079",
   "devTypeId":1,
   "collectTime":1501862400000
}
```

Response example:

Example 1: An error code is returned.

```
{
   "success":false,
   "data":null,
   "failCode":20009,
   "params":{
      "devIds":"214060404588862,213472461631079",
      "devTypeId":1,
      "collectTime":1501862400000,
      "currentTime":1503046597854
   },
   "message":null
}
```

Example 2: Yearly device data is returned.

```
{
   "success":true,
   "data":[
      {
         "dataItemMap":{
            "installed_capacity":30.24,
            "perpower_ratio":null,
            "product_power":300
         },
         "devId":213472461631079,
         "collectTime":1501516800000
      }
   ],
   "failCode":0,
   "params":{
      "devIds":"214060404588862,213472461631079",
      "devTypeId":1,
      "collectTime":1501862400000,
```

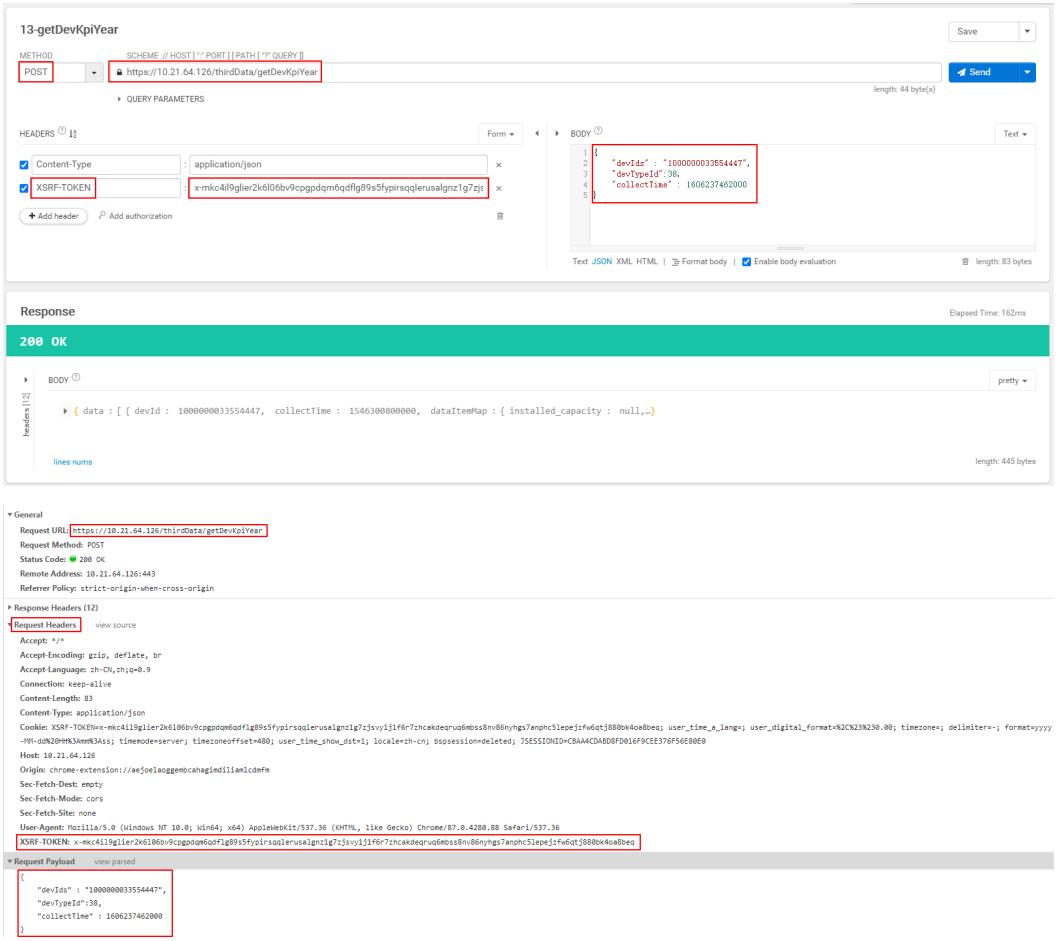
  

```
    "currentTime":1503046597854
  },
  "message":null
}
```

**NOTE**

Prerequisites for obtaining data: The user has the permission to access this interface.

Request example:




# 9.1.7 Device Alarm Interface

## Interface Description

This interface is used to query the current (active) alarm information of a device. If the query is based on plants, a maximum of 100 plants can be queried at a time. If the query is based on device SNs, a maximum of 100 devices can be queried at a time. If the transferred plant ID list is not empty, device alarm information is queried based on the plant ID list. If the plant ID list is empty and the device SN list is not empty, device alarm information is queried based on the device SN list.

## Request URL

https://*Domain name of the management system*/thirdData/getAlarmList

## Request Mode

HTTP method: POST

## Access Restrictions

Traffic limiting is performed based on the number of plants managed by northbound API users and the number of devices of each type.

Number of northbound API calls per user every 30 minutes = MAX (Roundup (Number of plants/100),∑ Roundup (Number of devices of each type/100))

If the access frequency exceeds the limit, the interface returns error code 407.

Example:

If a northbound API user manages 20 plants, 20 inverters, and 20 meters, the maximum number of API calls every 30 minutes is calculated as follows:

Roundup (Number of plants/100) = Roundup (20/100) = 1

∑ Roundup (Number of devices of each type/100) = Number of inverters + Number of meters = Roundup (20/100) + Roundup (20/100) = 1 + 1 = 2

Total: MAX (1,2) = 2

If a northbound API user manages 120 plants, 120 inverters, and 120 meters, the maximum number of API calls every 30 minutes is calculated as follows:

Roundup (Number of plants/100) = Roundup (120/100) = 2

∑Roundup (Number of devices of each type/100) = Number of inverters + Number of meters = Roundup (120/100) + Roundup (120/100) = 2 + 2 = 4

Total: MAX (2,4) = 4

## Request Parameters

| Parameter | Description | Data Type | Mandatory/ Optional |
| --- | --- | --- | --- |
| stationCodes | Plant ID list. Multiple plant IDs are separated by commas (,). At least one of the **stationCodes** and **sns** parameters must be set. If both parameters are set, alarms are queried by **stationCodes**. | String | Optional |
| sns | Device SN list. Multiple device SNs are separated by commas (,). At least one of the **stationCodes** and **sns** parameters must be set. If both parameters are set, alarms are queried by **stationCodes**. | String | Optional |
| beginTime | Query start time, in milliseconds | Long | Mandatory |

| Parameter | Description | Data Type | Mandatory/ Optional |
| --- | --- | --- | --- |
| endTime | Query end time, in milliseconds | Long | Mandatory |
| language | Language. The value must be **zh_CN**, **en_US**, **ja_JP**, **it_IT**, **nl_NL**, **pt_BR**, **de_DE**, **fr_FR**, **es_ES**, or **pl_PL**.<br>zh_CN: Chinese<br>en_US: English<br>ja_JP: Japanese<br>it_IT: Italian<br>nl_NL: Dutch<br>pt_BR: Portuguese<br>de_DE: German<br>fr_FR: French<br>es_ES: Spanish<br>pl_PL: Polish | String | Mandatory |
| levels | Alarm severity. Multiple alarm severities are separated by commas (,), for example, **1,2**. If this parameter is not transferred or is left empty, alarms of all severities are queried by default.<br>The following alarm severities are supported:<br>1: critical<br>2: major<br>3: minor<br>4: warning | String | Optional |

| Parameter | Description | Data Type | Mandatory/ Optional |
| --- | --- | --- | --- |
| devTypes | Device type. Multiple device types are separated by commas (,), for example, **1,38**. If this parameter is not transferred or is left empty, alarms of all device types are queried by default.<br>The following device types are supported:<br>1: string inverter<br>2: SmartLogger<br>8: STS<br>10: EMI<br>13: protocol converter<br>16: general device<br>17: grid meter<br>22: PID<br>37: Pinnet data logger<br>38: residential inverter<br>39: battery<br>40: backup box<br>45: PLC<br>46: optimizer<br>47: power sensor<br>62: Dongle<br>63: distributed SmartLogger<br>70: safety box | String | Optional |

## Response Packet

| Parameter | Description | Data Type | Remarks |
| --- | --- | --- | --- |
| success | Request success or failure flag<br>true: The request succeeded.<br>false: The request failed. | Boolean | Request success or failure flag |

| Parameter | | Description | Data Type | Remarks |
| --- | --- | --- | --- | --- |
| failCode | | Error code<br>Value 0 indicates that the status is normal. For definitions of other error codes, see **10 Error Code List**. | Integer | - |
| params | Parameters | - | - | - |
| | stationCodes | Plant ID list in the request parameter | String | - |
| | sns | Device SN list in the request parameter | String | - |
| | beginTime | Start time in the request parameter, in milliseconds | Long | - |
| | endTime | End time in the request parameter, in milliseconds | Long | - |
| | language | Language in the request parameter | String | - |
| | levels | Alarm severity in the request parameter | String | - |
| | devTypes | Device type in the request parameter | String | - |
| | currentTime | Current system time, in milliseconds | Long | - |
| message | | Optional message | String | - |
| data | Parameters | Returned data. The data contains the alarm information list. | List | - |
| | stationCode | Plant ID, which uniquely identifies a plant | String | - |
| | alarmName | Alarm name | String | - |
| | devName | Device name | String | - |
| | repairSuggestion | Solution | String | - |
| | esnCode | Device SN | String | - |

| Parameter | | Description | Data Type | Remarks |
| --- | --- | --- | --- | --- |
| | devTypeId | Device type ID<br>The following device types are supported:<br>1: string inverter<br>2: SmartLogger<br>8: STS<br>10: EMI<br>13: protocol converter<br>16: general device<br>17: grid meter<br>22: PID<br>37: Pinnet data logger<br>38: residential inverter<br>39: battery<br>40: backup box<br>45: PLC<br>46: optimizer<br>47: power sensor<br>62: Dongle<br>63: distributed SmartLogger<br>70: safety box | Integer | - |
| | causeId | Cause ID | Integer | - |
| | alarmCause | Alarm cause | String | - |
| | alarmType | Alarm type<br>The following alarm types are supported:<br>1: transposition signal<br>2: exception alarm<br>3: protection event<br>4: notification status<br>5: alarm information | Integer | - |
| | raiseTime | Alarm generation time in milliseconds | Long | - |
| | alarmId | Alarm ID | Integer | - |
| | stationName | Plant name | String | - |

| Parameter | | Description | Data Type | Remarks |
| --- | --- | --- | --- | --- |
| | lev | Alarm severity<br>The following alarm severities are supported:<br>1: critical<br>2: major<br>3: minor<br>4: warning | Integer | - |
| | status | Alarm status<br>The following alarm states are supported:<br>1: not processed (active) | Integer | - |

## Examples

Request example:

```
{
   "stationCodes":"NE=33554785,NE=33554792",
   "sns":"Inverter01",
   "beginTime":"1664553600000",
   "endTime":"1667231999000",
   "language":"zh_CN",
   "levels":"1,2,3,4",
   "devTypes":"1,2,38,46,62"
}
```

Response example:

Example 1: An error code is returned.

```
{
   "data": null,
   "failCode": 20055,
   "message": null,
   "params": {
      "currentTime": 1667399781133,
      "sns": "",
      "language": "zh_CN",
      "beginTime": 1664553600000,
      "devTypes": "1,2,38,46,62",
      "endTime": 1667231999000,
      "levels": "1,2,3,4",
      "stationCodes": ""
   },
   "success": false
}
```

Example 2: Alarm data of the device is returned.

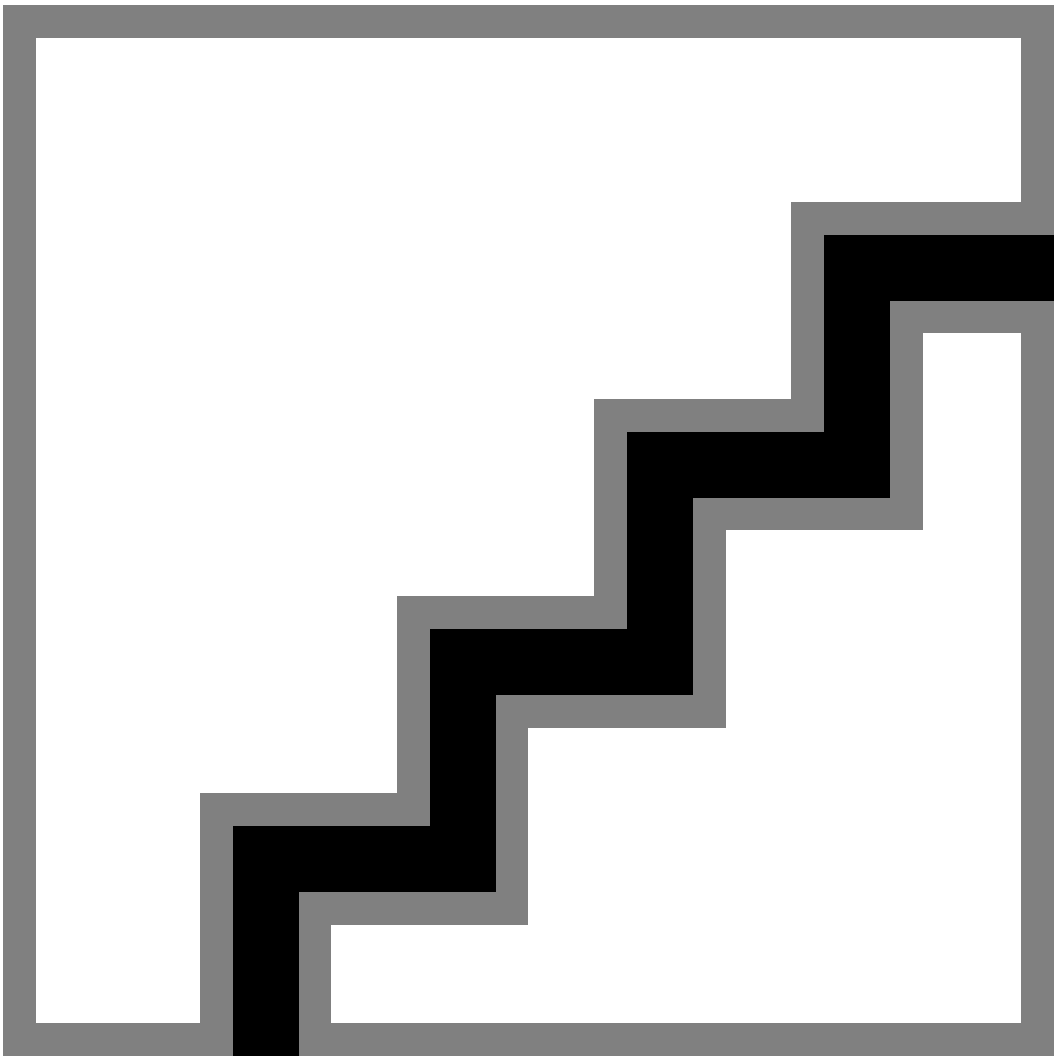
```
{
   "data": [
      {
         "alarmCause": "An unrecoverable fault has occurred in the internal circuit of the device.",
         "alarmId": 2064,
"alarmName": "The device is abnormal.",
```

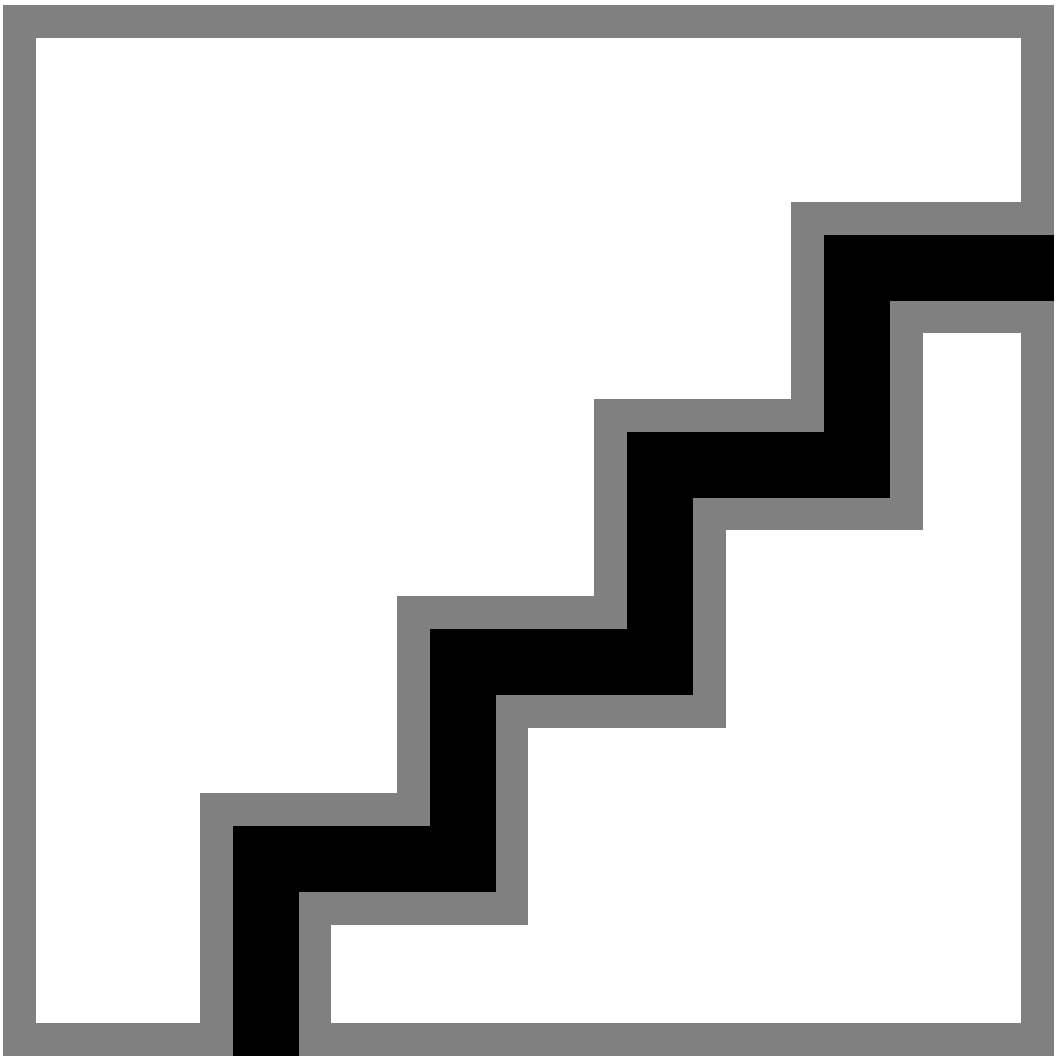
```
            "alarmType": 2,
            "causeId": 5,
            "devName": "Inverter-1",
            "devTypeId": 38,
            "esnCode": "Inverter05",
            "lev": 2,
            "raiseTime": 1667179861000,
            "repairSuggestion": "Turn off the AC and DC switches, wait for 5 minutes, and then turn on the AC
and DC switches. If the fault persists, contact your dealer or technical support.",
            "stationCode": "NE=33554792",
            "stationName": "hzhStation02",
            "status": 1
        },
        {
            "alarmCause": "1. The voltage of a battery expansion module is low.",
            "alarmId": 3011,
            "alarmName": "Battery expansion module undervoltage",
            "alarmType": 2,
            "causeId": 2,
            "devName": "Inverter-2",
            "devTypeId": 38,
            "esnCode": "Inverter01",
            "lev": 4,
            "raiseTime": 1665264943000,
            "repairSuggestion": "1. If the sunlight is sufficient or AC reverse charging is allowed, the Battery
[CNo] battery expansion module [SNo] (in the fault location information) can be charged when the
inverter is running.",
            "stationCode": "NE=33554785",
            "stationName": "hzhStation01",
            "status": 1
        }
    ],
    "failCode": 0,
    "message": null,
    "params": {
        "currentTime": 1667399432812,
        "sns": "Inverter01",
        "language": "zh_CN",
        "beginTime": 1664553600000,
        "devTypes": "1,2,38,46,62",
        "endTime": 1667231999000,
        "levels": "1,2,3,4",
        "stationCodes": "NE=33554785,NE=33554792"
    },
    "success": true
}
```

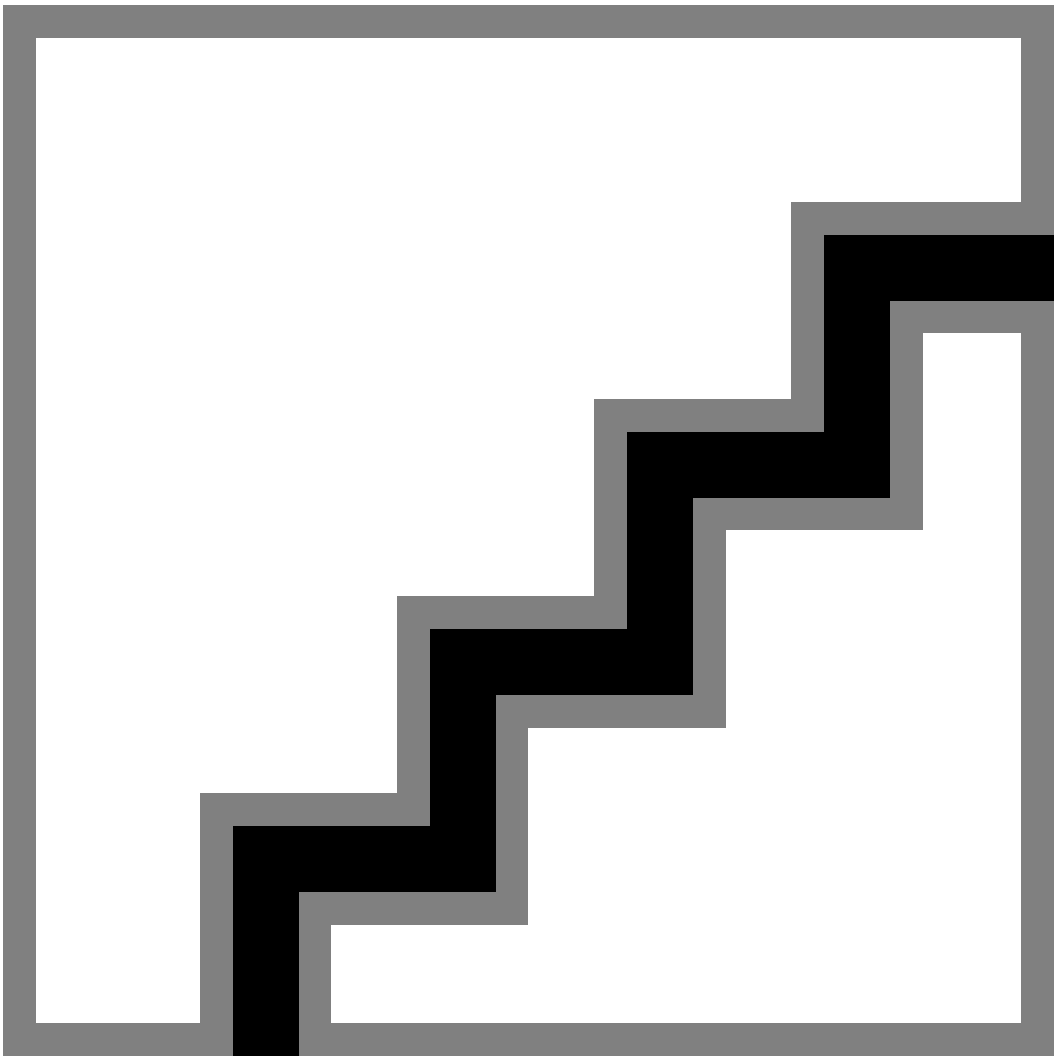
**NOTE**

Prerequisites for obtaining data: The user has the permission to access this interface.

Request example:







# 9.2 Indicators Obtained over Northbound Interfaces

## 9.2.1 Interface for Real-time Plant Data

| Key | Name | Unit | Return Value Type |
| --- | --- | --- | --- |
| day_power | Yield today | kWh | Double |
| month_power | Yield this month | kWh | Double |
| total_power | Total yield | kWh | Double |
| day_income | Revenue today | The currency specified in the management system | Double |

| Key | Name | Unit | Return Value Type |
| --- | --- | --- | --- |
| total_income | Total revenue | The currency specified in the management system | Double |
| real_health_state | Plant health status<br>The following plant health states are supported:<br>1: disconnected<br>2: faulty<br>3: healthy | None | Integer |

## 9.2.2 Hourly Plant Data Interface

| Key | Name | Unit | Return Value Type |
| --- | --- | --- | --- |
| radiation_intensity | Global irradiation | kWh/m² | Double |
| theory_power | Theoretical yield | kWh | Double |
| inverter_power | Inverter yield | kWh | Double |
| ongrid_power | Feed-in energy | kWh | Double |
| power_profit | Revenue | The currency specified in the management system | Double |

## 9.2.3 Daily Plant Data Interface

| Key | Name | Unit | Return Value Type |
| --- | --- | --- | --- |
| installed_capacity | Installed capacity | kW | Double |

| Key | Name | Unit | Return Value Type |
| --- | --- | --- | --- |
| radiation_intensity | Global irradiation | kWh/m² | Double |
| theory_power | Theoretical yield | kWh | Double |
| performance_ratio | Performance ratio | kWh | Double |
| inverter_power | Inverter yield | kWh | Double |
| ongrid_power | Feed-in energy | kWh | Double |
| use_power | Consumption | kWh | Double |
| power_profit | Revenue | The currency specified in the management system | Double |
| perpower_ratio | Specific energy (kWh/kWp) | h | Double |
| reduction_total_co2 | $CO_2$ emission reduction | Ton | Double |
| reduction_total_coal | Standard coal saved | Ton | Double |
| reduction_total_tree | Equivalent trees planted | N/A | Double |

## 9.2.4 Monthly Plant Data Interface

| Key | Name | Unit | Return Value Type |
| --- | --- | --- | --- |
| installed_capacity | Installed capacity | kW | Double |
| radiation_intensity | Global irradiation | kWh/m² | Double |
| theory_power | Theoretical yield | kWh | Double |
| performance_ratio | Performance ratio | kWh | Double |
| inverter_power | Inverter yield | kWh | Double |
| ongrid_power | Feed-in energy | kWh | Double |

| Key | Name | Unit | Return Value Type |
| --- | --- | --- | --- |
| use_power | Consumption | kWh | Double |
| power_profit | Revenue | The currency specified in the management system | Double |
| perpower_ratio | Specific energy (kWh/kWp) | h | Double |
| reduction_total_co2 | $CO_2$ emission reduction | Ton | Double |
| reduction_total_coal | Standard coal saved | Ton | Double |
| reduction_total_tree | Equivalent trees planted | N/A | Double |

## 9.2.5 Yearly Plant Data Interface

| Key | Name | Unit | Return Value Type |
| --- | --- | --- | --- |
| installed_capacity | Installed capacity | kW | Double |
| radiation_intensity | Global irradiation | $kWh/m^2$ | Double |
| theory_power | Theoretical yield | kWh | Double |
| performance_ratio | Performance ratio | kWh | Double |
| inverter_power | Inverter yield | kWh | Double |
| ongrid_power | Feed-in energy | kWh | Double |
| use_power | Consumption | kWh | Double |
| power_profit | Revenue | The currency specified in the management system | Double |

| Key | Name | Unit | Return Value Type |
| --- | --- | --- | --- |
| perpower_ratio | Specific energy (kWh/kWp) | h | Double |
| reduction_total_co2 | $CO_2$ emission reduction | Ton | Double |
| reduction_total_coal | Standard coal saved | Ton | Double |
| reduction_total_tree | Equivalent trees planted | N/A | Double |

## 9.2.6 Real-Time Device Data Interface

| Device Type | Key | Item | Unit | Return Value Type |
| --- | --- | --- | --- | --- |
| ID: 1<br>String inverter | inverter_state | Inverter state. For details, see **Table 9-1**. | None | Double |
| | ab_u | A-B line voltage of grid | V | Double |
| | bc_u | B-C line voltage of grid | V | Double |
| | ca_u | C-A line voltage of grid | V | Double |
| | a_u | Phase A voltage | V | Double |
| | b_u | Phase B voltage | V | Double |
| | c_u | Phase C voltage | V | Double |
| | a_i | Phase A current of grid | A | Double |
| | b_i | Phase B current of grid | A | Double |
| | c_i | Phase C current of grid | A | Double |
| | efficiency | Inverter conversion efficiency (manufacturer) | % | Double |

| Device Type | Key | Item | Unit | Return Value Type |
| --- | --- | --- | --- | --- |
| | temperature | Internal temperature | °C | Double |
| | power_factor | Power factor | None | Double |
| | elec_freq | Grid frequency | Hz | Double |
| | active_power | Active power | kW | Double |
| | reactive_power | Output reactive power | kVar | Double |
| | day_cap | Yield today | kWh | Double |
| | mppt_power | MPPT total input power | kW | Double |
| | pv1_u | PV1 input voltage | V | Double |
| | pv2_u | PV2 input voltage | V | Double |
| | pv3_u | PV3 input voltage | V | Double |
| | pv4_u | PV4 input voltage | V | Double |
| | pv5_u | PV5 input voltage | V | Double |
| | pv6_u | PV6 input voltage | V | Double |
| | pv7_u | PV7 input voltage | V | Double |
| | pv8_u | PV8 input voltage | V | Double |
| | pv9_u | PV9 input voltage | V | Double |
| | pv10_u | PV10 input voltage | V | Double |
| | pv11_u | PV11 input voltage | V | Double |
| | pv12_u | PV12 input voltage | V | Double |
| | pv13_u | PV13 input voltage | V | Double |
| | pv14_u | PV14 input voltage | V | Double |
| | pv15_u | PV15 input voltage | V | Double |
| | pv16_u | PV16 input voltage | V | Double |

| Device Type | Key | Item | Unit | Return Value Type |
| --- | --- | --- | --- | --- |
| | pv17_u | PV17 input voltage | V | Double |
| | pv18_u | PV18 input voltage | V | Double |
| | pv19_u | PV19 input voltage | V | Double |
| | pv20_u | PV20 input voltage | V | Double |
| | pv21_u | PV21 input voltage | V | Double |
| | pv22_u | PV22 input voltage | V | Double |
| | pv23_u | PV23 input voltage | V | Double |
| | pv24_u | PV24 input voltage | V | Double |
| | pv25_u | PV25 input voltage | V | Double |
| | pv26_u | PV26 input voltage | V | Double |
| | pv27_u | PV27 input voltage | V | Double |
| | pv28_u | PV28 input voltage | V | Double |
| | pv1_i | PV1 input current | A | Double |
| | pv2_i | PV2 input current | A | Double |
| | pv3_i | PV3 input current | A | Double |
| | pv4_i | PV4 input current | A | Double |
| | pv5_i | PV5 input current | A | Double |
| | pv6_i | PV6 input current | A | Double |
| | pv7_i | PV7 input current | A | Double |
| | pv8_i | PV8 input current | A | Double |
| | pv9_i | PV9 input current | A | Double |
| | pv10_i | PV10 input current | A | Double |

| Device Type | Key | Item | Unit | Return Value Type |
| --- | --- | --- | --- | --- |
| | pv11_i | PV11 input current | A | Double |
| | pv12_i | PV12 input current | A | Double |
| | pv13_i | PV13 input current | A | Double |
| | pv14_i | PV14 input current | A | Double |
| | pv15_i | PV15 input current | A | Double |
| | pv16_i | PV16 input current | A | Double |
| | pv17_i | PV17 input current | A | Double |
| | pv18_i | PV18 input current | A | Double |
| | pv19_i | PV19 input current | A | Double |
| | pv20_i | PV20 input current | A | Double |
| | pv21_i | PV21 input current | A | Double |
| | pv22_i | PV22 input current | A | Double |
| | pv23_i | PV23 input current | A | Double |
| | pv24_i | PV24 input current | A | Double |
| | pv25_i | PV25 input current | A | Double |
| | pv26_i | PV26 input current | A | Double |
| | pv27_i | PV27 input current | A | Double |
| | pv28_i | PV28 input current | A | Double |
| | total_cap | Total yield | kWh | Double |
| | open_time | Inverter startup time | ms | Double |
| | close_time | Inverter shutdown time | ms | Double |
| | mppt_total_cap | Total DC input energy | kWh | Double |
| | mppt_1_cap | MPPT 1 DC total yield | kWh | Double |
| | mppt_2_cap | MPPT 2 DC total yield | kWh | Double |
| | mppt_3_cap | MPPT 3 DC total yield | kWh | Double |

| Device Type | Key | Item | Unit | Return Value Type |
| --- | --- | --- | --- | --- |
| | mppt_4_cap | MPPT 4 DC total yield | kWh | Double |
| | mppt_5_cap | MPPT 5 DC total yield | kWh | Double |
| | mppt_6_cap | MPPT 6 DC total yield | kWh | Double |
| | mppt_7_cap | MPPT 7 DC total yield | kWh | Double |
| | mppt_8_cap | MPPT 8 DC total yield | kWh | Double |
| | mppt_9_cap | MPPT 9 DC total yield | kWh | Double |
| | mppt_10_cap | MPPT 10 DC total yield | kWh | Double |
| | run_state | State (0: Disconnected 1: Connected) | None | Long |
| ID: 38<br>Residential inverter | inverter_state | Inverter state. For details, see **Table 9-1**. | None | Double |
| | ab_u | A-B line voltage of grid | V | Double |
| | bc_u | B-C line voltage of grid | V | Double |
| | ca_u | C-A line voltage of grid | V | Double |
| | a_u | Phase A voltage | V | Double |
| | b_u | Phase B voltage | V | Double |
| | c_u | Phase C voltage | V | Double |
| | a_i | Phase A current of grid | A | Double |
| | b_i | Phase B current of grid | A | Double |
| | c_i | Phase C current of grid | A | Double |

| Device Type | Key | Item | Unit | Return Value Type |
| --- | --- | --- | --- | --- |
| | efficiency | Inverter conversion efficiency (manufacturer) | % | Double |
| | temperature | Internal temperature | °C | Double |
| | power_factor | Power factor | None | Double |
| | elec_freq | Grid frequency | Hz | Double |
| | active_power | Active power | kW | Double |
| | reactive_power | Output reactive power | kVar | Double |
| | day_cap | Yield today | kWh | Double |
| | mppt_power | MPPT total input power | kW | Double |
| | pv1_u | PV1 input voltage | V | Double |
| | pv2_u | PV2 input voltage | V | Double |
| | pv3_u | PV3 input voltage | V | Double |
| | pv4_u | PV4 input voltage | V | Double |
| | pv5_u | PV5 input voltage | V | Double |
| | pv6_u | PV6 input voltage | V | Double |
| | pv7_u | PV7 input voltage | V | Double |
| | pv8_u | PV8 input voltage | V | Double |
| | pv1_i | PV1 input current | A | Double |
| | pv2_i | PV2 input current | A | Double |
| | pv3_i | PV3 input current | A | Double |
| | pv4_i | PV4 input current | A | Double |
| | pv5_i | PV5 input current | A | Double |
| | pv6_i | PV6 input current | A | Double |
| | pv7_i | PV7 input current | A | Double |
| | pv8_i | PV8 input current | A | Double |
| | total_cap | Total yield | kWh | Double |

| Device Type | Key | Item | Unit | Return Value Type |
| --- | --- | --- | --- | --- |
| | open_time | Inverter startup time | ms | Double |
| | close_time | Inverter shutdown time | ms | Double |
| | mppt_1_cap | MPPT 1 DC total yield | kWh | Double |
| | mppt_2_cap | MPPT 2 DC total yield | kWh | Double |
| | mppt_3_cap | MPPT 3 DC total yield | kWh | Double |
| | mppt_4_cap | MPPT 4 DC total yield | kWh | Double |
| | run_state | State (0: Disconnected 1: Connected) | None | Long |
| ID: 10<br>EMI | temperature | Temperature | °C | Double |
| | pv_temperature | PV temperature | °C | Double |
| | wind_speed | Wind speed | m/s | Double |
| | wind_direction | Wind direction | Degree | Double |
| | radiant_total | Daily irradiation | $MJ/m^2$ | Double |
| | radiant_line | Irradiance | $W/m^2$ | Double |
| | horiz_radiant_line | Horizontal irradiance | $W/m^2$ | Double |
| | horiz_radiant_total | Horizontal irradiation | $MJ/m^2$ | Double |
| | run_state | State (0: Disconnected 1: Connected) | None | Long |
| ID: 17<br>Grid meter | ab_u | A-B line voltage of grid | V | Double |
| | bc_u | B-C line voltage of grid | V | Double |
| | ca_u | C-A line voltage of grid | V | Double |

| Device Type | Key | Item | Unit | Return Value Type |
| --- | --- | --- | --- | --- |
| | a_u | Phase A voltage (AC output) | V | Double |
| | b_u | Phase B voltage (AC output) | V | Double |
| | c_u | Phase C voltage (AC output) | V | Double |
| | a_i | Phase A current of grid (IA) | A | Double |
| | b_i | Phase B current of grid (IB) | A | Double |
| | c_i | Phase C current of grid (IC) | A | Double |
| | active_power | Active power | kW | Double |
| | power_factor | Power factor | None | Double |
| | active_cap | Active energy (positive active energy) | kWh | Double |
| | reactive_power | Reactive power | kVar | Double |
| | reverse_active_cap | Negative active energy | kWh | Double |
| | forward_reactive_cap | Positive reactive energy | kWh | Double |
| | reverse_reactive_cap | Negative reactive energy | kWh | Double |
| | active_power_a | Active power PA | kW | Double |
| | active_power_b | Active power PB | kW | Double |
| | active_power_c | Active power PC | kW | Double |
| | reactive_power_a | Reactive power QA | kVar | Double |
| | reactive_power_b | Reactive power QB | kVar | Double |
| | reactive_power_c | Reactive power QC | kVar | Double |
| | total_apparent_power | Total apparent power | kVA | Double |
| | grid_frequency | Grid frequency | Hz | Double |

| Device Type | Key | Item | Unit | Return Value Type |
| --- | --- | --- | --- | --- |
| | reverse_active_peak | Negative active energy (peak) | kWh | Double |
| | reverse_active_power | Negative active energy (shoulder) | kWh | Double |
| | reverse_active_valley | Negative active energy (off-peak) | kWh | Double |
| | reverse_active_top | Negative active energy (sharp) | kWh | Double |
| | positive_active_peak | Positive active energy (peak) | kWh | Double |
| | positive_active_power | Positive active energy (shoulder) | kWh | Double |
| | positive_active_valley | Positive active energy (off-peak) | kWh | Double |
| | positive_active_top | Positive active energy (sharp) | kWh | Double |
| | reverse_reactive_peak | Negative reactive energy (peak) | kVar | Double |
| | reverse_reactive_power | Negative reactive energy (shoulder) | kVar | Double |
| | reverse_reactive_valley | Negative reactive energy (off-peak) | kVar | Double |
| | reverse_reactive_top | Negative reactive energy (sharp) | kVar | Double |
| | positive_reactive_peak | Positive reactive energy (peak) | kVar | Double |
| | positive_reactive_power | Positive reactive energy (shoulder) | kVar | Double |
| | positive_reactive_valley | Positive reactive energy (off-peak) | kVar | Double |
| | positive_reactive_top | Positive reactive energy (sharp) | kVar | Double |
| ID: 47<br>Power sensor | meter_status | Meter state (0: offline; 1: normal) | None | Double |
| | meter_u | Phase A voltage (AC output) | V | Double |

| Device Type | Key | Item | Unit | Return Value Type |
| --- | --- | --- | --- | --- |
| | meter_i | Phase A current of grid (IA) | A | Double |
| | active_power | Active power | W | Double |
| | reactive_power | Reactive power | Var | Double |
| | power_factor | Power factor | None | Double |
| | grid_frequency | Grid frequency | Hz | Double |
| | active_cap | Active energy (positive active energy) | kWh | Double |
| | reverse_active_cap | Negative active energy | kWh | Double |
| | run_state | State (0: Disconnected 1: Connected) | None | Long |
| | ab_u | A-B line voltage of grid | V | Double |
| | bc_u | B-C line voltage of grid | V | Double |
| | ca_u | C-A line voltage of grid | V | Double |
| | b_u | Phase B voltage (AC output) | V | Double |
| | c_u | Phase C voltage (AC output) | V | Double |
| | b_i | Phase B current of grid (IB) | A | Double |
| | c_i | Phase C current of grid (IC) | A | Double |
| | reverse_active_cap | Negative active energy | kWh | Double |
| | forward_reactive_cap | Positive reactive energy | kWh | Double |
| | reverse_reactive_cap | Negative reactive energy | kWh | Double |
| | active_power_a | Active power PA | kW | Double |

| Device Type | Key | Item | Unit | Return Value Type |
| --- | --- | --- | --- | --- |
| | active_power_b | Active power PB | kW | Double |
| | active_power_c | Active power PC | kW | Double |
| | reactive_power_a | Reactive power QA | kVar | Double |
| | reactive_power_b | Reactive power QB | kVar | Double |
| | reactive_power_c | Reactive power QC | kVar | Double |
| | total_apparent_power | Total apparent power | kVA | Double |
| | reverse_active_peak | Negative active energy (peak) | kWh | Double |
| | reverse_active_power | Negative active energy (shoulder) | kWh | Double |
| | reverse_active_valley | Negative active energy (off-peak) | kWh | Double |
| | reverse_active_top | Negative active energy (sharp) | kWh | Double |
| | positive_active_peak | Positive active energy (peak) | kWh | Double |
| | positive_active_power | Positive active energy (shoulder) | kWh | Double |
| | positive_active_valley | Positive active energy (off-peak) | kWh | Double |
| | positive_active_top | Positive active energy (sharp) | kWh | Double |
| | reverse_reactive_peak | Negative reactive energy (peak) | kVar | Double |
| | reverse_reactive_power | Negative reactive energy (shoulder) | kVar | Double |
| | reverse_reactive_valley | Negative reactive energy (off-peak) | kVar | Double |
| | reverse_reactive_top | Negative reactive energy (sharp) | kVar | Double |
| | positive_reactive_peak | Positive reactive energy (peak) | kVar | Double |

| Device Type | Key | Item | Unit | Return Value Type |
| --- | --- | --- | --- | --- |
| | positive_reactive_power | Positive reactive energy (shoulder) | kVar | Double |
| | positive_reactive_valley | Positive reactive energy (off-peak) | kVar | Double |
| | positive_reactive_top | Positive reactive energy (sharp) | kVar | Double |
| ID: 39<br>Residential battery | battery_status | Battery running state (0: offline; 1: standby; 2: running; 3: faulty; 4: hibernating) | None | Double |
| | max_charge_power | Maximum charge power | W | Double |
| | max_discharge_power | Maximum discharge power | W | Double |
| | ch_discharge_power | Charge/Discharge power | W | Double |
| | busbar_u | Battery voltage | V | Double |
| | battery_soc | Battery SOC | % | Double |
| | battery_soh | Battery SOH | None | Double |
| | ch_discharge_model | Charge/Discharge mode (0: none; 1: forced charge/ discharge; 2: time-of-use price; 3: fixed charge/ discharge; 4: automatic charge/ discharge) | None | Double |
| | charge_cap | Charged energy | kWh | Double |
| | discharge_cap | Discharged energy | kWh | Double |
| | run_state | State (0: Disconnected 1: Connected) | None | Long |
| ID: 41<br>C&I and utility ESS | ch_discharge_power | Charge/Discharge power | W | Double |
| | battery_soc | Battery SOC | % | Double |

| Device Type | Key | Item | Unit | Return Value Type |
| --- | --- | --- | --- | --- |
| | battery_soh | Battery SOH | None | Double |
| | charge_cap | Charged energy | kWh | Double |
| | discharge_cap | Discharged energy | kWh | Double |
| | run_state | State (0: Disconnected 1: Connected) | None | Long |

**Table 9-1 Inverter state (inverter_state) description**

| State Value | Description |
| --- | --- |
| 0 | Standby: initializing |
| 1 | Standby: insulation resistance detecting |
| 2 | Standby: irradiation detecting |
| 3 | Standby: grid detecting |
| 256 | Start |
| 512 | Grid-connected |
| 513 | Grid-connected: power limited |
| 514 | Grid-connected: self-derating |
| 768 | Shutdown: on fault |
| 769 | Shutdown: on command |
| 770 | Shutdown: OVGR |
| 771 | Shutdown: communication interrupted |
| 772 | Shutdown: power limited |
| 773 | Shutdown: manual startup required |
| 774 | Shutdown: DC switch disconnected |
| 1025 | Grid scheduling: cosϕ-P curve |
| 1026 | Grid scheduling: Q-U curve |
| 1280 | Ready for terminal test |
| 1281 | Terminal testing... |
| 1536 | Inspection in progress |

| State Value | Description |
| --- | --- |
| 1792 | AFCI self-check |
| 2048 | I-V scanning |
| 2304 | DC input detection |
| 40960 | Standby: no irradiation |
| 45056 | Communication interrupted (written by SmartLogger) |
| 49152 | Loading... (written by SmartLogger) |

## 9.2.7 5-minute Device Data Interface

| Device Type | Key | Item | Unit | Return Value Type |
| --- | --- | --- | --- | --- |
| ID: 1<br>String inverter | inverter_state | Inverter state. For details, see **Table 9-2**. | None | Double |
| | ab_u | A-B line voltage of grid | V | Double |
| | bc_u | B-C line voltage of grid | V | Double |
| | ca_u | C-A line voltage of grid | V | Double |
| | a_u | Phase A voltage | V | Double |
| | b_u | Phase B voltage | V | Double |
| | c_u | Phase C voltage | V | Double |
| | a_i | Phase A current of grid | A | Double |
| | b_i | Phase B current of grid | A | Double |
| | c_i | Phase C current of grid | A | Double |
| | efficiency | Inverter conversion efficiency (manufacturer) | % | Double |
| | temperature | Internal temperature | °C | Double |

| Device Type | Key | Item | Unit | Return Value Type |
| --- | --- | --- | --- | --- |
| | power_factor | Power factor | None | Double |
| | elec_freq | Grid frequency | Hz | Double |
| | active_power | Active power | kW | Double |
| | reactive_power | Output reactive power | kVar | Double |
| | day_cap | Yield today | kWh | Double |
| | mppt_power | MPPT total input power | kW | Double |
| | pv1_u | PV1 input voltage | V | Double |
| | pv2_u | PV2 input voltage | V | Double |
| | pv3_u | PV3 input voltage | V | Double |
| | pv4_u | PV4 input voltage | V | Double |
| | pv5_u | PV5 input voltage | V | Double |
| | pv6_u | PV6 input voltage | V | Double |
| | pv7_u | PV7 input voltage | V | Double |
| | pv8_u | PV8 input voltage | V | Double |
| | pv9_u | PV9 input voltage | V | Double |
| | pv10_u | PV10 input voltage | V | Double |
| | pv11_u | PV11 input voltage | V | Double |
| | pv12_u | PV12 input voltage | V | Double |
| | pv13_u | PV13 input voltage | V | Double |
| | pv14_u | PV14 input voltage | V | Double |
| | pv15_u | PV15 input voltage | V | Double |
| | pv16_u | PV16 input voltage | V | Double |
| | pv17_u | PV17 input voltage | V | Double |

| Device Type | Key | Item | Unit | Return Value Type |
| --- | --- | --- | --- | --- |
| | pv18_u | PV18 input voltage | V | Double |
| | pv19_u | PV19 input voltage | V | Double |
| | pv20_u | PV20 input voltage | V | Double |
| | pv21_u | PV21 input voltage | V | Double |
| | pv22_u | PV22 input voltage | V | Double |
| | pv23_u | PV23 input voltage | V | Double |
| | pv24_u | PV24 input voltage | V | Double |
| | pv25_u | PV25 input voltage | V | Double |
| | pv26_u | PV26 input voltage | V | Double |
| | pv27_u | PV27 input voltage | V | Double |
| | pv28_u | PV28 input voltage | V | Double |
| | pv1_i | PV1 input current | A | Double |
| | pv2_i | PV2 input current | A | Double |
| | pv3_i | PV3 input current | A | Double |
| | pv4_i | PV4 input current | A | Double |
| | pv5_i | PV5 input current | A | Double |
| | pv6_i | PV6 input current | A | Double |
| | pv7_i | PV7 input current | A | Double |
| | pv8_i | PV8 input current | A | Double |
| | pv9_i | PV9 input current | A | Double |
| | pv10_i | PV10 input current | A | Double |
| | pv11_i | PV11 input current | A | Double |

| Device Type | Key | Item | Unit | Return Value Type |
| --- | --- | --- | --- | --- |
| | pv12_i | PV12 input current | A | Double |
| | pv13_i | PV13 input current | A | Double |
| | pv14_i | PV14 input current | A | Double |
| | pv15_i | PV15 input current | A | Double |
| | pv16_i | PV16 input current | A | Double |
| | pv17_i | PV17 input current | A | Double |
| | pv18_i | PV18 input current | A | Double |
| | pv19_i | PV19 input current | A | Double |
| | pv20_i | PV20 input current | A | Double |
| | pv21_i | PV21 input current | A | Double |
| | pv22_i | PV22 input current | A | Double |
| | pv23_i | PV23 input current | A | Double |
| | pv24_i | PV24 input current | A | Double |
| | pv25_i | PV25 input current | A | Double |
| | pv26_i | PV26 input current | A | Double |
| | pv27_i | PV27 input current | A | Double |
| | pv28_i | PV28 input current | A | Double |
| | total_cap | Total yield | kWh | Double |
| | open_time | Inverter startup time | ms | Double |
| | close_time | Inverter shutdown time | ms | Double |
| | mppt_total_cap | Total DC input energy | kWh | Double |
| | mppt_1_cap | MPPT 1 DC total yield | kWh | Double |
| | mppt_2_cap | MPPT 2 DC total yield | kWh | Double |
| | mppt_3_cap | MPPT 3 DC total yield | kWh | Double |
| | mppt_4_cap | MPPT 4 DC total yield | kWh | Double |

| Device Type | Key | Item | Unit | Return Value Type |
| --- | --- | --- | --- | --- |
| | mppt_5_cap | MPPT 5 DC total yield | kWh | Double |
| | mppt_6_cap | MPPT 6 DC total yield | kWh | Double |
| | mppt_7_cap | MPPT 7 DC total yield | kWh | Double |
| | mppt_8_cap | MPPT 8 DC total yield | kWh | Double |
| | mppt_9_cap | MPPT 9 DC total yield | kWh | Double |
| | mppt_10_cap | MPPT 10 DC total yield | kWh | Double |
| ID: 38<br>Residential inverter | inverter_state | Inverter state. For details, see **Table 9-2**. | None | Double |
| | ab_u | A-B line voltage of grid | V | Double |
| | bc_u | B-C line voltage of grid | V | Double |
| | ca_u | C-A line voltage of grid | V | Double |
| | a_u | Phase A voltage | V | Double |
| | b_u | Phase B voltage | V | Double |
| | c_u | Phase C voltage | V | Double |
| | a_i | Phase A current of grid | A | Double |
| | b_i | Phase B current of grid | A | Double |
| | c_i | Phase C current of grid | A | Double |
| | efficiency | Inverter conversion efficiency (manufacturer) | % | Double |
| | temperature | Internal temperature | °C | Double |

| Device Type | Key | Item | Unit | Return Value Type |
| --- | --- | --- | --- | --- |
| | power_factor | Power factor | None | Double |
| | elec_freq | Grid frequency | Hz | Double |
| | active_power | Active power | kW | Double |
| | reactive_power | Output reactive power | kVar | Double |
| | day_cap | Yield today | kWh | Double |
| | mppt_power | MPPT total input power | kW | Double |
| | pv1_u | PV1 input voltage | V | Double |
| | pv2_u | PV2 input voltage | V | Double |
| | pv3_u | PV3 input voltage | V | Double |
| | pv4_u | PV4 input voltage | V | Double |
| | pv5_u | PV5 input voltage | V | Double |
| | pv6_u | PV6 input voltage | V | Double |
| | pv7_u | PV7 input voltage | V | Double |
| | pv8_u | PV8 input voltage | V | Double |
| | pv1_i | PV1 input current | A | Double |
| | pv2_i | PV2 input current | A | Double |
| | pv3_i | PV3 input current | A | Double |
| | pv4_i | PV4 input current | A | Double |
| | pv5_i | PV5 input current | A | Double |
| | pv6_i | PV6 input current | A | Double |
| | pv7_i | PV7 input current | A | Double |
| | pv8_i | PV8 input current | A | Double |
| | total_cap | Total yield | kWh | Double |
| | open_time | Inverter startup time | ms | Double |
| | close_time | Inverter shutdown time | ms | Double |
| | mppt_1_cap | MPPT 1 DC total yield | kWh | Double |

| Device Type | Key | Item | Unit | Return Value Type |
| --- | --- | --- | --- | --- |
| | mppt_2_cap | MPPT 2 DC total yield | kWh | Double |
| | mppt_3_cap | MPPT 3 DC total yield | kWh | Double |
| | mppt_4_cap | MPPT 4 DC total yield | kWh | Double |
| ID: 10<br>EMI | temperature | Temperature | °C | Double |
| | pv_temperature | PV temperature | °C | Double |
| | wind_speed | Wind speed | m/s | Double |
| | wind_direction | Wind direction | Degree | Double |
| | radiant_total | Daily irradiation | $MJ/m^2$ | Double |
| | radiant_line | Irradiance | $W/m^2$ | Double |
| | horiz_radiant_line | Horizontal irradiance | $W/m^2$ | Double |
| | horiz_radiant_total | Horizontal irradiation | $MJ/m^2$ | Double |
| ID: 17<br>Grid meter | ab_u | A-B line voltage of grid | V | Double |
| | bc_u | B-C line voltage of grid | V | Double |
| | ca_u | C-A line voltage of grid | V | Double |
| | a_u | Phase A voltage (AC output) | V | Double |
| | b_u | Phase B voltage (AC output) | V | Double |
| | c_u | Phase C voltage (AC output) | V | Double |
| | a_i | Phase A current of grid (IA) | A | Double |
| | b_i | Phase B current of grid (IB) | A | Double |
| | c_i | Phase C current of grid (IC) | A | Double |

| Device Type | Key | Item | Unit | Return Value Type |
| --- | --- | --- | --- | --- |
| | active_power | Active power | kW | Double |
| | power_factor | Power factor | None | Double |
| | active_cap | Active energy (positive active energy) | kWh | Double |
| | reactive_power | Reactive power | kVar | Double |
| | reverse_active_cap | Negative active energy | kWh | Double |
| | forward_reactive_cap | Positive reactive energy | kWh | Double |
| | reverse_reactive_cap | Negative reactive energy | kWh | Double |
| | active_power_a | Active power PA | kW | Double |
| | active_power_b | Active power PB | kW | Double |
| | active_power_c | Active power PC | kW | Double |
| | reactive_power_a | Reactive power QA | kVar | Double |
| | reactive_power_b | Reactive power QB | kVar | Double |
| | reactive_power_c | Reactive power QC | kVar | Double |
| | total_apparent_power | Total apparent power | kVA | Double |
| | grid_frequency | Grid frequency | Hz | Double |
| | reverse_active_peak | Negative active energy (peak) | kWh | Double |
| | reverse_active_power | Negative active energy (shoulder) | kWh | Double |
| | reverse_active_valley | Negative active energy (off-peak) | kWh | Double |
| | reverse_active_top | Negative active energy (sharp) | kWh | Double |
| | positive_active_peak | Positive active energy (peak) | kWh | Double |
| | positive_active_power | Positive active energy (shoulder) | kWh | Double |

| Device Type | Key | Item | Unit | Return Value Type |
| --- | --- | --- | --- | --- |
| | positive_active_valley | Positive active energy (off-peak) | kWh | Double |
| | positive_active_top | Positive active energy (sharp) | kWh | Double |
| | reverse_reactive_peak | Negative reactive energy (peak) | kVar | Double |
| | reverse_reactive_power | Negative reactive energy (shoulder) | kVar | Double |
| | reverse_reactive_valley | Negative reactive energy (off-peak) | kVar | Double |
| | reverse_reactive_top | Negative reactive energy (sharp) | kVar | Double |
| | positive_reactive_peak | Positive reactive energy (peak) | kVar | Double |
| | positive_reactive_power | Positive reactive energy (shoulder) | kVar | Double |
| | positive_reactive_valley | Positive reactive energy (off-peak) | kVar | Double |
| | positive_reactive_top | Positive reactive energy (sharp) | kVar | Double |
| ID: 47<br>Power sensor | meter_status | Meter state (0: offline; 1: normal) | None | Double |
| | meter_u | Grid voltage | V | Double |
| | meter_i | Grid current | A | Double |
| | active_power | Active power | W | Double |
| | reactive_power | Reactive power | Var | Double |
| | power_factor | Power factor | None | Double |
| | grid_frequency | Grid frequency | Hz | Double |
| | active_cap | Active energy (positive active energy) | kWh | Double |
| | reverse_active_cap | Negative active energy | kWh | Double |

| Device Type | Key | Item | Unit | Return Value Type |
| --- | --- | --- | --- | --- |
| ID: 39<br>Residential battery | battery_status | Battery running state (0: offline; 1: standby; 2: running; 3: faulty; 4: hibernating) | None | Double |
| | max_charge_power | Maximum charge power | W | Double |
| | max_discharge_power | Maximum discharge power | W | Double |
| | ch_discharge_power | Charge/Discharge power | W | Double |
| | busbar_u | Battery voltage | V | Double |
| | battery_soc | Battery SOC | % | Double |
| | battery_soh | Battery SOH | None | Double |
| | ch_discharge_model | Charge/Discharge mode (0: none; 1: forced charge/ discharge; 2: time-of-use price; 3: fixed charge/ discharge; 4: automatic charge/ discharge) | None | Double |
| | charge_cap | Charged energy | kWh | Double |
| | discharge_cap | Discharged energy | kWh | Double |
| ID: 41<br>C&I and utility ESS | ch_discharge_power | Charge/Discharge power | W | Double |
| | battery_soc | Battery SOC | % | Double |
| | charge_cap | Charged energy | kWh | Double |
| | discharge_cap | Discharged energy | kWh | Double |

**Table 9-2 Inverter state (inverter_state) description**

| State Value | Description |
| --- | --- |
| 0 | Standby: initializing |
| 1 | Standby: insulation resistance detecting |

| State Value | Description |
| --- | --- |
| 2 | Standby: irradiation detecting |
| 3 | Standby: grid detecting |
| 256 | Start |
| 512 | Grid-connected |
| 513 | Grid-connected: power limited |
| 514 | Grid-connected: self-derating |
| 768 | Shutdown: on fault |
| 769 | Shutdown: on command |
| 770 | Shutdown: OVGR |
| 771 | Shutdown: communication interrupted |
| 772 | Shutdown: power limited |
| 773 | Shutdown: manual startup required |
| 774 | Shutdown: DC switch disconnected |
| 1025 | Grid scheduling: cosϕ-P curve |
| 1026 | Grid scheduling: Q-U curve |
| 1280 | Ready for terminal test |
| 1281 | Terminal testing... |
| 1536 | Inspection in progress |
| 1792 | AFCI self-check |
| 2048 | I-V scanning |
| 2304 | DC input detection |
| 40960 | Standby: no irradiation |
| 45056 | Communication interrupted (written by SmartLogger) |
| 49152 | Loading... (written by SmartLogger) |

## 9.2.8 Historical Device Data Interface

| Device Type | Key | Item | Unit | Return Value Type |
| --- | --- | --- | --- | --- |
| ID: 1<br>String inverter | inverter_state | Inverter state. For details, see **Table 9-3**. | None | Double |
| | ab_u | A-B line voltage of grid | V | Double |
| | bc_u | B-C line voltage of grid | V | Double |
| | ca_u | C-A line voltage of grid | V | Double |
| | a_u | Phase A voltage | V | Double |
| | b_u | Phase B voltage | V | Double |
| | c_u | Phase C voltage | V | Double |
| | a_i | Phase A current of grid | A | Double |
| | b_i | Phase B current of grid | A | Double |
| | c_i | Phase C current of grid | A | Double |
| | efficiency | Inverter conversion efficiency (manufacturer) | % | Double |
| | temperature | Internal temperature | °C | Double |
| | power_factor | Power factor | None | Double |
| | elec_freq | Grid frequency | Hz | Double |
| | active_power | Active power | kW | Double |
| | reactive_power | Output reactive power | kVar | Double |
| | day_cap | Yield today | kWh | Double |
| | mppt_power | MPPT total input power | kW | Double |
| | pv1_u | PV1 input voltage | V | Double |

| Device Type | Key | Item | Unit | Return Value Type |
| --- | --- | --- | --- | --- |
| | pv2_u | PV2 input voltage | V | Double |
| | pv3_u | PV3 input voltage | V | Double |
| | pv4_u | PV4 input voltage | V | Double |
| | pv5_u | PV5 input voltage | V | Double |
| | pv6_u | PV6 input voltage | V | Double |
| | pv7_u | PV7 input voltage | V | Double |
| | pv8_u | PV8 input voltage | V | Double |
| | pv9_u | PV9 input voltage | V | Double |
| | pv10_u | PV10 input voltage | V | Double |
| | pv11_u | PV11 input voltage | V | Double |
| | pv12_u | PV12 input voltage | V | Double |
| | pv13_u | PV13 input voltage | V | Double |
| | pv14_u | PV14 input voltage | V | Double |
| | pv15_u | PV15 input voltage | V | Double |
| | pv16_u | PV16 input voltage | V | Double |
| | pv17_u | PV17 input voltage | V | Double |
| | pv18_u | PV18 input voltage | V | Double |
| | pv19_u | PV19 input voltage | V | Double |
| | pv20_u | PV20 input voltage | V | Double |
| | pv21_u | PV21 input voltage | V | Double |
| | pv22_u | PV22 input voltage | V | Double |

| Device Type | Key | Item | Unit | Return Value Type |
| --- | --- | --- | --- | --- |
| | pv23_u | PV23 input voltage | V | Double |
| | pv24_u | PV24 input voltage | V | Double |
| | pv25_u | PV25 input voltage | V | Double |
| | pv26_u | PV26 input voltage | V | Double |
| | pv27_u | PV27 input voltage | V | Double |
| | pv28_u | PV28 input voltage | V | Double |
| | pv1_i | PV1 input current | A | Double |
| | pv2_i | PV2 input current | A | Double |
| | pv3_i | PV3 input current | A | Double |
| | pv4_i | PV4 input current | A | Double |
| | pv5_i | PV5 input current | A | Double |
| | pv6_i | PV6 input current | A | Double |
| | pv7_i | PV7 input current | A | Double |
| | pv8_i | PV8 input current | A | Double |
| | pv9_i | PV9 input current | A | Double |
| | pv10_i | PV10 input current | A | Double |
| | pv11_i | PV11 input current | A | Double |
| | pv12_i | PV12 input current | A | Double |
| | pv13_i | PV13 input current | A | Double |
| | pv14_i | PV14 input current | A | Double |
| | pv15_i | PV15 input current | A | Double |
| | pv16_i | PV16 input current | A | Double |
| | pv17_i | PV17 input current | A | Double |
| | pv18_i | PV18 input current | A | Double |
| | pv19_i | PV19 input current | A | Double |

| Device Type | Key | Item | Unit | Return Value Type |
| --- | --- | --- | --- | --- |
| | pv20_i | PV20 input current | A | Double |
| | pv21_i | PV21 input current | A | Double |
| | pv22_i | PV22 input current | A | Double |
| | pv23_i | PV23 input current | A | Double |
| | pv24_i | PV24 input current | A | Double |
| | pv25_i | PV25 input current | A | Double |
| | pv26_i | PV26 input current | A | Double |
| | pv27_i | PV27 input current | A | Double |
| | pv28_i | PV28 input current | A | Double |
| | total_cap | Total yield | kWh | Double |
| | open_time | Inverter startup time | ms | Double |
| | close_time | Inverter shutdown time | ms | Double |
| | mppt_total_cap | Total DC input energy | kWh | Double |
| | mppt_1_cap | MPPT 1 DC total yield | kWh | Double |
| | mppt_2_cap | MPPT 2 DC total yield | kWh | Double |
| | mppt_3_cap | MPPT 3 DC total yield | kWh | Double |
| | mppt_4_cap | MPPT 4 DC total yield | kWh | Double |
| | mppt_5_cap | MPPT 5 DC total yield | kWh | Double |
| | mppt_6_cap | MPPT 6 DC total yield | kWh | Double |
| | mppt_7_cap | MPPT 7 DC total yield | kWh | Double |
| | mppt_8_cap | MPPT 8 DC total yield | kWh | Double |
| | mppt_9_cap | MPPT 9 DC total yield | kWh | Double |

| Device Type | Key | Item | Unit | Return Value Type |
| --- | --- | --- | --- | --- |
| | mppt_10_cap | MPPT 10 DC total yield | kWh | Double |
| ID: 38<br>Residential inverter | inverter_state | Inverter state. For details, see **Table 9-3**. | None | Double |
| | ab_u | A-B line voltage of grid | V | Double |
| | bc_u | B-C line voltage of grid | V | Double |
| | ca_u | C-A line voltage of grid | V | Double |
| | a_u | Phase A voltage | V | Double |
| | b_u | Phase B voltage | V | Double |
| | c_u | Phase C voltage | V | Double |
| | a_i | Phase A current of grid | A | Double |
| | b_i | Phase B current of grid | A | Double |
| | c_i | Phase C current of grid | A | Double |
| | efficiency | Inverter conversion efficiency (manufacturer) | % | Double |
| | temperature | Internal temperature | °C | Double |
| | power_factor | Power factor | None | Double |
| | elec_freq | Grid frequency | Hz | Double |
| | active_power | Active power | kW | Double |
| | reactive_power | Output reactive power | kVar | Double |
| | day_cap | Yield today | kWh | Double |
| | mppt_power | MPPT total input power | kW | Double |
| | pv1_u | PV1 input voltage | V | Double |

| Device Type | Key | Item | Unit | Return Value Type |
| --- | --- | --- | --- | --- |
| | pv2_u | PV2 input voltage | V | Double |
| | pv3_u | PV3 input voltage | V | Double |
| | pv4_u | PV4 input voltage | V | Double |
| | pv5_u | PV5 input voltage | V | Double |
| | pv6_u | PV6 input voltage | V | Double |
| | pv7_u | PV7 input voltage | V | Double |
| | pv8_u | PV8 input voltage | V | Double |
| | pv1_i | PV1 input current | A | Double |
| | pv2_i | PV2 input current | A | Double |
| | pv3_i | PV3 input current | A | Double |
| | pv4_i | PV4 input current | A | Double |
| | pv5_i | PV5 input current | A | Double |
| | pv6_i | PV6 input current | A | Double |
| | pv7_i | PV7 input current | A | Double |
| | pv8_i | PV8 input current | A | Double |
| | total_cap | Total yield | kWh | Double |
| | open_time | Inverter startup time | ms | Double |
| | close_time | Inverter shutdown time | ms | Double |
| | mppt_1_cap | MPPT 1 DC total yield | kWh | Double |
| | mppt_2_cap | MPPT 2 DC total yield | kWh | Double |
| | mppt_3_cap | MPPT 3 DC total yield | kWh | Double |
| | mppt_4_cap | MPPT 4 DC total yield | kWh | Double |
| ID: 10<br>EMI | temperature | Temperature | °C | Double |
| | pv_temperature | PV temperature | °C | Double |
| | wind_speed | Wind speed | m/s | Double |

| Device Type | Key | Item | Unit | Return Value Type |
| --- | --- | --- | --- | --- |
| | wind_direction | Wind direction | Degree | Double |
| | radiant_total | Daily irradiation | $MJ/m^2$ | Double |
| | radiant_line | Irradiance | $W/m^2$ | Double |
| | horiz_radiant_line | Horizontal irradiance | $W/m^2$ | Double |
| | horiz_radiant_total | Horizontal irradiation | $MJ/m^2$ | Double |
| ID: 17<br>Grid meter | ab_u | A-B line voltage of grid | V | Double |
| | bc_u | B-C line voltage of grid | V | Double |
| | ca_u | C-A line voltage of grid | V | Double |
| | a_u | Phase A voltage (AC output) | V | Double |
| | b_u | Phase B voltage (AC output) | V | Double |
| | c_u | Phase C voltage (AC output) | V | Double |
| | a_i | Phase A current of grid (IA) | A | Double |
| | b_i | Phase B current of grid (IB) | A | Double |
| | c_i | Phase C current of grid (IC) | A | Double |
| | active_power | Active power | kW | Double |
| | power_factor | Power factor | None | Double |
| | active_cap | Active energy (positive active energy) | kWh | Double |
| | reactive_power | Reactive power | kVar | Double |
| | reverse_active_cap | Negative active energy | kWh | Double |
| | forward_reactive_cap | Positive reactive energy | kWh | Double |

| Device Type | Key | Item | Unit | Return Value Type |
| --- | --- | --- | --- | --- |
| | reverse_reactive_cap | Negative reactive energy | kWh | Double |
| | active_power_a | Active power PA | kW | Double |
| | active_power_b | Active power PB | kW | Double |
| | active_power_c | Active power PC | kW | Double |
| | reactive_power_a | Reactive power QA | kVar | Double |
| | reactive_power_b | Reactive power QB | kVar | Double |
| | reactive_power_c | Reactive power QC | kVar | Double |
| | total_apparent_power | Total apparent power | kVA | Double |
| | grid_frequency | Grid frequency | Hz | Double |
| | reverse_active_peak | Negative active energy (peak) | kWh | Double |
| | reverse_active_power | Negative active energy (shoulder) | kWh | Double |
| | reverse_active_valley | Negative active energy (off-peak) | kWh | Double |
| | reverse_active_top | Negative active energy (sharp) | kWh | Double |
| | positive_active_peak | Positive active energy (peak) | kWh | Double |
| | positive_active_power | Positive active energy (shoulder) | kWh | Double |
| | positive_active_valley | Positive active energy (off-peak) | kWh | Double |
| | positive_active_top | Positive active energy (sharp) | kWh | Double |
| | reverse_reactive_peak | Negative reactive energy (peak) | kVar | Double |
| | reverse_reactive_power | Negative reactive energy (shoulder) | kVar | Double |
| | reverse_reactive_valley | Negative reactive energy (off-peak) | kVar | Double |

| Device Type | Key | Item | Unit | Return Value Type |
| --- | --- | --- | --- | --- |
| | reverse_reactive_top | Negative reactive energy (sharp) | kVar | Double |
| | positive_reactive_peak | Positive reactive energy (peak) | kVar | Double |
| | positive_reactive_power | Positive reactive energy (shoulder) | kVar | Double |
| | positive_reactive_valley | Positive reactive energy (off-peak) | kVar | Double |
| | positive_reactive_top | Positive reactive energy (sharp) | kVar | Double |
| ID: 47<br>Power sensor | meter_status | Meter status (0: offline; 1: normal) | None | Double |
| | meter_u | Grid voltage | V | Double |
| | meter_i | Grid current | A | Double |
| | active_power | Active power | W | Double |
| | reactive_power | Reactive power | Var | Double |
| | power_factor | Power factor | None | Double |
| | grid_frequency | Grid frequency | Hz | Double |
| | active_cap | Active energy (positive active energy) | kWh | Double |
| | reverse_active_cap | Negative active energy | kWh | Double |
| | ab_u | A-B line voltage of grid | V | Double |
| | bc_u | B-C line voltage of grid | V | Double |
| | ca_u | C-A line voltage of grid | V | Double |
| | b_u | Phase B voltage (AC output) | V | Double |
| | c_u | Phase C voltage (AC output) | V | Double |
| | b_i | Phase B current of grid (IB) | A | Double |

| Device Type | Key | Item | Unit | Return Value Type |
| --- | --- | --- | --- | --- |
| | c_i | Phase C current of grid (IC) | A | Double |
| | reverse_active_cap | Negative active energy | kWh | Double |
| | forward_reactive_cap | Positive reactive energy | kWh | Double |
| | reverse_reactive_cap | Negative reactive energy | kWh | Double |
| | active_power_a | Active power PA | kW | Double |
| | active_power_b | Active power PB | kW | Double |
| | active_power_c | Active power PC | kW | Double |
| | reactive_power_a | Reactive power QA | kVar | Double |
| | reactive_power_b | Reactive power QB | kVar | Double |
| | reactive_power_c | Reactive power QC | kVar | Double |
| | total_apparent_power | Total apparent power | kVA | Double |
| | reverse_active_peak | Negative active energy (peak) | kWh | Double |
| | reverse_active_power | Negative active energy (shoulder) | kWh | Double |
| | reverse_active_valley | Negative active energy (off-peak) | kWh | Double |
| | reverse_active_top | Negative active energy (sharp) | kWh | Double |
| | positive_active_peak | Positive active energy (peak) | kWh | Double |
| | positive_active_power | Positive active energy (shoulder) | kWh | Double |
| | positive_active_valley | Positive active energy (off-peak) | kWh | Double |
| | positive_active_top | Positive active energy (sharp) | kWh | Double |
| | reverse_reactive_peak | Negative reactive energy (peak) | kVar | Double |

| Device Type | Key | Item | Unit | Return Value Type |
| --- | --- | --- | --- | --- |
| | reverse_reactive_power | Negative reactive energy (shoulder) | kVar | Double |
| | reverse_reactive_valley | Negative reactive energy (off-peak) | kVar | Double |
| | reverse_reactive_top | Negative reactive energy (sharp) | kVar | Double |
| | positive_reactive_peak | Positive reactive energy (peak) | kVar | Double |
| | positive_reactive_power | Positive reactive energy (shoulder) | kVar | Double |
| | positive_reactive_valley | Positive reactive energy (off-peak) | kVar | Double |
| | positive_reactive_top | Positive reactive energy (sharp) | kVar | Double |
| ID: 39<br>Residential battery | battery_status | Battery running state (0: offline; 1: standby; 2: running; 3: faulty; 4: hibernating) | None | Double |
| | max_charge_power | Maximum charge power | W | Double |
| | max_discharge_power | Maximum discharge power | W | Double |
| | ch_discharge_power | Charge/Discharge power | W | Double |
| | busbar_u | Battery voltage | V | Double |
| | battery_soc | Battery SOC | % | Double |
| | battery_soh | Battery SOH | None | Double |
| | ch_discharge_model | Charge/Discharge mode (0: none; 1: forced charge/discharge; 2: time-of-use price; 3: fixed charge/discharge; 4: automatic charge/discharge) | None | Double |
| | charge_cap | Charged energy | kWh | Double |

| Device Type | Key | Item | Unit | Return Value Type |
| --- | --- | --- | --- | --- |
| | discharge_cap | Discharged energy | kWh | Double |
| ID: 41<br>C&I and utility ESS | ch_discharge_power | Charge/Discharge power | W | Double |
| | battery_soc | Battery SOC | % | Double |
| | charge_cap | Charged energy | kWh | Double |
| | discharge_cap | Discharged energy | kWh | Double |

**Table 9-3** Inverter state (inverter_state) description

| State Value | Description |
| --- | --- |
| 0 | Standby: initializing |
| 1 | Standby: insulation resistance detecting |
| 2 | Standby: irradiation detecting |
| 3 | Standby: grid detecting |
| 256 | Start |
| 512 | Grid-connected |
| 513 | Grid-connected: power limited |
| 514 | Grid-connected: self-derating |
| 768 | Shutdown: on fault |
| 769 | Shutdown: on command |
| 770 | Shutdown: OVGR |
| 771 | Shutdown: communication interrupted |
| 772 | Shutdown: power limited |
| 773 | Shutdown: manual startup required |
| 774 | Shutdown: DC switch disconnected |
| 1025 | Grid scheduling: cosϕ-P curve |
| 1026 | Grid scheduling: Q-U curve |
| 1280 | Ready for terminal test |
| 1281 | Terminal testing... |
| 1536 | Inspection in progress |

| State Value | Description |
| --- | --- |
| 1792 | AFCI self-check |
| 2048 | I-V scanning |
| 2304 | DC input detection |
| 40960 | Standby: no irradiation |
| 45056 | Communication interrupted (written by SmartLogger) |
| 49152 | Loading... (written by SmartLogger) |

## 9.2.9 Daily Device Data Interface

| Device Type | Key | Name | Unit | Return Value Type |
| --- | --- | --- | --- | --- |
| ID: 39<br>Residential battery | charge_cap | Charged energy | kWh | Double |
| | discharge_cap | Discharged energy | kWh | Double |
| | charge_time | Charging duration | h | Double |
| | discharge_time | Discharging duration | h | Double |
| ID: 1<br>String inverter | installed_capacity | Installed capacity | kW | Double |
| | product_power | Yield | kWh | Double |
| | perpower_ratio | Specific energy (kWh/kWp) | h | Double |
| ID: 38<br>Residential inverter | installed_capacity | Installed capacity | kW | Double |
| | product_power | Yield | kWh | Double |
| | perpower_ratio | Specific energy (kWh/kWp) | h | Double |
| ID: 41<br>C&I and utility ESS | charge_cap | Charged energy | kWh | Double |
| | discharge_cap | Discharged energy | kWh | Double |

## 9.2.10 Monthly Device Data Interface

| Device Type | Key | Name | Unit | Return Value Type |
| --- | --- | --- | --- | --- |
| ID: 39<br>Residential battery | charge_cap | Charged energy | kWh | Double |
| | discharge_cap | Discharged energy | kWh | Double |
| | charge_time | Charging duration | h | Double |
| | discharge_time | Discharging duration | h | Double |
| ID: 1<br>String inverter | installed_capacity | Installed capacity | kW | Double |
| | product_power | Yield | kWh | Double |
| | perpower_ratio | Specific energy (kWh/kWp) | h | Double |
| ID: 38<br>Residential inverter | installed_capacity | Installed capacity | kW | Double |
| | product_power | Yield | kWh | Double |
| | perpower_ratio | Specific energy (kWh/kWp) | h | Double |
| ID: 41<br>C&I and utility ESS | charge_cap | Charged energy | kWh | Double |
| | discharge_cap | Discharged energy | kWh | Double |

## 9.2.11 Yearly Device Data Interface

| Device Type | Key | Name | Unit | Return Value Type |
| --- | --- | --- | --- | --- |
| ID: 39<br>Residential battery | charge_cap | Charged energy | kWh | Double |
| | discharge_cap | Discharged energy | kWh | Double |
| | charge_time | Charging duration | h | Double |
| | discharge_time | Discharging duration | h | Double |
| ID: 1<br>String inverter | installed_capacity | Installed capacity | kW | Double |
| | product_power | Yield | kWh | Double |
| | perpower_ratio | Specific energy (kWh/kWp) | h | Double |

| Device Type | Key | Name | Unit | Return Value Type |
| --- | --- | --- | --- | --- |
| ID: 38<br>Residential inverter | installed_capacity | Installed capacity | kW | Double |
| | product_power | Yield | kWh | Double |
| | perpower_ratio | Specific energy (kWh/kWp) | h | Double |
| ID: 41<br>C&I and utility ESS | charge_cap | Charged energy | kWh | Double |
| | discharge_cap | Discharged energy | kWh | Double |

# 9.3 Restricted Access Interface

The interfaces in this section are restricted. To use them, contact Huawei technical support.

## 9.3.1 Device Convergence Data Interface

### Interface Description

Used to query the running and alarm data of a maximum of 100 inverters at a time.

### Request URL

https://Domain name of the management system/thirdData/cs/getInventerRealKpi

### Request Mode

HTTP method: POST

### Access Restrictions

This interface can be invoked once every hour.

### Request Parameters

| Parameter | Description | Data Type | Mandatory/ Optional |
| --- | --- | --- | --- |
| sns | Inverter SN list. Multiple device IDs are separated by commas (,). | String | Mandatory |

## Response Packet

| Parameter | Description | Data Type | Remarks |
| --- | --- | --- | --- |
| success | Request success or failure flag<br>true: The request succeeded.<br>false: The request failed. | Boolean | Request success or failure flag |
| failCode | Error code<br>Value 0 indicates that the status is normal. For definitions of other error codes, see **10 Error Code List**. | Integer | - |
| params | Request input parameter, including the following information: | - | - |
| >sns | Inverter SNs in the request parameter | String | - |
| message | Optional message | String | - |
| data | Returned data. The data contains the query result list of each inverter, including the following information: | List | Real-time, alarm, and historical inverter data |
| >sn | Inverter SN | String | |
| >kpis | Real-time or historical inverter data, including the following information: | Map | 5-minute device data |
| >>activePower | Active power | Double | |
| >>collectorSN | Collector SN | String | |
| >>controlVersion | Control board version | String | |
| >>createTime | Data collection time | Integer | |
| >>eDay | Yield today | Double | |
| >>eMonth | Energy yield of this month | Double | |
| >>eTotal | Total energy yield | Double | |
| >>errorCode | Error code and alarm ID | String | When historical data is queried, the value is null. |

| Parameter | Description | Data Type | Remarks |
| --- | --- | --- | --- |
| >>fac | Frequency | Double | |
| >>iac1 | Phase A current of output current 1 | Double | |
| >>iac2 | Phase B current of output current 2 | Double | |
| >>iac3 | Phase C current of output current 3 | Double | |
| >>inverterSN | Inverter SN | String | |
| >>inverterManufacturer | Inverter manufacturer | String | |

| Parameter | Description | Data Type | Remarks |
| --- | --- | --- | --- |
| >>ipvs | String input current list | List | The length of the list indicates the number of strings which are sorted in sequence. If data is missing, the corresponding data is populated with null.<br>For example, if the number of strings cannot be queried, inverters are classified by type (residential or string inverter). The missing data is populated with null. The length of the list is as follows:<br>Residential inverter: 8<br>String inverter: 24 |
| >>nationalStandard | National standards | String | |
| >>pac | Output power | Double | |
| >>powerFactor | Power factor | Double | |
| >>reactivePower | Reactive power | Double | |

| Parameter | Description | Data Type | Remarks |
| --- | --- | --- | --- |
| >>status | Alarm status | Interger | For real-time data, this parameter specifies whether the device has alarms. If an alarm is generated, this parameter is set to 0. If no alarm is generated, this parameter is set to 1. For historical data, this parameter is set to null. |
| >>temperature | Temperature | Double | |
| >>vac1 | Phase A voltage of output voltage 1 | Double | |
| >>vac2 | Phase B voltage of output voltage 2 | Double | |
| >>vac3 | Phase C voltage of output voltage 3 | Double | |

| Parameter | Description | Data Type | Remarks |
| --- | --- | --- | --- |
| >>vpvs | String input voltage list | Double | The length of the list indicates the number of strings which are sorted in sequence. If data is missing, the corresponding data is populated with null.<br>For example, if the number of strings cannot be queried, inverters are classified by type (residential or string inverter). The missing data is populated with null. The length of the list is as follows:<br>Residential inverter: 8<br>String inverter: 24 |

## Example

Request example:

```
{
    "sns": "LKSN2KL,SLV1_SN2KL_001"
}
```

Response example:

Example 1: An error code is returned.

```
{
    "data": null,
    "failCode": 20046,
    "message": null,
    "params": {
        "sns": "LKSN2KL,SLV1_SN2KL_001"
    },
    "success": false
}
```


Example 2: The real-time and alarm data of the device is returned.


```
{
    "data": [
        {
            "kpis": [
                {
                    "activePower": 30.0,
                    "collectorSN": "SLV1_001_1158",
                    "controlVersion": "V100R001C00SPC334",
                    "createTime": 1650441600,
                    "eDay": 405.0,
                    "eMonth": 0.0,
                    "eTotal": 9605.0,
                    "errorCode": "",
                    "fac": 56.16,
                    "iac1": 50.0,
                    "iac2": 50.0,
                    "iac3": 50.0,
                    "inventerSN": "SLV1_SN2KL_001",
                    "inverterManufacturer": "Huawei",
                    "ipvs": [
                        26.16,
                        26.16,
                        26.16,
                        26.16,
                        20.0,
                        20.0,
                        20.0,
                        20.0,
                        null,
                        null,
                        null,
                        null,
                        null,
                        null,
                        null,
                        null,
                        null,
                        null,
                        null,
                        null,
                        null,
                        null,
                        null,
                        null,
                        null
                    ],
                    "nationalStandard": "NB32004",
                    "pac": 30.0,
                    "powerFactor": -0.384,
                    "reactivePower": 6.616,
                    "status": 1,
                    "temperature": 11.6,
                    "vac1": 261.6,
                    "vac2": 261.6,
                    "vac3": 261.6,
                    "vpvs": [
                        261.6,
                        261.6,
                        261.6,
```

```
                    261.6,
                    200.0,
                    200.0,
                    200.0,
                    200.0,
                    null,
                    null,
                    null,
                    null,
                    null,
                    null,
                    null,
                    null,
                    null,
                    null,
                    null,
                    null,
                    null,
                    null,
                    null,
                    null
                ]
            }
        ],
        "sn": "SLV1_SN2KL_001"
    }
  ],
  "failCode": 0,
  "message": null,
  "params": {
     "sns": "LKSN2KL,SLV1_SN2KL_001"
  },
  "success": true
}
```


NOTE

This interface is restricted. Before obtaining data, the system administrator must authorize the northbound user.

# 9.3.2 Interface for Creating a Plant

## Interface Description

This interface is used to create a plant. One plant is created at a time. Before accessing this interface, the northbound user needs to authorize a company to bind the created plant to the company. If multiple companies are authorized, the plant is bound to the first company by default.

## Request URL

https://*Domain name of the management system*/thirdData/createStation

## Request Mode

HTTP method: POST

## Access Restrictions

Maximum number of API calls per user per minute: 10. If the access frequency exceeds the limit, the interface returns error code 407.

Each user can create a maximum of 1000 plants per day. If the creation frequency exceeds the limit, the interface returns error code 26001.

## Request Parameters

| Parameter | Description | Data Type | Mandatory/ Optional |
| --- | --- | --- | --- |
| basicConfig | Basic information configuration | Object | Mandatory |
| >stationName | Plant name. It cannot be empty and must contain a maximum of 80 characters, excluding the following special characters: ' < > , / & \| or null. | String | Mandatory |
| >stationType | Plant type<br>**1**: residential power plant<br>**2**: C&I power plant<br>**3**: utility plant | Integer | Mandatory |
| >pureChange | Indicates whether the plant is an EV-charger-only plant. The default value is 0. It can be set to 1 only for residential power plants.<br>**0**: no<br>**1**: yes | Integer | Optional |
| >connectTime | Grid connection time (second). The API call time is used by default.<br>The grid connection time cannot be set for an EV-charger-only plant. | Long | Optional |
| >linkman | Contact person. It can contain a maximum of 30 characters. (A Chinese character occupies two characters.) | String | Optional |
| >linkmanPho | Contact information. Provide the mobile number, fixed-line number, or email address. | String | Optional |
| deviceConfig | Connected device configuration. Devices connected to multiple communication modules are supported. | List | Mandatory |
| >esn | Device SN. For devices connected to the same communication module, you only need to enter the SN of any device (including the communication module). | String | Mandatory |

| Parameter | Description | Data Type | Mandatory/ Optional |
| --- | --- | --- | --- |
| >registerCode | Device registration code. It is mandatory for non-directly connected inverters and devices that require a registration code outside China. | String | Optional |
| storageConfig | String capacity configuration. It cannot be set for an EV-charger-only plant. | Object | Optional |
| >totalStorage | String capacity of a plant (unit: kWp)<br>String capacity of a plant or PV device must be specified. If both of them are specified, the string capacity of the plant is prioritized.<br>The string capacity of a plant is evenly allocated to the PV strings connected to devices, and the allocated PV string capacity ranges from 0 to 150 kWp. | Double | Leave it empty/ Fill in either **>totalStorage** or **>PVParams**. |
| >PVParams | PV device string capacity. The value must be consistent with the number of connected inverters. | List | Leave it empty/ Fill in either **>totalStorage** or **>PVParams**. |
| >>deviceSn | Inverter SN | String | Mandatory |
| >>PVStorage | PV string capacity of an inverter (unit: Wp). The values of multiple PV strings are separated by comma (,). The number of values must be the same as the number of PV strings connected to the device, and the values range from 0 to 150,000 Wp. | String | Mandatory |
| priceConfig | Electricity price configuration. It cannot be set for an EV-charger-only plant. | Object | Optional |
| >useCompanyPrice | Indicates whether to use the company's electricity price. The default value is 0.<br>**0**: no<br>**1**: yes | Integer | Optional |

| Parameter | Description | Data Type | Mandatory/ Optional |
| --- | --- | --- | --- |
| >definePrice | User-defined electricity price. If it is not specified, the electricity price is not set. If both the company electricity price and user-defined electricity price are specified, the company electricity price is prioritized. | Object | Optional |
| >>ongridPrice | Feed-in electricity price. The time for the feed-in electricity price must cover the whole year and must not overlap. | List | Optional |
| >>>beginMonth | Begin month | Integer | Mandatory |
| >>>beginDay | Begin day | Integer | Mandatory |
| >>>endMonth | End month | Integer | Mandatory |
| >>>endDay | End day | Integer | Mandatory |
| >>>hourRange | Hour range configuration. It must cover continuous 24 hours and must not overlap. | List | Mandatory |
| >>>>beginHour | Begin hour | Integer | Mandatory |
| >>>>endHour | End hour | Integer | Mandatory |
| >>>>price | Feed-in electricity price. The value must be greater than or equal to 0 and can contain a maximum of seven integers and four decimal places. If the decimal part contains more than four digits, only the first four digits will be retained by default. | Double | Mandatory |
| >>purchasePrice | Electricity purchase price. The date must cover the whole year and must not overlap. | List | Optional |
| >>>beginMonth | Begin month | Integer | Mandatory |
| >>>beginDay | Begin day | Integer | Mandatory |

| Parameter | Description | Data Type | Mandatory/ Optional |
| --- | --- | --- | --- |
| >>>endMonth | End month | Integer | Mandatory |
| >>>endDay | End day | Integer | Mandatory |
| >>>hourRange | Hour range configuration. It must cover continuous 24 hours and must not overlap. | List | Mandatory |
| >>>>beginHour | Begin hour | Integer | Mandatory |
| >>>>endHour | End hour | Integer | Mandatory |
| >>>>price | Feed-in electricity price. The value must be greater than or equal to 0 and can contain a maximum of seven integers and four decimal places. If the decimal part contains more than four digits, only the first four digits will be retained by default. | Double | Mandatory |
| additionConfig | Additional information configuration | Object | Mandatory |
| areaCode | Area code | Integer | Mandatory |
| address | Plant address | String | Mandatory |
| longitude | Longitude. The value ranges from –180 to +180 and can contain a maximum of seven decimal places. | Double | Mandatory |
| latitude | Latitude. The value ranges from –90 to +90 and can contain a maximum of seven decimal places. | Double | Mandatory |
| timeZoneCode | Time zone code | Integer | Mandatory |
| safeRunningTime | Safe running start time (unit: second). The API call time is used by default. | Long | Optional |
| introduction | Plant introduction. It can contain a maximum of 128 characters. | String | Optional |

| Parameter | Description | Data Type | Mandatory/ Optional |
| --- | --- | --- | --- |
| loadStatus | Indicates whether any load is connected. The default value is 1.<br>**0**: no<br>**1**: yes | Integer | Optional |

## Area Codes

| Area Code | Country/ Region | Area Code | Country/ Region | Area Code | Country/ Region | Area Code | Country/ Region |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | Ascension Island | 65 | Algeria | 129 | Cayman Islands | 193 | Réunion |
| 2 | Andorra | 66 | Ceuta and Melilla | 130 | Kazakhstan | 194 | Romania |
| 3 | United Arab Emirates | 67 | Ecuador | 131 | Laos | 195 | Serbia |
| 4 | Afghanistan | 68 | Estonia | 132 | Lebanon | 196 | Russia |
| 5 | Antigua and Barbuda | 69 | Egypt | 133 | Saint Lucia | 197 | Rwanda |
| 6 | Anguilla | 70 | Western Sahara | 134 | Liechtenstein | 198 | Saudi Arabia |
| 7 | Albania | 71 | Eritrea | 135 | Sri Lanka | 199 | Solomon Islands |
| 8 | Armenia | 72 | Spain | 136 | Liberia | 200 | Seychelles |
| 9 | Angola | 73 | Ethiopia | 137 | Lesotho | 201 | Sudan |
| 10 | Antarctica | 74 | Finland | 138 | Lithuania | 202 | Sweden |

| Area Code | Country/ Region | Area Code | Country/ Region | Area Code | Country/ Region | Area Code | Country/ Region |
|---|---|---|---|---|---|---|---|
| 11 | Argentina | 75 | Fiji | 139 | Luxembourg | 203 | Singapore |
| 12 | American Samoa | 76 | Falkland Islands | 140 | Latvia | 204 | Saint Helena |
| 13 | Austria | 77 | Micronesia | 141 | Libya | 205 | Slovenia |
| 14 | Australia | 78 | Faroe Islands | 142 | Morocco | 206 | Svalbard and Jan Mayen |
| 15 | Aruba | 79 | France | 143 | Monaco | 207 | Slovakia |
| 16 | Aland Islands | 80 | Gabon | 144 | Moldova | 208 | Sierra Leone |
| 17 | Azerbaijan | 81 | United Kingdom | 145 | Montenegro | 209 | San Marino |
| 18 | Bosnia and Herzegovina | 82 | Granada | 146 | Saint Martin | 210 | Senegal |
| 19 | Barbados | 83 | Georgia | 147 | Madagascar | 211 | Somalia |
| 20 | Bangladesh | 84 | French Guiana | 148 | Marshall Islands | 212 | Suriname |
| 21 | Belgium | 85 | Guernsey | 149 | Republic of North Macedonia | 213 | South Sudan |
| 22 | Burkina Faso | 86 | Ghana | 150 | Mali | 214 | São Tomé and Príncipe |
| 23 | Bulgaria | 87 | Gibraltar | 151 | Myanmar | 215 | El Salvador |

| Area Code | Country/ Region | Area Code | Country/ Region | Area Code | Country/ Region | Area Code | Country/ Region |
|---|---|---|---|---|---|---|---|
| 24 | Bahrain | 88 | Greenland | 152 | Mongolia | 216 | Sint Maarten |
| 25 | Burundi | 89 | Gambia | 153 | Macao (China) | 217 | Syria |
| 26 | Benin | 90 | Guinea | 154 | Northern Mariana Islands | 218 | Eswatini |
| 27 | Saint Barthélemy | 91 | Guadeloupe | 155 | Martinique | 219 | Tristan da Cunha |
| 28 | Bermuda | 92 | Equatorial Guinea | 156 | Mauritania | 220 | Turks and Caicos Islands |
| 29 | Brunei | 93 | Greece | 157 | Montserrat | 221 | Chad |
| 30 | Bolivia | 94 | South Georgia and the South Sandwich Islands | 158 | Malta | 222 | French Southern and Antarctic Lands |
| 31 | Caribbean Netherlands | 95 | Guatemala | 159 | Mauritius | 223 | Togo |
| 32 | Brazil | 96 | Guam | 160 | Maldives | 224 | Thailand |
| 33 | Bahamas | 97 | Guinea-Bissau | 161 | Malawi | 225 | Tajikistan |
| 34 | Bhutan | 98 | Guyana | 162 | Mexico | 226 | Tokelau |
| 35 | Bouvet Island | 99 | Hong Kong (China) | 163 | Malaysia | 227 | East Timor |

| Area Code | Country/ Region | Area Code | Country/ Region | Area Code | Country/ Region | Area Code | Country/ Region |
|---|---|---|---|---|---|---|---|
| 36 | Botswana | 100 | Heard Island and McDonald Islands | 164 | Mozambique | 228 | Turkmenistan |
| 37 | Belarus | 101 | Honduras | 165 | Namibia | 229 | Tunisia |
| 38 | Belize | 102 | Croatia | 166 | New Caledonia | 230 | Tonga |
| 39 | Canada | 103 | Haiti | 167 | Niger | 231 | Türkiye |
| 40 | Cocos (Keeling) Islands | 104 | Hungary | 168 | Norfolk Island | 232 | Trinidad and Tobago |
| 41 | Democratic Republic of the Congo | 105 | Canary Islands | 169 | Nigeria | 233 | Tuvalu |
| 42 | Central African Republic | 106 | Indonesia | 170 | Nicaragua | 234 | Taiwan (China) |
| 43 | Republic of the Congo | 107 | Ireland | 171 | Netherlands | 235 | Tanzania |
| 44 | Switzerland | 108 | Israel | 172 | Norway | 236 | Ukraine |
| 45 | Côte d'Ivoire | 109 | Isle of Man | 173 | Nepal | 237 | Uganda |
| 46 | Cook Islands | 110 | India | 174 | Nauru | 238 | United States Minor Outlying Islands |

| Area Code | Country/ Region | Area Code | Country/ Region | Area Code | Country/ Region | Area Code | Country/ Region |
|---|---|---|---|---|---|---|---|
| 47 | Chile | 111 | British Indian Ocean Territory | 175 | Niue | 239 | United States |
| 48 | Cameroon | 112 | Iraq | 176 | New Zealand | 240 | Uruguay |
| 49 | Chinese mainland | 113 | Iran | 177 | Oman | 241 | Uzbekistan |
| 50 | Colombia | 114 | Iceland | 178 | Panama | 242 | Vatican City State |
| 51 | Clipperton Island | 115 | Italy | 179 | Peru | 243 | Saint Vincent and the Grenadines |
| 52 | Costa Rica | 116 | Jersey | 180 | French Polynesia | 244 | Venezuela |
| 53 | Cuba | 117 | Jamaica | 181 | Papua New Guinea | 245 | British Virgin Islands |
| 54 | Cape Verde | 118 | Jordan | 182 | Philippines | 246 | United States Virgin Islands |
| 55 | Curacao | 119 | Japan | 183 | Pakistan | 247 | Vietnam |
| 56 | Christmas Island | 120 | Kenya | 184 | Poland | 248 | Vanuatu |
| 57 | Cyprus | 121 | Kyrgyzstan | 185 | Saint Pierre and Miquelon | 249 | Wallis and Futuna |
| 58 | Czech | 122 | Cambodia | 186 | Pitcairn Islands | 250 | Samoa |

| Area Code | Country/ Region | Area Code | Country/ Region | Area Code | Country/ Region | Area Code | Country/ Region |
|---|---|---|---|---|---|---|---|
| 59 | Germany | 123 | Kiribati | 187 | Puerto Rico | 251 | Kosovo |
| 60 | Diego Garcia | 124 | Comoros | 188 | Palestinian Territories | 252 | Yemen |
| 61 | Djibouti | 125 | Saint Kitts and Nevis | 189 | Portugal | 253 | Mayotte |
| 62 | Denmark | 126 | North Korea | 190 | Palau | 254 | South Africa |
| 63 | Dominica | 127 | South Korea | 191 | Paraguay | 255 | Zambia |
| 64 | Dominican Republic | 128 | Kuwait | 192 | Qatar | 256 | Zimbabwe |

## Time Zone Codes

| Time Zone | Details | Time Zone | Details | Time Zone | Details | Time Zone | Details |
|---|---|---|---|---|---|---|---|
| 54 | (UTC-12:00) International Date Line West | 102 | (UTC-03:00) Araguaína | 13 | (UTC+03:00) Minsk | 36 | (UTC+08:00) Singapore |
| 85 | (UTC-11:00) Coordinated Universal Time-11 | 103 | (UTC-03:00) Greenland | 77 | (UTC+03:00) Ankara | 37 | (UTC+08:00) Perth |

| Time Zone | Details | Time Zone | Details | Time Zone | Details | Time Zone | Details |
|---|---|---|---|---|---|---|---|
| 55 | (UTC-10:00) Hawaii | 104 | (UTC-03:00) Punta Arenas | 17 | (UTC+03:00) Baghdad | 38 | (UTC+08:00) Taipei |
| 86 | (UTC-10:00) Aleutian Islands | 105 | (UTC-03:00) Salvador | 19 | (UTC+03:00) Kuwait, Riyadh | 39 | (UTC+08:00) Irkutsk |
| 87 | (UTC-09:30) Marquesas Islands | 106 | (UTC-03:00) Saint Pierre and Miquelon | 20 | (UTC+03:00) Moscow, Saint Petersburg | 78 | (UTC+08:00) Kuala Lumpur |
| 56 | (UTC-09:00) Alaska | 107 | (UTC-02:00) Coordinated Universal Time-2 | 21 | (UTC+03:00) Nairobi | 134 | (UTC+08:00) Ulaanbaatar |
| 88 | (UTC-09:00) Coordinated Universal Time-9 | 84 | (UTC-01:00) Azores | 79 | (UTC+03:00) Riyadh | 135 | (UTC+08:45) Eucla |
| 57 | (UTC-08:00) Tijuana | 108 | (UTC-01:00) Cape Verde | 119 | (UTC+03:00) Istanbul | 40 | (UTC+09:00) Osaka, Sapporo, Tokyo |
| 58 | (UTC-08:00) Pacific Time (United States and Canada) | 4 | (UTC) Coordinated Universal Time | 22 | (UTC+03:30) Tehran | 41 | (UTC+09:00) Seoul |

| Time Zone | Details | Time Zone | Details | Time Zone | Details | Time Zone | Details |
|---|---|---|---|---|---|---|---|
| 89 | (UTC-08:00) Baja California | 1 | (UTC+00:00) Dublin, Edinburgh, Lisbon | 18 | (UTC+04:00) Tbilisi | 42 | (UTC+09:00) Yakutsk |
| 90 | (UTC-08:00) Coordinated Universal Time-8 | 3 | (UTC+00:00) Monrovia, Reykjavik | 23 | (UTC+04:00) Muscat | 136 | (UTC+09:00) Chita |
| 59 | (UTC-07:00) Chihuahua, La Paz, Mazatlan | 82 | (UTC+00:00) London | 24 | (UTC+04:00) Yerevan | 137 | (UTC+09:00) Pyongyang |
| 60 | (UTC-07:00) Mountain Time (United States and Canada) | 109 | (UTC+00:00) São Tomé | 25 | (UTC+04:00) Baku | 43 | (UTC+09:30) Adelaide |
| 61 | (UTC-07:00) Arizona | 2 | (UTC+01:00) Casablanca | 83 | (UTC+04:00) Abu Dhabi | 44 | (UTC+09:30) Darwin |
| 62 | (UTC-06:00) Central Standard Time (United States and Canada) | 5 | (UTC+01:00) Berlin | 120 | (UTC+04:00) Astrakhan, Ulyanovsk | 45 | (UTC+10:00) Brisbane |

| Time Zone | Details | Time Zone | Details | Time Zone | Details | Time Zone | Details |
|---|---|---|---|---|---|---|---|
| 63 | (UTC-06:00) Central America | 6 | (UTC+01:00) Belgrade, Bratislava, Budapest, Ljubljana, Prague | 121 | (UTC+04:00) Volgograd | 46 | (UTC+10:00) Guam, Port Moresby |
| 91 | (UTC-06:00) Easter Island | 7 | (UTC+01:00) Brussels, Copenhagen, Madrid | 122 | (UTC+04:00) Port Louis | 47 | (UTC+10:00) Hobart |
| 92 | (UTC-06:00) Guadalajara, Mexico City, Monterrey | 8 | (UTC+01:00) Sarajevo, Skopje, Warsaw, Zagreb | 123 | (UTC+04:00) Saratov | 48 | (UTC+10:00) Canberra, Melbourne, Sydney |
| 93 | (UTC-06:00) Saskatchewan | 74 | (UTC+01:00) Paris | 124 | (UTC+04:00) Izhevsk, Samara | 138 | (UTC+10:00) Vladivostok |
| 64 | (UTC-05:00) Bogotá, Lima, Quito, Rio Branco | 80 | (UTC+01:00) Amsterdam, Bern, Stockholm, Vienna | 26 | (UTC+04:30) Kabul | 139 | (UTC+10:30) Lord Howe Island |

| Time Zone | Details | Time Zone | Details | Time Zone | Details | Time Zone | Details |
|---|---|---|---|---|---|---|---|
| 65 | (UTC-05:00) Eastern Time (United States and Canada) | 81 | (UTC+01:00) Rome | 27 | (UTC+05:00) Ashgabat, Tashkent | 49 | (UTC+11:00) Magadan |
| 94 | (UTC-05:00) Havana | 110 | (UTC+01:00) West Africa Time | 28 | (UTC+05:00) Islamabad, Karachi | 140 | (UTC+11:00) Bougainville Island |
| 95 | (UTC-05:00) Haiti | 9 | (UTC+02:00) Amman | 125 | (UTC+05:00) Kyzylorda | 141 | (UTC+11:00) Norfolk Island |
| 96 | (UTC-05:00) Chetumal | 10 | (UTC+02:00) Harare | 126 | (UTC+05:00) Yekaterinburg | 142 | (UTC+11:00) Chokurdakh |
| 97 | (UTC-05:00) Turks and Caicos Islands | 11 | (UTC+02:00) Helsinki, Kyiv, Riga, Sofia, Tallinn, Vilnius | 29 | (UTC+05:30) Chennai, Kolkata, Mumbai, New Delhi | 143 | (UTC+11:00) Sakhalin |
| 98 | (UTC-05:00) Indiana (Eastern Time) | 12 | (UTC+02:00) Cairo | 127 | (UTC+05:30) Sri Jayawardenepura Kotte | 144 | (UTC+11:00) Solomon Islands, New Caledonia |
| 66 | (UTC-04:00) Caracas | 14 | (UTC+02:00) Windhoek | 30 | (UTC+05:45) Kathmandu | 50 | (UTC+12:00) Auckland, Wellington |

| Time Zone | Details | Time Zone | Details | Time Zone | Details | Time Zone | Details |
|---|---|---|---|---|---|---|---|
| 67 | (UTC-04:00) Atlantic Time (Canada) | 15 | (UTC+02:00) Athens, Bucharest | 32 | (UTC+06:00) Dhaka | 51 | (UTC+12:00) Anadyr, Petropavlovsk-Kamchatsky |
| 68 | (UTC-04:00) Guyana | 16 | (UTC+02:00) Jerusalem | 128 | (UTC+06:00) Astana | 52 | (UTC+12:00) Fiji |
| 69 | (UTC-04:00) Santiago | 75 | (UTC+02:00) Cape Town | 129 | (UTC+06:00) Omsk | 145 | (UTC+12:00) Coordinated Universal Time+12 |
| 99 | (UTC-04:00) Cuiabá | 111 | (UTC+02:00) Beirut | 33 | (UTC+06:30) Yangon | 146 | (UTC+12:45) Chatham Islands |
| 100 | (UTC-04:00) Georgetown, La Paz, Manaus, San Juan | 112 | (UTC+02:00) Damascus | 31 | (UTC+07:00) Novosibirsk | 53 | (UTC+13:00) Tongatapu |
| 101 | (UTC-04:00) Asunción | 113 | (UTC+02:00) Tripoli | 34 | (UTC+07:00) Bangkok, Hanoi, Jakarta | 147 | (UTC+13:00) Nuku‘alofa |
| 70 | (UTC-03:30) Newfoundland | 114 | (UTC+02:00) Harare, Pretoria | 130 | (UTC+07:00) Barnaul, Gorno-Altaysk | 148 | (UTC+13:00) Samoa |

| Time Zone | Details | Time Zone | Details | Time Zone | Details | Time Zone | Details |
|---|---|---|---|---|---|---|---|
| 71 | (UTC-03:00) Brasilia | 115 | (UTC+02:00) Chisinau | 131 | (UTC+07:00) Khovd | 149 | (UTC+13:00) Coordinated Universal Time+13 |
| 72 | (UTC-03:00) Cayenne, Fortaleza | 116 | (UTC+02:00) Kaliningrad | 132 | (UTC+07:00) Krasnoyarsk | 150 | (UTC+14:00) Kiritimati Island |
| 73 | (UTC-03:00) Montevideo | 117 | (UTC+02:00) Gasha, Hebron | 133 | (UTC+07:00) Tomsk | | |
| 76 | (UTC-03:00) Buenos Aires | 118 | (UTC+02:00) Khartoum | 35 | (UTC+08:00) Beijing | | |

## Response Packet

| Parameter | | Description | Data Type | Remarks |
|---|---|---|---|---|
| success | | Request success or failure flag<br>true: The request succeeded.<br>false: The request failed. | Boolean | Request success or failure flag |
| failCode | | Error code<br>Value 0 indicates that the status is normal. For definitions of other error codes, see **10 Error Code List**. | Integer | - |
| message | | Optional message | String | - |
| data | The following information is included: | Returned data | Object | - |

| Parameter | | Description | Data Type | Remarks |
| --- | --- | --- | --- | --- |
| | dn | Unique plant ID | String | - |
| | name | Plant name | String | - |
| | result | Plant creation result<br>0: succeeded<br>1: failed | Integer | - |

## Examples

Request example:

```
{
 "basicConfig": {
  "stationName": "station",
  "stationType": 1,
  "pureCharge": 0,
  "connectTime": 1501862400,
  "linkman": "linkman",
  "linkmanPho": 12345678
 },
 "deviceConfig": [{
   "esn": "SLV3",
   "registerCode": ""
  },
  {
   "esn": "SLV2",
   "registerCode": ""
  }
 ],
 "storageConfig": {
  "totalStorage": 10.0,
  "PVParams": [{
    "deviceSn": "SLV3_SN2K3_001",
    "PVStorage": "1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24"
   },
   {
    "deviceSn": "SLV3_SN2KL_001",
    "PVStorage": "1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24"
   }
  ]
 },
 "priceConfig": {
  "useCompanyPrice": 0,
  "definePrice": {
   "ongridPrice": [{
     "beginMonth": 1,
     "beginDay": 1,
     "endMonth": 12,
     "endDay": 1,
     "hourRange": [{
       "beginHour": 0,
       "endHour": 12,
       "price": 5
      },
      {
       "beginHour": 12,
       "endHour": 24,
       "price": 5
      }
```

```
    ]
   },
   {
    "beginMonth": 12,
    "beginDay": 2,
    "endMonth": 12,
    "endDay": 31,
    "hourRange": [{
     "beginHour": 0,
     "endHour": 12,
     "price": 5
    },
    {
     "beginHour": 12,
     "endHour": 24,
     "price": 5
    }

    ]
   }
  ],
  "purchasePrice": [{
   "beginMonth": 1,
   "beginDay": 1,
   "endMonth": 12,
   "endDay": 31,
   "hourRange": [{
    "beginHour": 0,
    "endHour": 24,
    "price": 1
   }]
  }]
 }
},
"additionConfig": {
 "areaCode": 49,
 "address": "xian",
       "longitude": 117.3112268,
 "latitude": 35.3672079,
 "timeZoneCode": 35,
 "introduction": "station",
 "loadStatus": 1,
 "safeRunningTime": 1501862400
}
}
```

Response examples:

Example 1: An error code is returned.

```
{
   "data": null,
   "failCode": 22000,
   "message": "Device does not exist.",
   "success": false
}
```

Example 2: The information indicating that the creation is successful is returned.

```
{
 "data": {
  "dn": "NE = 33564176",
  "name": "station"
 },
 "failCode": 0,
 "message": "Create station success.",
 "success": true
}
```

NOTE

This interface is restricted. Before obtaining data, the system administrator must authorize the northbound user.

# 9.4 To-Be-Offline Interfaces

The interfaces described in this section are about to go offline and are not recommended. Replace them with new interfaces in a timely manner.

NOTICE

Users registered after June 30, 2022 cannot access the interfaces that are about to go offline. Use the new interfaces.

**Table 9-4** To-be-offline interfaces

| Interface Name | Request URL | Estimated Offline Date | Offline Reason | New Interface | Request URL |
|---|---|---|---|---|---|
| Historical Device Data Interface | https://*Domain name of the management system*/thirdData/getDevFiveMinutes | 2023-06-30 | The function is enhanced. | **Historical Device Data Interface** | https://*Domain name of the management system*/thirdData/getDevHistoryKpi |
| Plant list | https://*Domain name of the management system*/thirdData/getStationList | 2023-12-30 | The function is enhanced. | **Plant List Interface** | https://*Domain name of the management system*/thirdData/stations |

## 9.4.1 Historical Device Data Interface

### Interface Description

This interface is used to obtain 5-minute device data. Data of a maximum of 100 devices of the same type can be queried at a time.

The backend calculates the date of the collection time based on the request parameter **collectTime** (collection time in milliseconds) and the time zone where the device is located.

Then, you can query the 5-minute data of the device in the day based on the device ID.

If data is generated for *n* (0 ≤ *n* ≤ 288) 5-minute periods of the day, *n* (0 ≤ *n* ≤ 288) results are returned.

For details about the data list that can be queried using this interface, see **9.2.7 5-minute Device Data Interface**.

## Request URL

https://Domain name of the management system/thirdData/getDevFiveMinutes

## Request Mode

HTTP method: POST

## Access Restrictions

Traffic limiting is performed based on the number of devices of each type managed by a northbound API user. Maximum number of northbound API calls per user per day = ∑ Roundup (Number of devices of each type/10) + 24.

If the access frequency exceeds the limit, the interface returns error code 407.

Example:

- If a northbound API user manages 20 inverters and 20 meters, the maximum number of API calls per device type per day is calculated as follows:

  Inverters: Roundup (20/10) = 2

  Meters: Roundup (20/10) = 2

  Total: Number of API calls for inverters + Number of API calls for meters = 2 + 2 + 24 = 28
- If a northbound API user manages 120 inverters and 120 meters, the maximum number of API calls per day is calculated as follows:

  Inverters: Roundup (120/10) = 12

  Meters: Roundup (120/10) = 12

  Total: Number of API calls for inverters + Number of API calls for meters = 12 + 12 + 24 = 48

## Request Parameters

| Parameter | Description | Data Type | Mandatory/ Optional |
| --- | --- | --- | --- |
| devIds | Device ID list. Multiple device IDs are separated by commas (,). | String | Mandatory |

| Parameter | Description | Data Type | Mandatory/ Optional |
| --- | --- | --- | --- |
| devTypeId | Device type ID. Use the device type ID obtained in **9.1.5 Device List Interface**.<br>The following device types are supported:<br>1: string inverter<br>10: EMI<br>17: grid meter<br>38: residential inverter<br>39: battery<br>41: ESS<br>47: power sensor | Integer | Mandatory |
| collectTime | Collection time, in milliseconds | Long | Mandatory |

## Response Packet

| Parameter | | Description | Data Type | Remarks |
| --- | --- | --- | --- | --- |
| success | | Request success or failure flag<br>true: The request succeeded.<br>false: The request failed. | Boolean | Request success or failure flag |
| failCode | | Error code<br>Value 0 indicates that the status is normal. For definitions of other error codes, see **10 Error Code List**. | Integer | - |
| params | Parameters | - | - | - |
| | devIds | Device ID list in the request parameter | String | - |
| | devTypeId | Device type ID in the request parameter | Integer | - |
| | collectTime | Collection time in milliseconds in the request parameter | Long | - |
| | currentTime | Current system time, in milliseconds | Long | - |

| Parameter | | Description | Data Type | Remarks |
| --- | --- | --- | --- | --- |
| message | | Optional message | String | - |
| data | Parameters | Returned data. The data contains the 5-minute data object list of each device. | List | 5-minute data of a device in a day |
| | devId | Device ID | Long | - |
| | collectTime | Collection time, in milliseconds | Long | - |
| | dataItemMap | Content of data items, which are returned in the key-value format. The content of data items varies according to device types. For details about the data item list, see **9.2.7 5-minute Device Data Interface**. | Map | 5-minute device data |

## Example

Request example:

```
{
   "devIds":"214060404588862,213472461631079",
   "devTypeId":1,
   "collectTime":1501862400000
}
```

Response example:

Example 1: An error code is returned.

```
{
   "success":false,
   "data":null,
   "failCode":20009,
   "params":{
      "devIds":"214060404588862,213472461631079",
      "devTypeId":1,
      "collectTime":1501862400000,
      "currentTime":1503046597854
   },
   "message":null
}
```

Example 2: 5-minute device data is returned.

```
{
   "success":true,
   "data":[
      {
         "dataItemMap":{
            "pv7_u":null,
```

```
"pv1_u":575.3,
"b_u":286.1,
"c_u":286.9,
"pv6_u":576.1,
"temperature":44.6,
"open_time":null,
"b_i":24.9,
"bc_u":495.6,
"pv9_u":null,
"pv8_u":null,
"c_i":25,
"mppt_total_cap":null,
"pv9_i":null,
"mppt_3_cap":null,
"mppt_2_cap":null,
"inverter_state":512,
"pv8_i":null,
"mppt_1_cap":null,
"pv6_i":7.1,
"mppt_power":21.962,
"pv1_i":7.1,
"total_cap":655.37,
"ab_u":495.4,
"pv7_i":null,
"pv13_u":null,
"reactive_power":20.95,
"pv10_u":null,
"pv12_i":null,
"pv11_i":null,
"pv3_i":7.1,
"pv11_u":null,
"pv2_i":7.1,
"pv13_i":null,
"power_factor":0,
"pv12_u":null,
"pv5_i":7.2,
"active_power":21.05,
"elec_freq":50.05,
"pv10_i":null,
"pv4_i":7,
"mppt_4_cap":null,
"mppt_5_cap":0,
"mppt_6_cap":0,
"mppt_7_cap":0,
"mppt_8_cap":0,
"mppt_9_cap":0,
"mppt_10_cap":0,
"pv4_u":577.8,
"close_time":null,
"day_cap":159.26,
"ca_u":496.9,
"a_i":24.9,
"pv5_u":576.1,
"a_u":286,
"pv3_u":577.8,
"pv14_u":null,
"pv14_i":null,
"pv15_u":0,
"pv15_i":0,
"pv16_u":0,
"pv16_i":0,
"pv17_u":0,
"pv17_i":0,
"pv18_u":0,
"pv18_i":0,
"pv19_u":0,
"pv19_i":0,
"pv20_u":0,
"pv20_i":0,
```

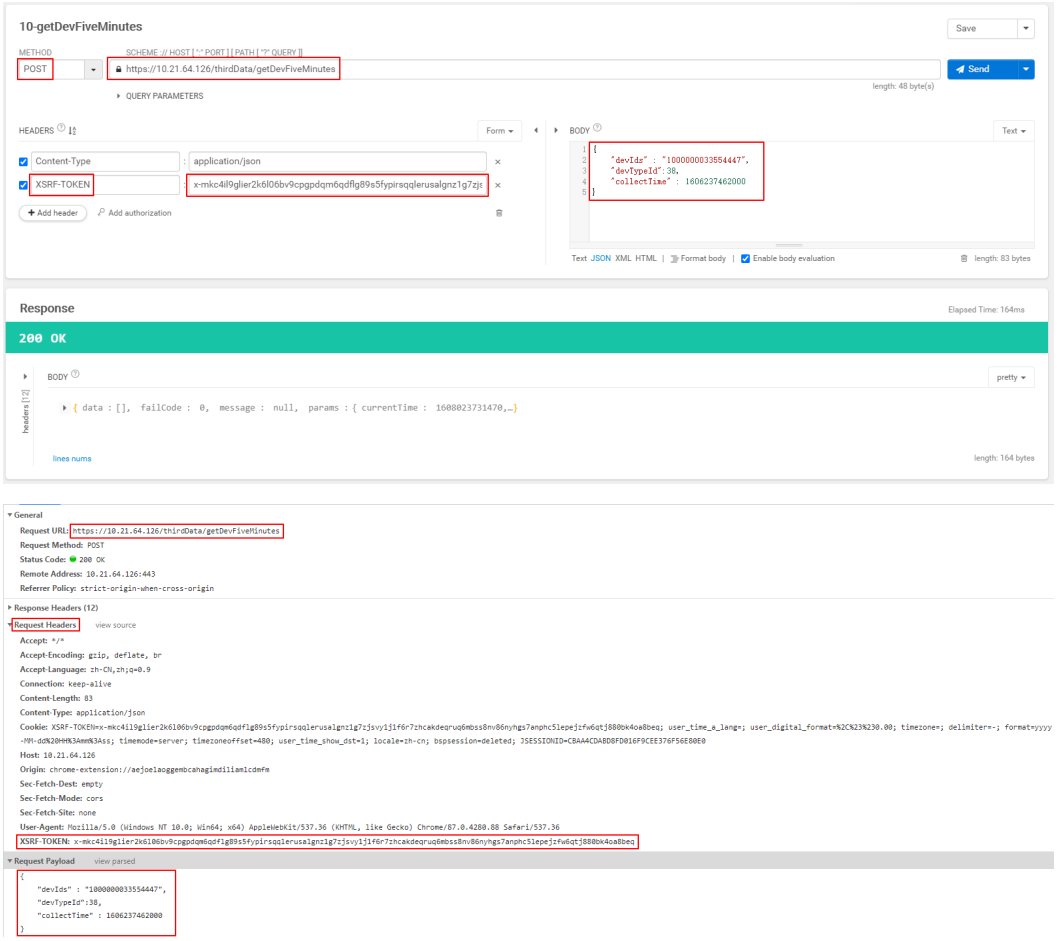
```
            "pv21_u":0,
            "pv21_i":0,
            "pv22_u":0,
            "pv22_i":0,
            "pv23_u":0,
            "pv23_i":0,
            "pv24_u":0,
            "pv24_i":0,
            "pv25_u":0,
            "pv25_i":0,
            "pv26_u":0,
            "pv26_i":0,
            "pv27_u":0,
            "pv27_i":0,
            "pv28_u":0,
            "pv28_i":0,
            "efficiency":null,
            "pv2_u":575.3
        },
        "devId":213472461631079,
        "collectTime":1501862400000
    },
    {
        "dataItemMap":{
            "pv7_u":null,
            "pv1_u":575.3,
            "b_u":286.1,
            "c_u":286.9,
            "pv6_u":576.1,
            "temperature":44.6,
            "open_time":null,
            "b_i":24.9,
            "bc_u":495.6,
            "pv9_u":null,
            "pv8_u":null,
            "c_i":25,
            "mppt_total_cap":null,
            "pv9_i":null,
            "mppt_3_cap":null,
            "mppt_2_cap":null,
            "inverter_state":512,
            "pv8_i":null,
            "mppt_1_cap":null,
            "pv6_i":7.1,
            "mppt_power":21.962,
            "pv1_i":7.1,
            "total_cap":655.37,
            "ab_u":495.4,
            "pv7_i":null,
            "pv13_u":null,
            "reactive_power":20.95,
            "pv10_u":null,
            "pv12_i":null,
            "pv11_i":null,
            "pv3_i":7.1,
            "pv11_u":null,
            "pv2_i":7.1,
            "pv13_i":null,
            "power_factor":0,
            "pv12_u":null,
            "pv5_i":7.2,
            "active_power":21.05,
            "elec_freq":50.05,
            "pv10_i":null,
            "pv4_i":7,
            "mppt_4_cap":null,
            "mppt_5_cap":0,
            "mppt_6_cap":0,
            "mppt_7_cap":0,
```

```
            "mppt_8_cap":0,
            "mppt_9_cap":0,
            "mppt_10_cap":0,
            "pv4_u":577.8,
            "close_time":null,
            "day_cap":159.26,
            "ca_u":496.9,
            "a_i":24.9,
            "pv5_u":576.1,
            "a_u":286,
            "pv3_u":577.8,
            "pv14_u":null,
            "pv14_i":null,
            "pv15_u":0,
            "pv15_i":0,
            "pv16_u":0,
            "pv16_i":0,
            "pv17_u":0,
            "pv17_i":0,
            "pv18_u":0,
            "pv18_i":0,
            "pv19_u":0,
            "pv19_i":0,
            "pv20_u":0,
            "pv20_i":0,
            "pv21_u":0,
            "pv21_i":0,
            "pv22_u":0,
            "pv22_i":0,
            "pv23_u":0,
            "pv23_i":0,
            "pv24_u":0,
            "pv24_i":0,
            "pv25_u":0,
            "pv25_i":0,
            "pv26_u":0,
            "pv26_i":0,
            "pv27_u":0,
            "pv27_i":0,
            "pv28_u":0,
            "pv28_i":0,
            "efficiency":null,
            "pv2_u":575.3
         },
         "devId":213472461631079,
         "collectTime":1501862700000
      }
   ],
   "failCode":0,
   "params":{
      "devIds":"214060404588862,213472461631079",
      "devTypeId":1,
      "collectTime":1501862400000,
      "currentTime":1503046597854
   },
   "message":null
}
```

**NOTE**

Prerequisites for obtaining data: The account allocated by the system administrator has the permission to invoke this interface.

Request example:




# 9.4.2 Plant List Interface

## Interface Description

This interface is used to obtain basic plant information. Before invoking other interfaces to obtain plant data, you need to invoke this interface to obtain the plant ID.

This interface supports pagination query and batch query.

## Request URL

https://Domain name of the management system/thirdData/getStationList

## Request Mode

HTTP method: POST

## Request Parameters

Batch query: None

Pagination query

| Parameter | Description | Data Type | Mandatory/ Optional |
| --- | --- | --- | --- |
| pageNo | Page No. of the results | Integer | Mandatory |
| pageSize | Number of results on each page. The value can be **50** or **100**. | Integer | Mandatory |

## Access Restrictions

Maximum number of northbound API calls per user per day: 24

Only one concurrent request is supported per minute.

If the access frequency exceeds the limit, the interface returns error code 407.

## Response Packet

Full query

| Parameter | | Description | Data Type | Remarks |
| --- | --- | --- | --- | --- |
| success | | Request success or failure flag<br>true: The request succeeded.<br>false: The request failed. | Boolean | Request success or failure flag |
| failCode | | Error code<br>Value 0 indicates that the status is normal. For definitions of other error codes, see **10 Error Code List**. | Integer | - |
| params | Parameters | - | - | - |
| | currentTime | Current system time, in milliseconds | Long | - |
| message | | Optional response message | String | - |
| data | Parameters | Returned data. The data contains the object parameter list of each plant. | List | - |

| Parameter | | Description | Data Type | Remarks |
| --- | --- | --- | --- | --- |
| | stationCode | Plant ID, which uniquely identifies a plant | String | - |
| | stationName | Plant name | String | - |
| | stationAddr | Detailed address of the plant | String | - |
| | capacity | Installed capacity (unit: MW) | Double | - |
| | buildState | Plant status<br>The following plant states are supported:<br>0: not constructed;<br>1: under construction;<br>2: grid-connected | String | - |
| | combineType | Grid connection type<br>The following grid connection types are supported:<br>1: utility;<br>2: commercial & industrial;<br>3: residential | String | - |
| | aidType | Poverty alleviation plant ID<br>The following poverty alleviation plant identifiers are supported:<br>0: poverty alleviation plant<br>1: non-poverty alleviation plant | Integer | - |
| | stationLinkman | Plant contact | String | - |
| | linkmanPho | Contact phone number | String | - |

Pagination query

| Parameter | | Description | Data Type | Remarks |
| --- | --- | --- | --- | --- |
| success | | Request success or failure flag<br>true: The request succeeded.<br>false: The request failed. | Boolean | Request success or failure flag |
| failCode | | Error code<br>Value 0 indicates that the status is normal. For definitions of other error codes, see **11-Error Code List**. | Integer | - |
| params | Parameters | - | - | - |
| | currentTime | Current system time, in milliseconds | Long | - |
| message | | Optional response message | String | - |
| data | Parameters | Returned data. **data** contains the query result by page, including the following information: | List | - |
| | > total | Total number of results | Long | |
| | > pageCount | Total number of pages | Long | |
| | > pageNo | Page No. of the results | Integer | |

| Parameter | | Description | Data Type | Remarks |
| --- | --- | --- | --- | --- |
| | > pageSize | Number of query results displayed on each page | Integer | |
| | > list | Plant information, which is as follows: | List | Plant information |
| | >> stationCode | Plant ID, which uniquely identifies a plant | String | - |
| | >> stationName | Plant name | String | - |
| | >> stationAddr | Detailed address of the plant | String | - |
| | >> capacity | Installed capacity (unit: MW) | Double | - |
| | >> buildState | Plant status<br>The following plant states are supported:<br>0: not constructed;<br>1: under construction;<br>2: grid-connected | String | - |

| Parameter | | Description | Data Type | Remarks |
| --- | --- | --- | --- | --- |
| | >> combineType | Grid connection type<br>The following grid connection types are supported:<br>1: utility;<br>2: commercial & industrial;<br>3: residential | String | - |
| | >> aidType | Poverty alleviation plant ID<br>The following poverty alleviation plant identifiers are supported:<br>0: poverty alleviation plant<br>1: non-poverty alleviation plant | Integer | - |
| | >> stationLinkman | Plant contact | String | - |
| | >> linkmanPho | Contact phone number | String | - |

## Example

Batch query

Request example:

```
{}
```

Response example:

Example 1: An error code is returned.

```
{
    "success":false,
    "data":20007,
    "failCode":20003,
    "params":{
        "currentTime":1503046597854
    },
    "message":null
}
```


Example 2: The plant list is returned.


```
{
    "success":true,
    "data":[
        {
            "stationCode":"BA4372D08E014822AB065017416F254C",
            "stationName":"NMstation1",
            "stationAddr":null,
            "capacity":146.5,
            "buildState":"3",
            "combineType":"2",
            "aidType":0,
            "stationLinkman":"",
            "linkmanPho":""
        },
        {
            "stationCode":"5D02E8B40AD342159AC8D8A2BCD4FAB5",
            "stationName":"station2",
            "stationAddr":null,
            "capacity":123.3,
            "buildState":"3",
            "combineType":"1",
            "aidType":0,
            "stationLinkman":"",
            "linkmanPho":""
        }
    ],
    "failCode":0,
    "params":{
        "currentTime":1503046597854
    },
    "message":null
}
```


Pagination query

Request example:


```
{
  "pageNo":1,
  "pageSize":100
}
```


Response example:

Example 1: Plants are displayed in multiple pages.

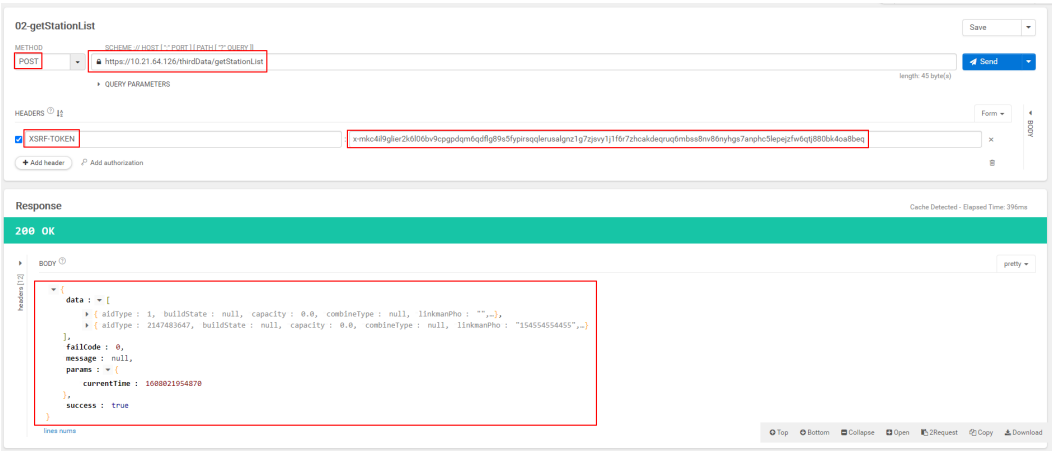

```
{
    "data": {
        "list": [
            {
                "aidType": 2147483647,
                "buildState": null,
                "capacity": 0.0,
                "combineType": null,
                "linkmanPho": "",
                "stationAddr": "12",
                "stationCode": "NE=33554435",
                "stationLinkman": "",
```

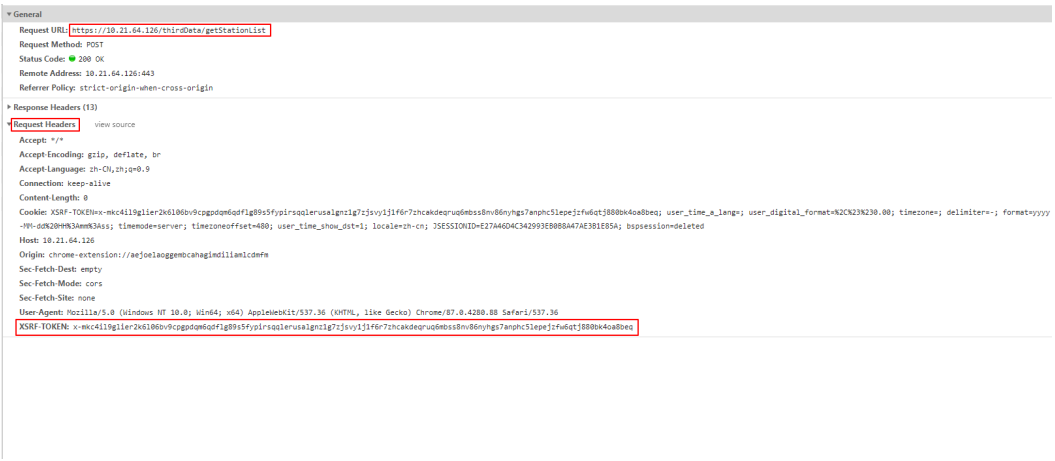
```
            "stationName": "test"
        },
        {
            "aidType": 2147483647,
            "buildState": null,
            "capacity": 0.0,
            "combineType": null,
            "linkmanPho": "",
            "stationAddr": "Xi'an, Shaanxi, China",
            "stationCode": "NE=33554440",
            "stationLinkman": "",
            "stationName": "test2"
        }
    ],
    "pageCount": 1,
    "pageNo": 1,
    "pageSize": 100,
    "total": 2
},
"failCode": 0,
"message": null,
"params": {
    "currentTime": 1663851483997
},
"success": true
}
```

## NOTE

No input parameter is required to obtain the plant list. The backend obtains the plant resources of the corresponding user based on the XSRF-TOKEN.

Request example:



# 10 Error Code List

| No. | Error Code | Description |
| --- | --- | --- |
| 1 | 20001 | The third-party system ID does not exist. |
| 2 | 20002 | The third-party system is forbidden. |
| 3 | 20003 | The third-party system has expired. |
| 4 | 20004 | The server is abnormal. |
| 5 | 20005 | The device ID cannot be empty. |
| 6 | 20006 | Some devices do not match the device type. |
| 7 | 20007 | The system does not have the desired power plant resources. |
| 8 | 20008 | The system does not have the desired device resources. |
| 9 | 20009 | Queried KPIs are not configured in the system. |
| 10 | 20010 | The plant list cannot be empty. |
| 11 | 20011 | The device list cannot be empty. |
| 12 | 20012 | The query time cannot be empty. |
| 13 | 20013 | The device type is incorrect. The interface does not support operations on some devices. |
| 14 | 20014 | A maximum of 100 plants can be queried at a time. |
| 15 | 20015 | A maximum of 100 plants can be queried at a time. |
| 16 | 20016 | A maximum of 100 devices can be queried at a time. |
| 17 | 20017 | A maximum of 100 devices can be queried at a time. |
| 18 | 20018 | A maximum of 10 devices can be operated at a time. |

| No. | Error Code | Description |
| --- | --- | --- |
| 19 | 20019 | The switch type is incorrect. 1 and 2 indicate switch-on and switch-off respectively. |
| 20 | 20020 | The upgrade package corresponding to the device version cannot be found. |
| 21 | 20021 | The upgrade file does not exist. |
| 22 | 20022 | The upgrade records of the devices in the system are not found. |
| 23 | 305 | You are not in the login state. You need to log in again. |
| 24 | 401 | You do not have the related data interface permission. |
| 25 | 407 | The interface access frequency is too high. |
| 26 | 20023 | The query start time cannot be later than the query end time. |
| 27 | 20024 | The language cannot be empty. |
| 28 | 20025 | The language parameter value is incorrect. |
| 29 | 20026 | Only data of the latest 365 days can be queried. |
| 30 | 20027 | The query time period cannot span more than 31 days. |
| 31 | 20028 | The system does not have related user information. |
| 32 | 20030 | Failed to create the I-V curve diagnosis task. |
| 33 | 20034 | The task does not exist. |
| 34 | 20035 | MPPT devices do not support backfeed current. |
| 35 | 20036 | The backfeed current duration of the MPPT device exceeds the maximum limit. |
| 36 | 20037 | The backfeed current of the MPPT device is out of range. The allowed value is (0, 15]. |
| 37 | 20038 | In the input parameters, the authorization code list is empty (null), or the number of authorization codes is out of range. The allowed range is [0, 1000]. |
| 38 | 20039 | In the input parameters, the DOD value is out of range. The allowed range is [0, 100]. |
| 39 | 20040 | The charge/discharge switch parameter value is invalid. |
| 40 | 20041 | The control type cannot be empty for forced charge and discharge. |
| 41 | 20042 | The target SOC for charge/discharge is empty or invalid. |

| No. | Error Code | Description |
| --- | --- | --- |
| 42 | 20043 | The charge/discharge duration is empty or invalid. |
| 43 | 20044 | The unique ID of a charge/discharge task cannot be empty. |
| 44 | 20045 | Unauthorized PV plants exist in the input parameters. |
| 45 | 20046 | Unauthorized PV plants exist in the input parameters. |
| 46 | 20047 | The forced charge/discharge power in the input parameters is invalid. |
| 47 | 20048 | Duplicate charging and discharging task ID |
| 48 | 20049 | Failed to deliver the charging and discharging task. |
| 49 | 20050 | The charging and discharging task query parameter does not exist. |
| 50 | 20051 | Failed to set the battery DOD. |
| 51 | 20055 | The plant list and device list parameters cannot be empty at the same time. |
| 52 | 20116 | The inverter control parameter is incorrect. (The number of PV plants is greater than 100 or equal to 0, or the total number of inverters in the PV plants is greater than 200 or equal to 0.) |
| 53 | 20200 | The system is busy. Try again later. |
| 54 | 20400 | • The username or password of the third-party system is incorrect.<br>• The user is locked.<br>• The password has expired.<br>• The number of online sessions reaches the upper limit. |
| 55 | 20403 | The login of the third-party system user is restricted. |
| 56 | 20604 | The time parameter is incorrect. The start time cannot be later than or equal to the end time. |
| 57 | 20605 | The time parameter is incorrect. The time parameter contains a negative value. |
| 58 | 20606 | If only the start time is entered and the end time is empty, the start time cannot be later than or equal to the current time. |
| 59 | 20607 | The task list is empty. |
| 60 | 20608 | Duplicate plant IDs exist in the input parameters. |
| 61 | 20609 | The plant networking is abnormal. |
| 62 | 20610 | The plant does not support default configuration. |

| No. | Error Code | Description |
| --- | --- | --- |
| 63 | 20611 | The values of input parameters exceed the valid range. |
| 64 | 20612 | The value of an input parameter is empty. |
| 65 | 20613 | The default setting task fails to be sent for all plants. |
| 66 | 20614 | The network communication is abnormal. |
| 67 | 20615 | The same task is being executed in the current plant. |
| 68 | 20616 | The task ID is empty. |
| 69 | 20617 | The query result of the default plant setting task is empty. |
| 70 | 20618 | The calls to API have reached the maximum number per user per day. |
| 71 | 20619 | The number of task IDs exceeds 100. |
| 72 | 20620 | The task ID does not exist. |
| 73 | 21000 | The basic information for the plant creation is empty. |
| 74 | 21001 | The plant name is empty or in an incorrect format. |
| 75 | 21002 | The plant type is empty or incorrect. |
| 76 | 21003 | The grid connection time must be a positive number. |
| 77 | 21004 | The format of the contact name is incorrect. |
| 78 | 21005 | The format of the contact information is incorrect. |
| 79 | 21006 | The C&I plant and utility plant cannot be EV-charger-only plants. |
| 80 | 21007 | The grid connection time cannot be set for an EV-charger-only plant. |
| 81 | 21008 | The string capacity cannot be set for an EV-charger-only plant. |
| 82 | 21009 | The electricity price cannot be set for an EV-charger-only plant. |
| 83 | 21010 | **>pureChange** can only be set to **0** or **1**. |
| 84 | 21011 | The plant name already exists. |
| 85 | 22000 | No related data of connected devices was found. |
| 86 | 22001 | The device registration code is empty. |
| 87 | 22002 | The device is an unauthorized device. |
| 88 | 22003 | The device registration code is incorrect. |

| No. | Error Code | Description |
| --- | --- | --- |
| 89 | 22004 | You will be locked out for 5 minutes due to five consecutive incorrect registration codes. |
| 90 | 22005 | Devices other than chargers are connected to an EV-charger-only plant. |
| 91 | 22006 | The device SN is empty. |
| 92 | 22007 | The device has been bound to another plant. |
| 93 | 22008 | The parameters of connected devices are empty. |
| 94 | 23000 | The plant-level string capacity and PV-level string capacity cannot be empty at the same time. |
| 95 | 23001 | The format of the plant string capacity is incorrect. |
| 96 | 23002 | The inverter SN does not exist. |
| 97 | 23003 | The number of inverter SNs is incorrect. |
| 98 | 23005 | The inverter PV string capacity is incorrectly set. |
| 99 | 23006 | The inverter SN or PV string capacity is empty. |
| 100 | 23007 | The quantity in the inverter PV string capacity setting is incorrect. |
| 101 | 24000 | The electricity price must be a positive number. |
| 102 | 24001 | The electricity price date settings must cover a complete year and without overlapping. |
| 103 | 24002 | The electricity price time segments must cover 24 hours of the day without overlapping. |
| 104 | 24003 | The date range is invalid. |
| 105 | 24004 | The time range is invalid. |
| 106 | 24005 | The company electricity price is empty. |
| 107 | 24006 | **>useCompanyPrice** can only be set to **0** or **1**. |
| 108 | 25000 | Additional information configuration is empty. |
| 109 | 25001 | The area code is empty or in an incorrect format. |
| 110 | 25002 | The plant address is empty. |
| 111 | 25003 | The longitude and latitude are empty or in incorrect format. |
| 112 | 25004 | The safe running time of the plant must be a positive number. |
| 113 | 25005 | The time zone is empty or the format is incorrect. |

| No. | Error Code | Description |
| --- | --- | --- |
| 114 | 25006 | **loadStatus** can only be set to **0** or **1**. |
| 115 | 25007 | The plant introduction can contain a maximum of 128 characters. |
| 116 | 26000 | Failed to create plants. |
| 117 | 26001 | A maximum of 1000 plants can be created in a day. |
| 118 | 26002 | The company authorized by the northbound user does not exist. |
| 119 | 30001 | The device ESN list cannot be empty. |
| 120 | 30002 | The ESNs queried at a time cannot exceed 50. |
| 121 | 30003 | The account cannot be empty in the input parameter. |
| 122 | 30004 | The value of **pageNo** cannot be empty. |
| 123 | 30005 | The value of **pageSize** cannot be empty. |
| 124 | 30006 | The value of **pageSize** is out of range. The allowed range is {10, 20, 30, 50, 100}. |
| 125 | 30007 | The values of **startTime** and **endTime** must be both provided or empty. |
| 126 | 30008 | Failed to invoke the internal interface. |
| 127 | 30009 | The value of **taskName** is empty. |
| 128 | 30010 | The value of **nds** is empty. |
| 129 | 30011 | The value of **cleanStatus** is empty or invalid. |
| 130 | 30012 | The value of **environmentalParameters** is empty or invalid. |
| 131 | 30013 | The value of **modulePlaneIrradiance** or **moduleBackSurfaceTemperature** is empty when **environmentalParameters** is set to 1. |
| 132 | 30014 | The value of **scanPointNum** must be set to 128. |
| 133 | 30015 | The value of **taskId** is empty. |
| 134 | 30016 | The value of **dn** is empty. |
| 135 | 30017 | The value of **dns** is invalid. The number of devices exceeds 100 or devices on which the user does not have permission exist. |
| 136 | 30018 | The value of **taskName** is invalid (for example, null field). |

| No. | Error Code | Description |
| --- | --- | --- |
| 137 | 30019 | The value of **moduleBackSurfaceTemperature** is out of range. The allowed range is [0.0, 100.0]. |
| 138 | 30020 | The value of **modulePlaneIrradiance** is out of range. The allowed range is [600.0, 1500.0]. |
| 139 | 30021 | The value of **pageNo** is smaller than 0. |
| 140 | 30022 | The value of **timestamp** is empty. |
| 141 | 30023 | The command type is invalid (for example, null). |
| 142 | 30024 | The power supply duration is invalid. |
| 143 | 30025 | The MPPT list is empty. |
| 144 | 30026 | The value of **mppts** is empty. |
| 145 | 30027 | The number of MPPTs connected to a single inverter exceeds the maximum limit (3), or the total number of MPPTs in a single task exceeds the maximum limit (32). |
| 146 | 30028 | The backfeed current input value is invalid. |
| 147 | 30029 | Authentication failed. |
| 148 | 30030 | The input parameter is incorrect. |
| 149 | 30031 | A maximum of 10 devices can be queried at a time. |
| 150 | 30032 | The time parameter is invalid. The query time segment cannot be longer than three days. |
| 151 | 30033 | The task is in progress. |
| 152 | 30034 | The returned list is empty. |

# 11 Recommended Solutions for Error Codes

| No. | Error Code | Description |
| --- | --- | --- |
| 1 | 20607 | The task list is empty. You are advised to add the parameters for the task list in "Request Parameters" of the interface. |
| 2 | 20608 | Duplicate plant IDs exist in the input parameters. You are advised to delete the duplicate plant IDs from "Request Parameters" of the interface. |
| 3 | 20609 | The plant networking is abnormal. You are advised to check whether each plant has communications devices and whether each plant has only one communications device. |
| 4 | 20610 | The plant does not support the default configuration. |
| 5 | 20611 | The values of input parameters exceed the valid range. You are advised to check "Request Parameters" of the interface in this document to determine the value range of each input parameter. |
| 6 | 20612 | The values of input parameters are empty. You are advised to add the values in "Request Parameters" of the interface. |
| 7 | 20613 | The default setting task fails to be sent for all plants. You are advised to view the error code of each plant in "Response Packet" of the interface and rectify the fault based on the error code. |
| 8 | 20614 | The network communication is abnormal. You are advised to check whether the network connection is normal. |
| 9 | 20615 | The same task is being executed in the plant. You are advised to wait for 3 minutes and try again. |

| No. | Error Code | Description |
| --- | --- | --- |
| 10 | 20616 | The task ID is empty. You are advised to add the parameters for the task ID in "Request Parameters" of the interface. |
| 11 | 20617 | The query result of the default plant setting task is empty. You are advised to check whether **requestId** and **plantCodes** are correctly set, and then check whether the plants corresponding to **requestId** contain the plants corresponding to **plantCodes**. |
| 12 | 20618 | The number of times that an API is called on a single day exceeds the limit. For details about the maximum number of northbound API calls, see "Access Restrictions" in the corresponding interface description in this document. |
| 13 | 20619 | The number of task IDs exceeds 100. You are advised to reduce the number of task IDs transferred in a single request to less than 100. |
| 14 | 20620 | The task ID does not exist. Check whether the entered task ID is correct. |

# 12 FAQ

## 12.1 Failed to invoke the northbound interface

### 12.1.1 Importing a New Certificate When Certificate Verification Fails

#### Problem Description

When a client accesses the northbound API of FusionSolar using HTTPS, the access fails because the server certificate cannot be verified.

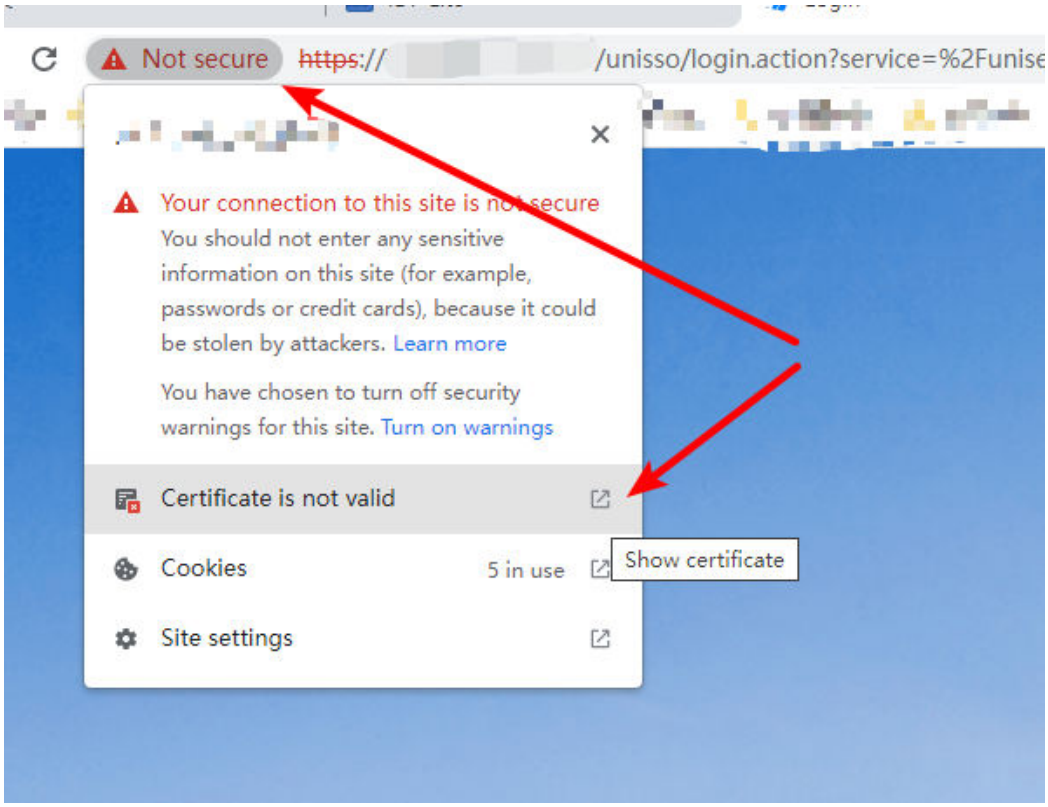
#### Solution

Import a trusted certificate again.

#### Procedure

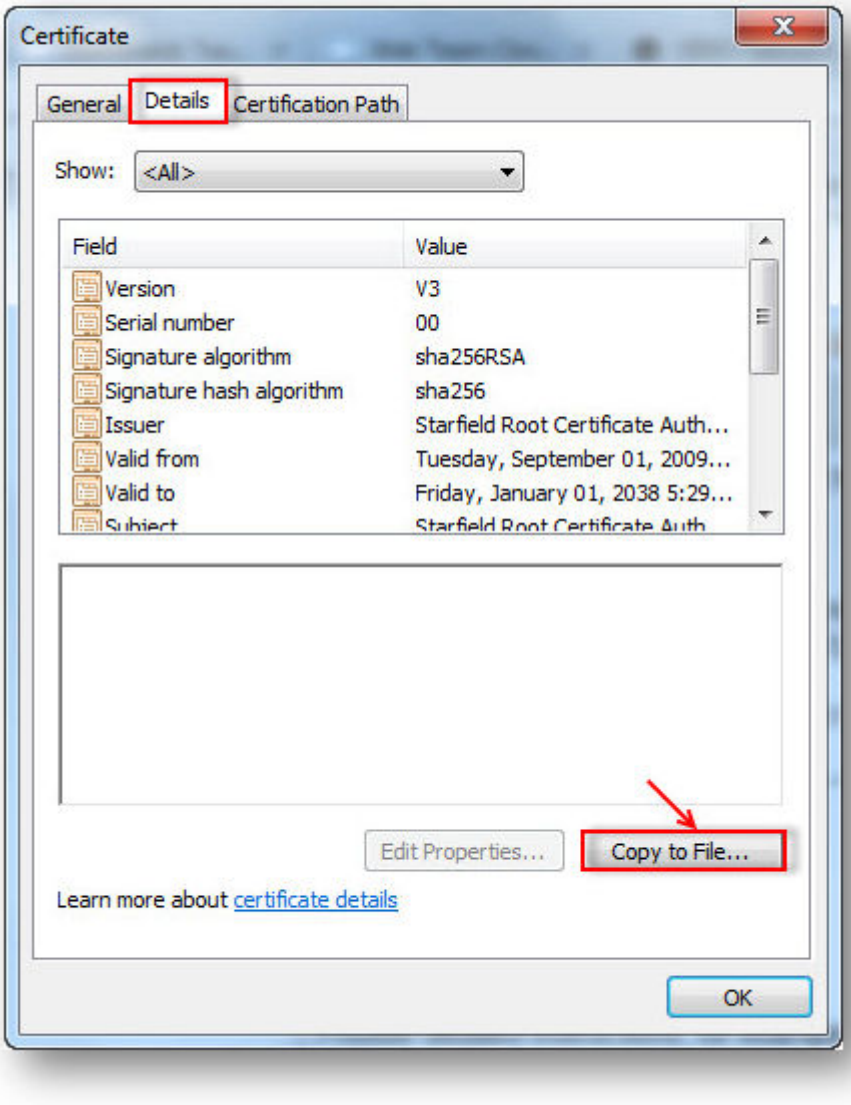
**Step 1** Obtain a new trusted certificate.

Log in to the FusionSolar WebUI.

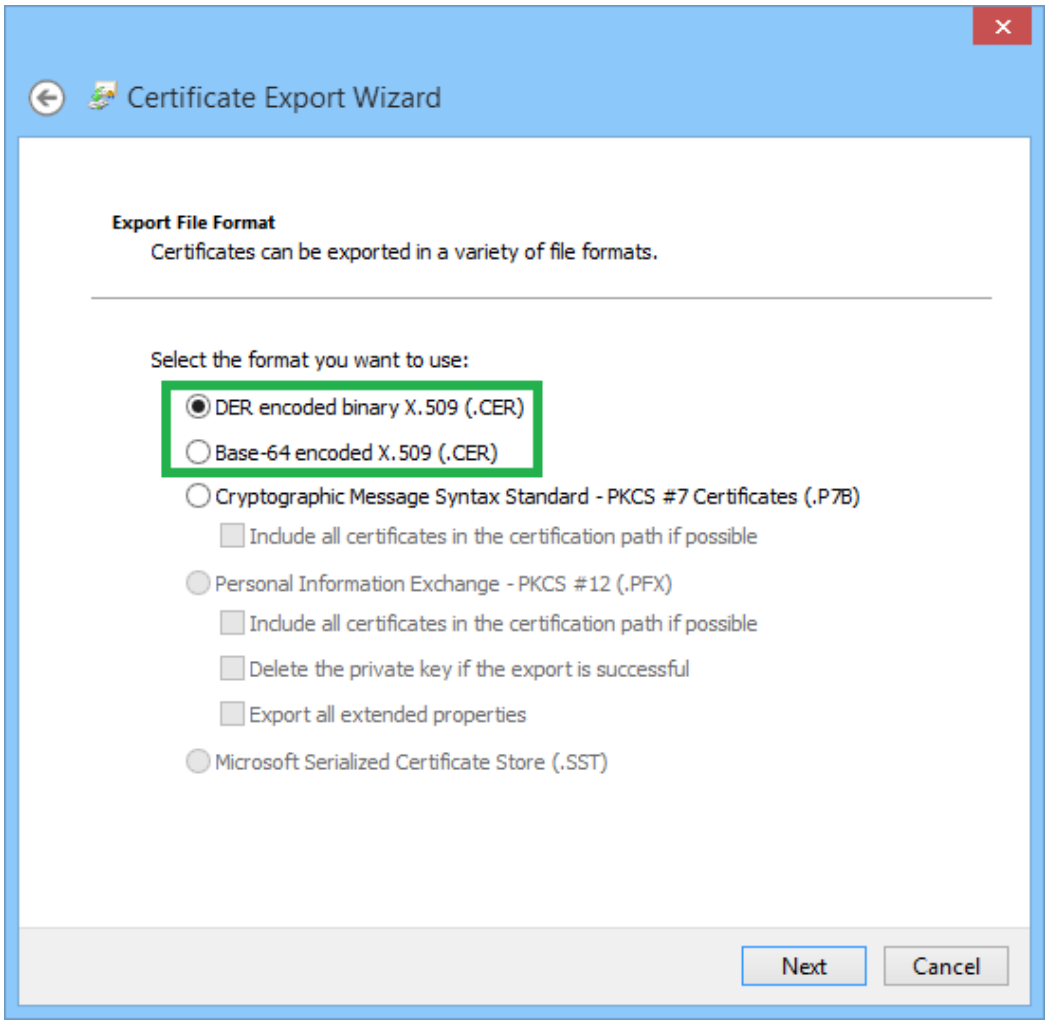


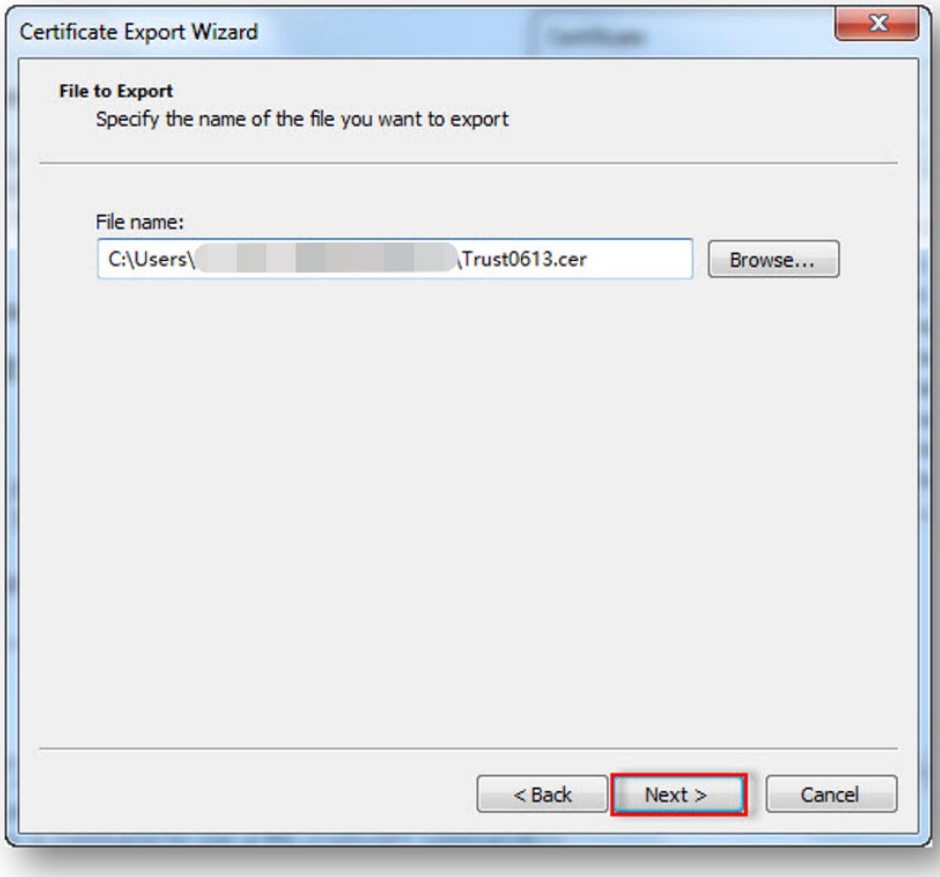

On the **Details** tab page of the certificate, click **Copy to File...** to download the new certificate.




Select **DER encoded binary X.509 (.CER)** to export and save the certificate.


Certificate Export Wizard
Export File Format
Certificates can be exported in a variety of file formats.
Select the format you want to use:
DER encoded binary X.509 (.CER)
Base-64 encoded X.509 (.CER)
Cryptographic Message Syntax Standard - PKCS #7 Certificates (.P7B)
Include all certificates in the certification path if possible
Personal Information Exchange - PKCS #12 (.PFX)
Include all certificates in the certification path if possible
Delete the private key if the export is successful
Export all extended properties
Microsoft Serialized Certificate Store (.SST)
Next
Cancel




**Step 2** Import the certificate.

The JRE environment is used as an example. Import the trusted certificate to the security directory of the JRE environment.

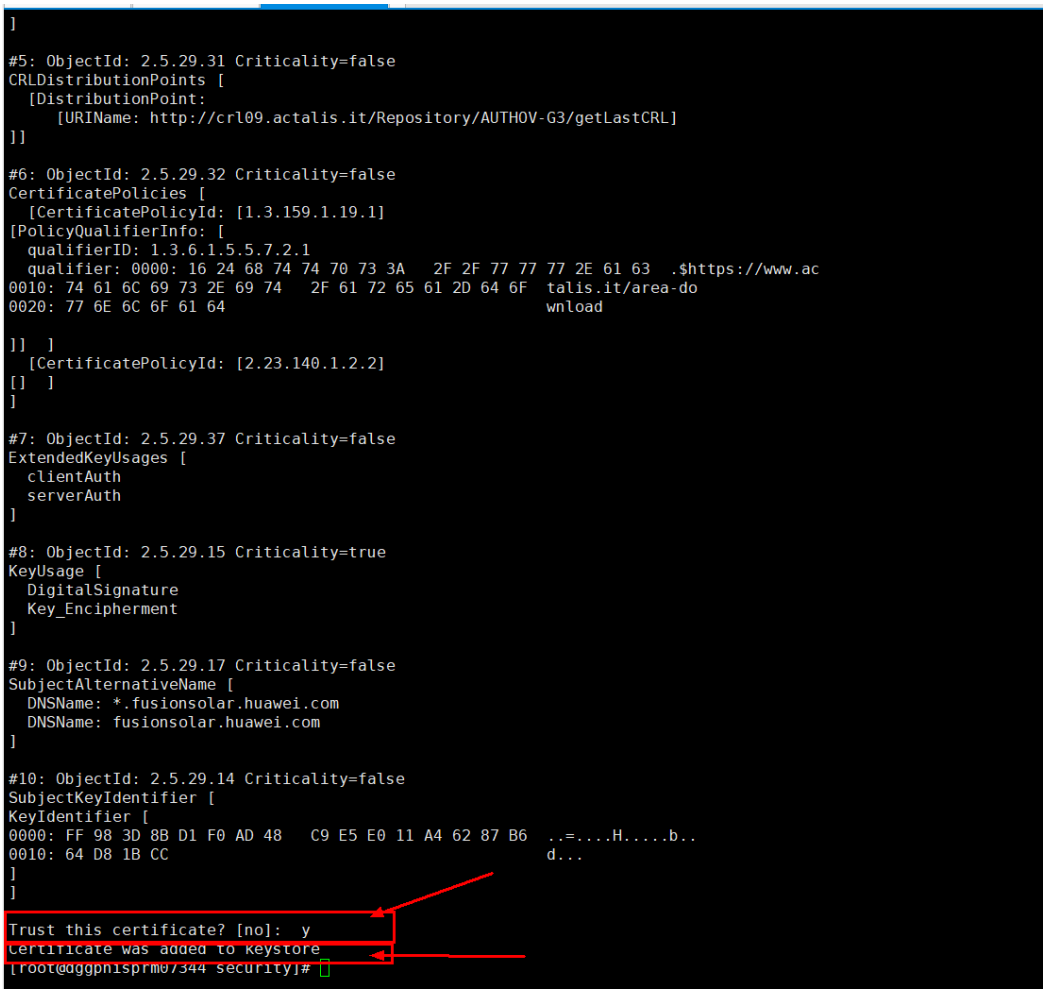
Run the **keytool -import -alias abc -keystore cacerts -file /opt/hd/Trust0613.cer** command.

Set the password of the certificate.

```
[root@dggphisprm07344 security]# keytool -import -alias abc -keystore cacerts -file /opt/hd/Trust0613.cer
Enter keystore password:
Owner: CN=*.fusionsolar.huawei.com, O="Huawei Technologies Co., Ltd", L=Shenzhen, ST=Guangdong, C=CN
Issuer: CN=Actalis Organization Validated Server CA G3, O=Actalis S.p.A., L=Ponte San Pietro, ST=Bergamo, C=IT
Serial number: 74743e222cf6f1819cf86c224ec223e4
```

When the system asks you whether to trust the certificate, enter **Y** and press **Enter**. The system displays a message indicating that the certificate has been added to the certificate library.




**Step 3** Access the interface again and check whether the server certificate verification is successful.

**----End**