SmartPVMS V500R007C00 NBI Reference

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About This Document

Purpose

This document is an auxiliary description document 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. NOTICE is used to address practices not related to personal injury.
NOTE	Supplements the important information in the main text. NOTE is used to address information not related to personal injury,

Symbol	Description
	equipment damage, and environment deterioration.

Change History

Issue	Release Date	Product Version	Description
01	2021-02-23	V500R007C00SPC110 or later	2 Changes from V300R006C10SPC230 to V500R007C00SPC200

Contents

1 Interface Overview

Technical Background

NBIs are designed based on RESTful APIs.

Third-party users communicate with the SmartPVMS in HTTPS mode.

The results of third-party users' access to the SmartPVMS are returned in JSON format.

Access Format and Path

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

Access path: https://*Domain name or IP address of the management system*/

You can contact the system administrator to obtain the domain name or IP address of the management system.

Access Permission

You need to apply to the system administrator for the permission to access NBIs. The system administrator will assign an account with the required permission and password for subsequent login.

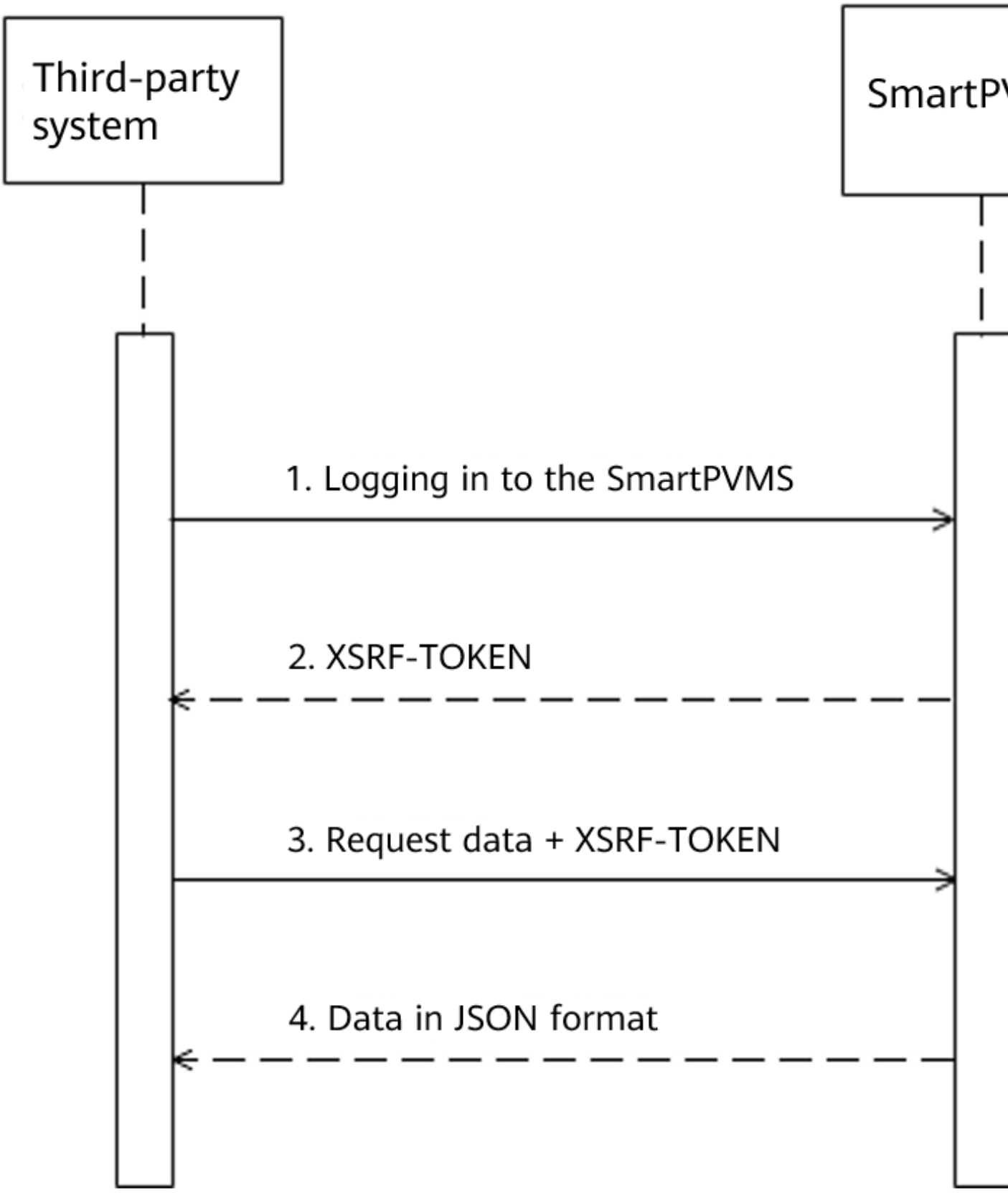
Access Restriction

The maximum number of access times of each API account is 10 per API per minute.

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

Communication Between a Third-Party System and the SmartPVMS

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



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NOTE

- After the system administrator assigns an account and password to a third-party system, the third-party system uses the account and password to invoke the login interface to obtain the XSRF-TOKEN.
- The third-party system adds XSRF-TOKEN to the request header to invoke the interface to obtain data.
- XSRF-TOKEN indicates the cross-site request token. If a user carries a token in a subsequent request, the request is initiated by a logged-in user.

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2 Changes from V300R006C10SPC230 to V500R007C00SPC200

2.1 New Interfaces

Interface	Interface Method and Path	Description
Logout interface	POST /thirdData/logout	New interface
Login Interface	POST https://x.x.x.x:27200/rest/openapi/pvms/v1/login	New interface
Logout Interface	POST https://x.x.x.x:27200/rest/openapi/pvms/v1/logout	New interface
Power Plant Query Interface	POST https://x.x.x.x:27200/rest/openapi/pvms/v1/plants	New interface
Device Query Interface	POST https://x.x.x.x:27200/rest/openapi/pvms/v1/devices	New interface
Plant SN Registration Interface	POST https://x.x.x.x:27200/rest/openapi/pvms/v1/vpp/snEnrolment	New interface
Plant AC Registration Interface	POST https://x.x.x.x:27200/rest/openapi/pvms/v1/vpp/acEnrolment	New interface
Basic Plant Information Interface	POST https://x.x.x.x:27200/rest/openapi/pvms/v1/vpp/plants	New interface

Interface	Interface Method and Path	Description
Real-time Plant Data Interface	POST https://x.x.x.x:27200/rest/openapi/pvms/v1/vpp/plantRealtimeKpi	New interface
5-minute Plant Data Interface	POST https://x.x.x.x:27200/rest/openapi/pvms/v1/vpp/plantFiveMinutesKpi	New interface
Interface for Delivering Battery Charge and Discharge Tasks	POST https://x.x.x.x:27200/rest/openapi/pvms/v1/vpp/chargeAndDischarge	New interface
Interface for Querying Battery Charge and Discharge Tasks	POST https://x.x.x.x:27200/rest/openapi/pvms/v1/vpp/chargeAndDischargeStatus	New interface
Battery DoD Setting Interface	POST https://x.x.x.x:27200/rest/openapi/pvms/v1/vpp/dod	New interface
Plant DRM Setting Interface	POST https://x.x.x.x:27200/rest/openapi/pvms/v1/vpp/drm	New interface
Inverter Power-On/Off Interface	POST https://x.x.x.x:27200/rest/openapi/pvms/v1/vpp/devOnOff	New interface
SN Registration Query Interface	POST https://x.x.x.x:27200/rest/openapi/pvms/v1/community/snIsRegister	New interface

2.2 Deleted Interfaces

Interface	Interface Method and Path	Deletion Description	Impact
Device switch interface	POST /thirdData/devOnOff	The function of this interface is not implemented.	The interface is unavailable in V500R007C00SPC110.
Device upgrade interface	POST /thirdData/devUpgrade	The function of this interface is not	The interface is unavailable in

Interface	Interface Method and Path	Deletion Description	Impact
		implemented.	V500R007C00SPC110.
Device upgrade record interface	POST /thirdData/getDevUpgradeInfo	The function of this interface is not implemented.	The interface is unavailable in V500R007C00SPC110.
SN registration query interface	POST /thirdData/snIsRegister	Replaced with the /rest/openapi/pvms/v1/community/snIsRegister interface	The original interface is not in use.

2.3 Modified Interfaces

Interface	Interface Method and Path	Interface Change	Data Change	Description	Impact
Login interface	POST /thirdData/login	None	Yes	1. In V300R006C10SPC230, a northbound login request has multiple Set-Cookie headers, with first letters in upper case. The XSRF-TOKEN is put in the second Set-Cookie header. 2. In V500R007C00SPC110, a northbound login request has only one set-cookie header, with all letters in lower case. The XSRF-TOKEN is put in the set-cookie header. An xsrf-token is added to the response header of northbound login requests. The content of the xsrf-token is the same as that of the XSRF-TOKEN in the set-cookie header. You are advised to use the new xsrf-token response header.	-
Device list interface	POST /thirdData/getDevList	None	Yes	Only the following device types are supported: **1**: String inverter **2**: SmartLogger **8**: Transformer	-

Interface	Interface Method and Path	Interface Change	Data Change	Description	Impact
				10: EMI **13**: Protocol converter **16**: General device **17**: Grid meter **22**: PID **37**: Pinnet data logger **38**: Residential inverter **39**: Battery **40**: Backup box **45**: PLC **46**: Optimizer **47**: Power Sensor **62**: Dongle **63**: Distributed SmartLogger **70**: Safety box	
Real-time device data interface	POST /thirdData/getDevRealKpi	None	Yes	Only the following device types are supported: **1**: String inverter **10**: EMI **17**: Grid meter **38**: Residential inverter **39**: Battery **47**: Power Sensor	-
5-minute device data interface	POST /thirdData/getDevFiveMinutes	None	Yes	Only the following device types are supported: **1**: String inverter **10**: EMI **17**: Grid meter **38**: Residential inverter **39**: Battery **47**: Power Sensor	-
Daily device data interface	POST /thirdData/getDevKpiDay	None	Yes	Only the following device types are supported: **1**: String inverter **38**: Residential inverter **39**: Battery The following indicators cannot be	-

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Interface	Interface Method and Path	Interface Change	Data Change	Description	Impact
				queried for string inverters: Production deviation Production reliability Communication reliability The following indicators cannot be queried for residential inverters: Production deviation Production reliability Communication reliability	
Monthly device data interface	POST /thirdData/getDevKpiMonth	None	Yes	Only the following device types are supported: **1**: String inverter **38**: Residential inverter **39**: Battery	-
Yearly device data interface	POST /thirdData/getDevKpiYear	None	Yes	Only the following device types are supported: **1**: String inverter **38**: Residential inverter **39**: Battery	-

3 Northbound Interface Format Definition

3.1 Login Interface

Description

- Before obtaining data, the login interface must be invoked to obtain the XSRF-TOKEN. The validity period of the 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, the XSRF-TOKEN is returned in the response header.

Request URL

https://*Domain name or IP address of the management system*/thirdData/login

Request Method

HTTP method: POST

Access Restrictions

The maximum number of access times of each NBI account per minute is 1.

It is recommended that the interface be invoked every 30 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. Value: true: The request succeeded. false: The request failed.	boolean	Request success or failure flag
failCode		Error code 0 indicates that the status is normal. For definitions of other error codes, see 7 Error Code List.	Integer	-
params	The following information is included:	-	-	-
	currentTime	Current system time, expressed by milliseconds	Long	-
message		Optional message	String	-
data		Returned data	Object	-

Examples

Request example:

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

Response example:

Example 1: The login is successful.

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

```
    "data":null,
    "failCode":0,
    "params":null,
    "message":null
}
```

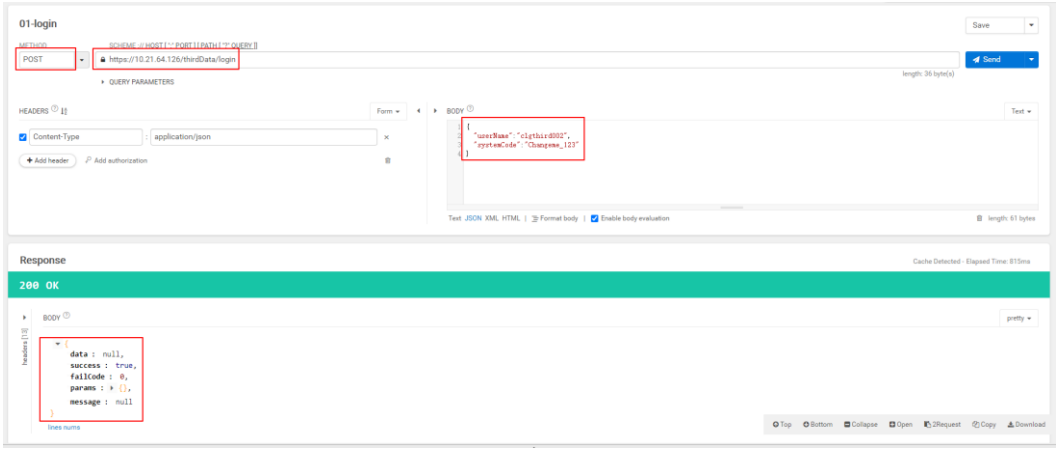
Example 2: The login fails.

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

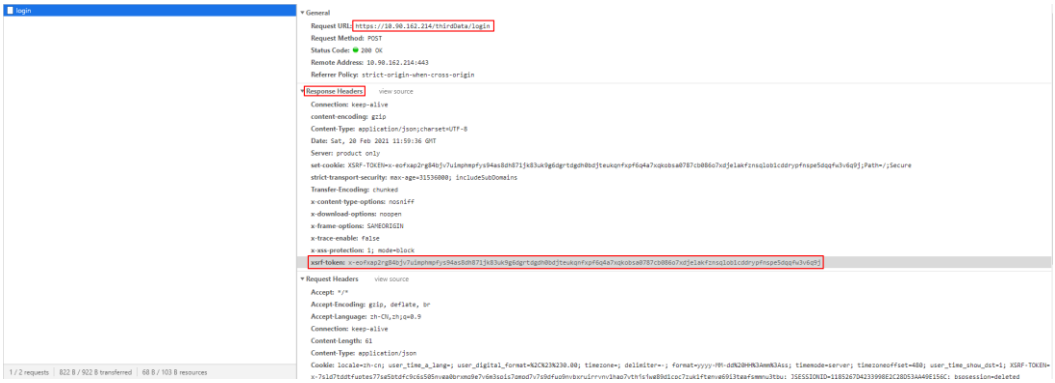
NOTICE

After the login is successful, the XSRF-TOKEN is returned in the response header. This parameter must be reserved. In subsequent data interface requests, this parameter and its value must be included in the request headers and sent to the SmartPVMS.

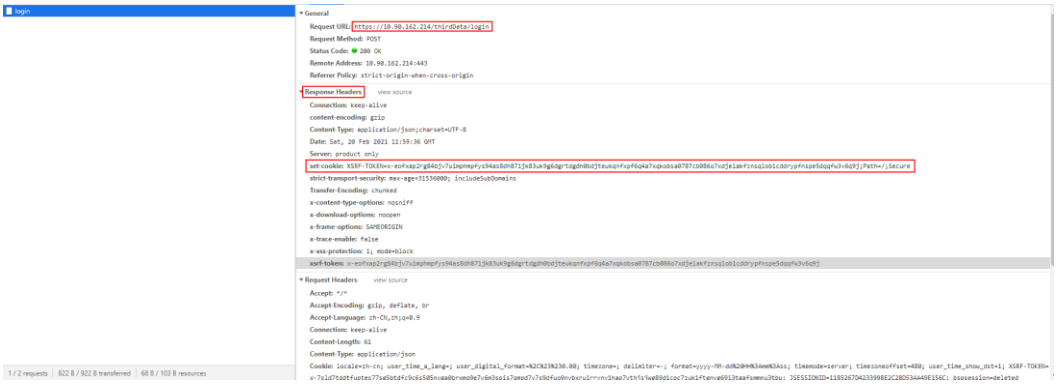
Login example:



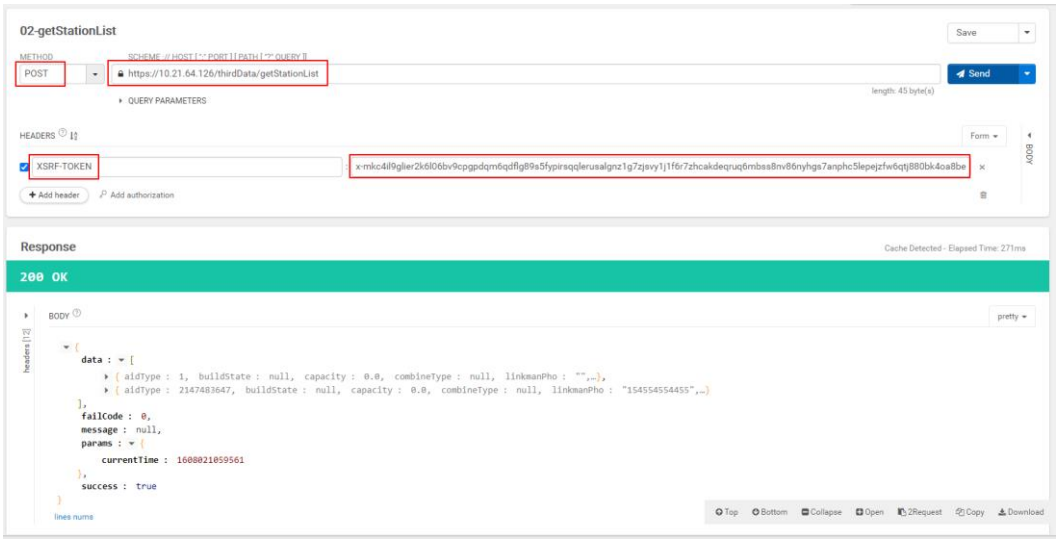
The following is an example of the XSRF-TOKEN returned after a successful login. The following method is recommended for obtaining the XSRF-TOKEN.

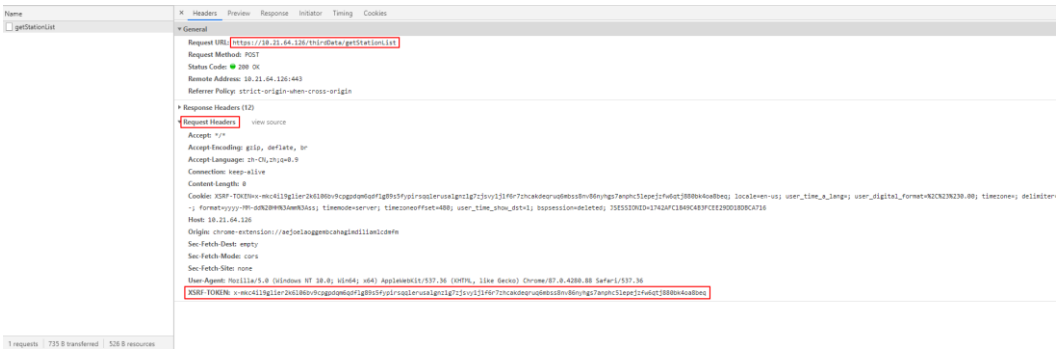


If you need compatibility with the old version, you can use the following method.



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





3.2 Logout Interface

Description

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

Request URL

https://*Domain name or IP address of the management system*/thirdData/logout

Request Method

HTTP method: POST

Access Restrictions

The maximum number of access times of each NBI account per minute is 1.

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 is returned in the response header after the login interface is successfully invoked.	String	Mandatory

Response Packet

Parameter		Description	Data Type	Remarks
success		Request success or failure flag. Value: true: The request succeeded. false: The request failed.	boolean	Request success or failure flag
failCode		Error code 0 indicates that the status is normal. For definitions of other error codes, see 7 Error Code List.	Integer	-
params	The following parameters are included:	-	-	-
	currentTime	Current system time, expressed by milliseconds	Long	-
message		Optional message	String	-
data		Returned data	Object	-

Examples

Request example:

```
{

"xsrfToken":"x-apepjy1fpd2ptete1f7zuqimep7wuqen9hkb3xaourelbyrx9jio7s09hgk6ca2mdlk
sjdglasdhjaklsdfhhdsahwedyuioqwehjkd"
}
```

Response example:

Example 1: The logout is successful.

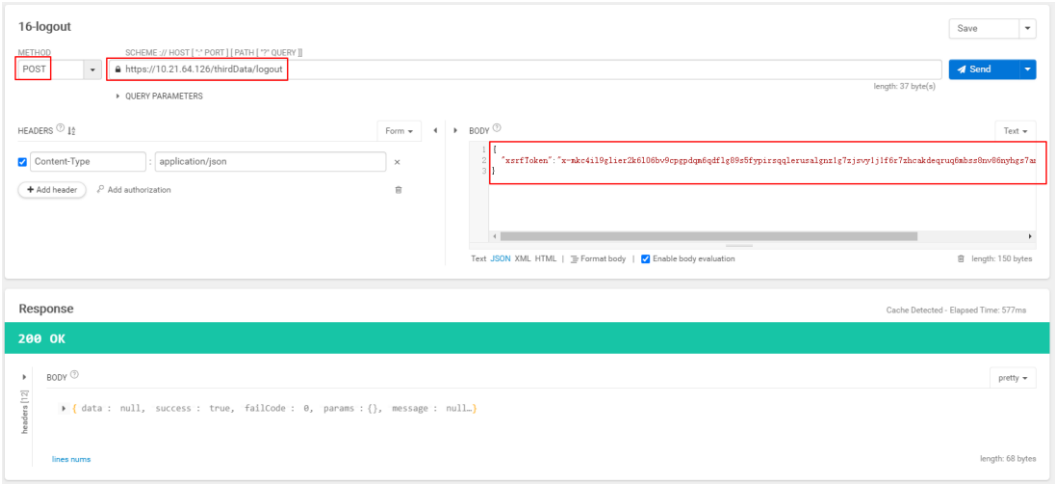
```
{
    "success":true,
    "data":null,
    "failCode":0,
    "params":{
        "currentTime":1503046597854
    },
    "message":null
}
```

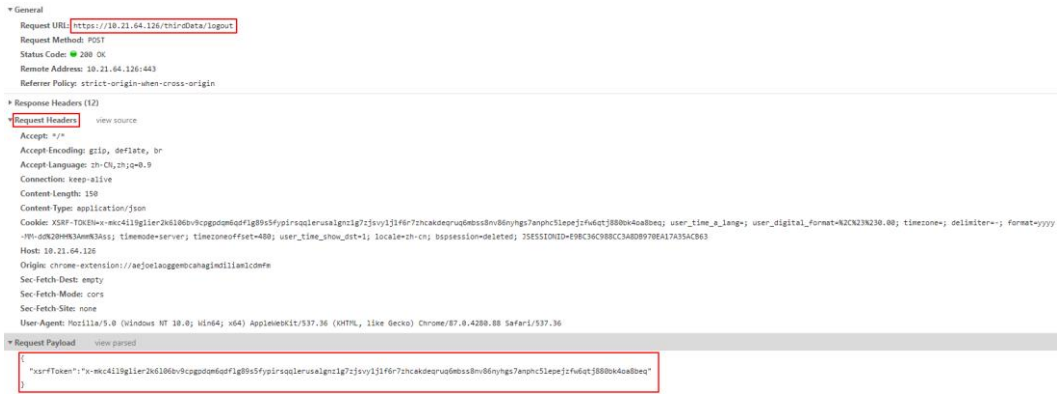
Example 2: The logout fails.

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

NOTE

Logout example:





3.3 Plant List 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.

Request URL

https://*Domain name or IP address of the management system*/thirdData/getStationList

Request Method

HTTP method: POST

Request Parameters

N/A

Access Restrictions

The maximum number of access times of each NBI account per minute is 1.

The data on this interface will not be updated if the plant information has not changed. It is recommended that this interface be invoked at most once an hour.

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

Response Packet

Parameter	Description	Data Type	Remarks
success	Request success or failure flag. Value: true: The request succeeded. false: The request failed.	boolean	Request success or failure flag
failCode	Error code	Integer	-

Parameter		Description	Data Type	Remarks
		0 indicates that the status is normal. For definitions of other error codes, see 7 Error Code List.		
params	The following parameters are included:	-	-	-
	currentTime	Current system time, expressed by milliseconds	Long	-
message		Optional response message	String	-
data	The following parameters are included:	Returned data. The data contains the object parameter list of each plant.	List	-
	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. The following plant states are supported: **0**: not constructed; **1**: under construction; **2**: grid-connected	String	-
	combineType	Grid connection type. The following grid connection types are supported: **1**: utility; **2**: commercial & industrial; **3**: residential	String	-
	aidType	Poverty alleviation plant ID. The following poverty alleviation plant identifiers are supported: **0**: poverty alleviation plant **1**: non-poverty alleviation plant	Integer	-
	stationLinkman	Plant contact person	String	-
	linkmanPho	Telephone number of the contact person	String	-

Examples

Request example:

```
{}
```

Response example:

Example 1: An error code is returned.

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

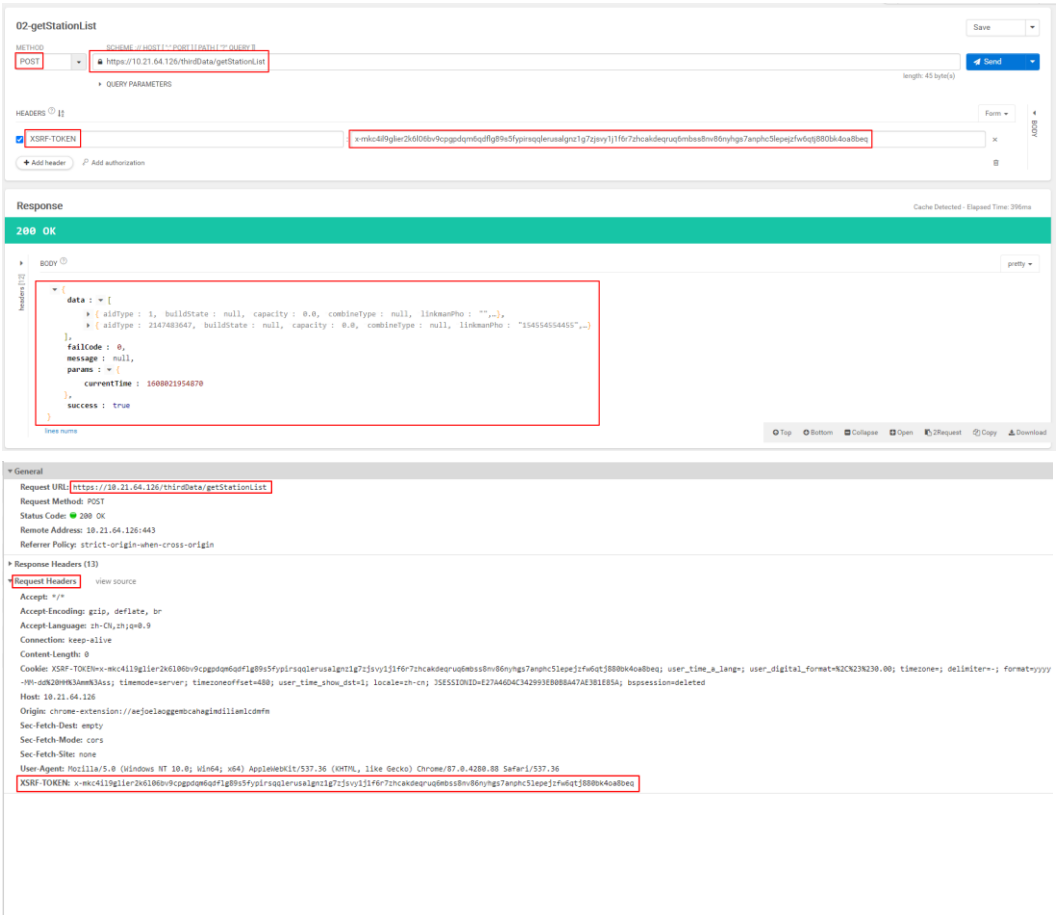
Example 2: The plant list is returned.

```
{
   "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
}
```


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:



3.4 Plant Data Interfaces

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

3.4.1 Real-Time Plant Data 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 4.1 Real-Time Plant Data Interface.

Request URL

https://*Domain name or IP address of the management system*/thirdData/getStationRealKpi

Request Method

HTTP method: POST

Access Restrictions

The maximum number of access times of each NBI account per minute is 10.

The data on this interface is updated every 5 minutes. It is recommended that the interface be invoked every 5 minutes at most.

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

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 3.3 Plant List Interface.	String	Mandatory

Response Packet

Parameter		Description	Data Type	Remarks
success		Request success or failure flag. Value: true: The request succeeded. false: The request failed.	boolean	Request success or failure flag
failCode		Error code 0 indicates that the status is normal. For definitions of other error codes, see 7 Error Code List.	Integer	-
params	The following parameters are included:	-	-	-
	stationCodes	Plant ID list in the request parameter	String	-
	currentTime	Current system time, expressed by milliseconds	Long	-
message		Optional message	String	-
data	The following parameters are included:	Returned data. The data contains the real-time data object list of each plant.	List	-

Parameter		Description	Data Type	Remarks
	stationCode	Plant ID	String	-
	dataItemMap	Content of each data item, which is returned in key-value format. For details about the data item list, see 4.1 Real-Time Plant Data Interface.	Map	-

Examples

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 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",
```

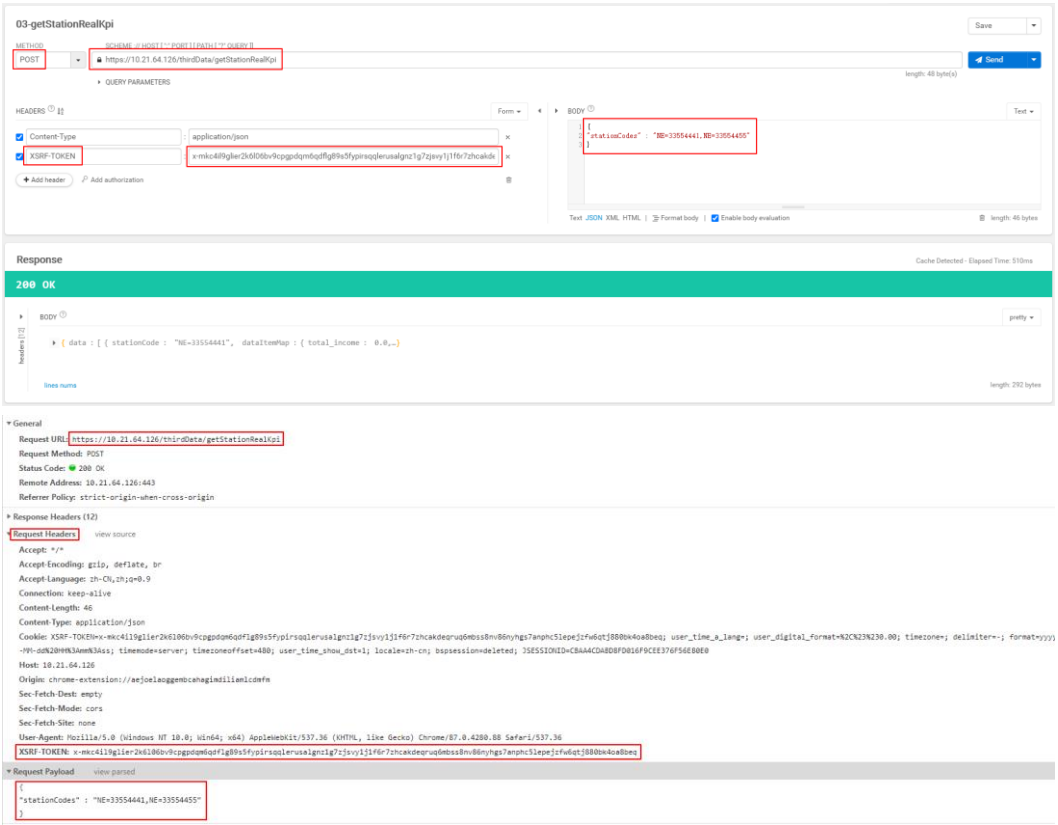


```
                "day_power":"16770.000",
                "total_power":"35100.000",
                "day_income":"26832.000",
                "month_power":"35100.000",
                "total_income":"61152.000"
            },
            "stationCode":"5D02E8B40AD342159AC8D8A2BCD4FAB5"
        }
    ],
    "failCode":0,
    "params":{

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


NOTE

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

Request example:



3.4.2 Hourly Plant Data 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 on the current day.

If there is data for n ($0 \leq n \leq 24$) hours of the day, n ($0 \leq n \leq 24$) records will be returned.

For details about the data list that can be queried using this interface, see 4.2 Hourly Plant Data Interface.

Request URL

https://*Domain name or IP address of the management system*/thirdData/getKpiStationHour

Request Method

HTTP method: POST

Access Restrictions

The maximum number of access times of each NBI account per minute is 1.

The interface data is updated once an hour. It is recommended that the interface be invoked once an hour at most.

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

Request Parameters

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

Response Packet

Parameter	Description	Data Type	Remarks
success	Request success or failure flag. Value: true: The request succeeded. false: The request failed.	boolean	Request success or failure flag
failCode	Error code 0 indicates that the status is normal. For definitions of other error codes, see 7 Error Code	Integer	-

Parameter		Description	Data Type	Remarks
		List.		
params	The following parameters are included:	-	-	-
	stationCodes	Plant ID list in the request parameter	String	-
	collectTime	Collection time in milliseconds in the request parameter	Long	-
	currentTime	Current system time, expressed by milliseconds	Long	-
message		Optional message	String	-
data	The following parameters are included:	Returned data. The data contains the hourly data object list of each plant.	List	Hourly data list of a plant on a day
	stationCode	Plant ID	String	-
	collectTime	Collection time, expressed by milliseconds	Long	-
	dataItemMap	Content of each data item, which is returned in key-value format. For details about the data item list, see 4.2 Hourly Plant Data Interface.	Map	-

Examples

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: The hourly plant data is returned.

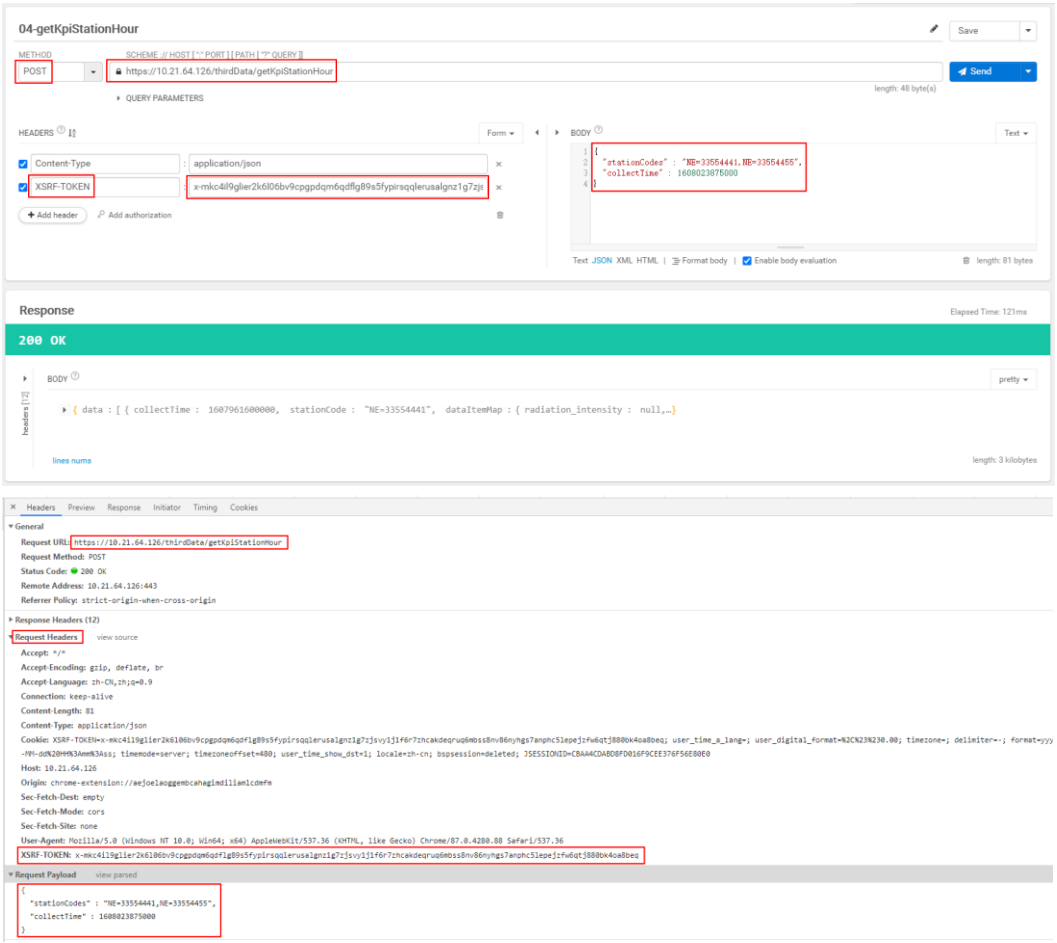

```
{
    "success":true,
    "data":[
        {
            "dataItemMap":{
                "radiation_intensity":null,
                "theory_power":null,
                "inverter_power":0,
                "ongrid_power":null,
                "power_profit":0
            },
            "stationCode":"5D02E8B40AD342159AC8D8A2BCD4FAB5",
            "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 account allocated by the system administrator must have the permission to invoke this interface.

Request example:



3.4.3 Daily Plant Data 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 there is data for n ($0 \leq n \leq 31$) days of the month, n ($0 \leq n \leq 31$) records will be returned.

For details about the data list that can be queried using this interface, see 4.3 Daily Plant Data Interface.

Request URL

https://*Domain name or IP address of the management system*/thirdData/getKpiStationDay

Request Method

HTTP method: POST

Access Restrictions

The maximum number of access times of each NBI account per minute is 1.

The interface data is updated once an hour. It is recommended that the interface be invoked once an hour at most.

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

Request Parameters

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

Response Packet

Parameter		Description	Data Type	Remarks
success		Request success or failure flag. Value: true: The request succeeded. false: The request failed.	boolean	Request success or failure flag
failCode		Error code 0 indicates that the status is normal. For definitions of other error codes, see 7 Error Code List.	Integer	-
params	The following parameters are included:	-	-	-
	stationCodes	Plant ID list in the request parameter	String	-
	collectTime	Collection time in milliseconds in the request parameter	Long	-
	currentTime	Current system time, expressed by milliseconds	Long	-

Parameter		Description	Data Type	Remarks
message		Optional message	String	-
data	The following parameters are included:	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, expressed by milliseconds	Long	-
	dataItemMap	Content of each data item, which is returned in key-value format. For details about the data item list, see 4.3 Daily Plant Data Interface.	Map	-

Examples

Request example:

```
{

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

Response example:

Example 1: An error code is returned.

```
{

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

Example 2: The daily plant data is returned.

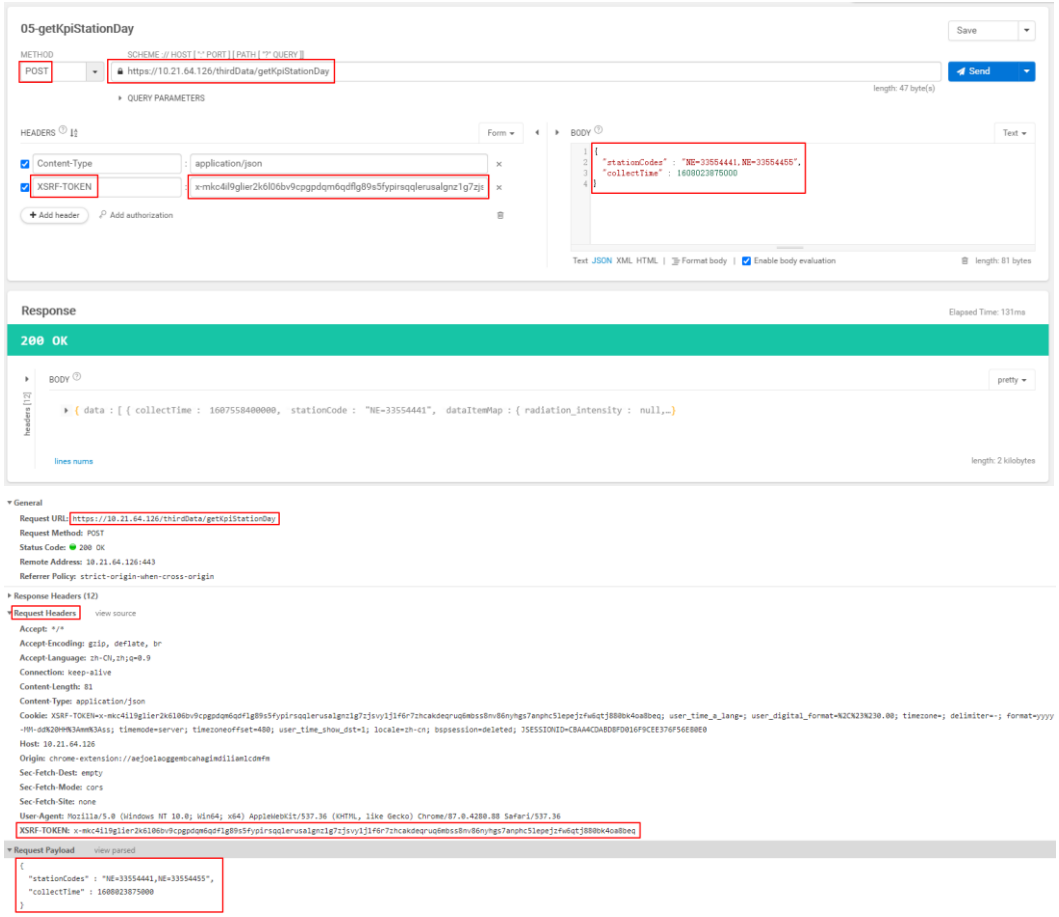
```
{
   "success":true,
   "data":[
      {
         "dataItemMap":{
            "use_power":288760,
            "radiation_intensity":0.6968,
            "reduction_total_co2":18.275,
            "reduction_total_coal":7.332,
            "theory_power":17559.36,
            "ongrid_power":18330,
            "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 account allocated by the system administrator must have the permission to invoke this interface.

Request example:



3.4.4 Monthly Plant Data 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 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 there is data for n ($0 \leq n \leq 12$) months of the year, n ($0 \leq n \leq 12$) records will be returned.

For details about the data list that can be queried using this interface, see 4.4 Monthly Plant Data Interface.

Request URL

https://*Domain name or IP address of the management system*/thirdData/getKpiStationMonth

Request Method

HTTP method: POST

Access Restrictions

The maximum number of access times of each NBI account per minute is 1.

The data on this interface is updated once a day. It is recommended that the interface be invoked once an hour at most.

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

Request Parameters

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

Response Packet

Parameter		Description	Data Type	Remarks
success		Request success or failure flag. Value: true: The request succeeded. false: The request failed.	boolean	Request success or failure flag
failCode		Error code 0 indicates that the status is normal. For definitions of other error codes, see 7 Error Code List.	Integer	-
params	The following parameters are included:	-	-	-
	stationCodes	Plant ID list in the request parameter	String	-
	collectTime	Collection time in milliseconds in the request parameter	Long	-
	currentTime	Current system time, expressed by milliseconds	Long	-
message		Optional message	String	-
data	The following parameters are	Returned data. The data contains the monthly data object	List	Monthly data list of a plant

Parameter		Description	Data Type	Remarks
	included:	list of each plant.		in a year
	stationCode	Plant ID	String	-
	collectTime	Collection time, expressed by milliseconds	Long	-
	dataItemMap	Content of each data item, which is returned in key-value format. For details about the data item list, see 4.4 Monthly Plant Data Interface.	Map	-

Examples

Request example:

```
{

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

Response example:

Example 1: An error code is returned.

```
{

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

Example 2: The monthly plant data is returned.

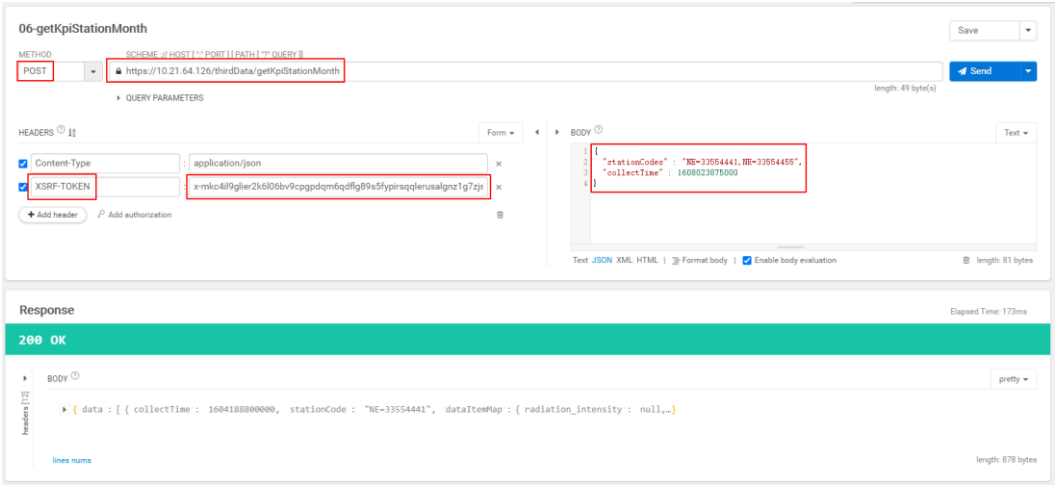
```
{
   "success":true,
   "data":[
      {
         "dataItemMap":{
            "use power":288760,
            "radiation intensity":0.6968,
            "reduction total co2":18.275,
            "reduction total coal":7.332,
            "inverter power":null,
            "theory power":17559.36,
            "ongrid power":18330,
            "power profit":34320,
            "installed capacity":25200,
            "perpower ratio":0.727,
            "reduction total tree":999,
            "performance ratio":89
         },
```

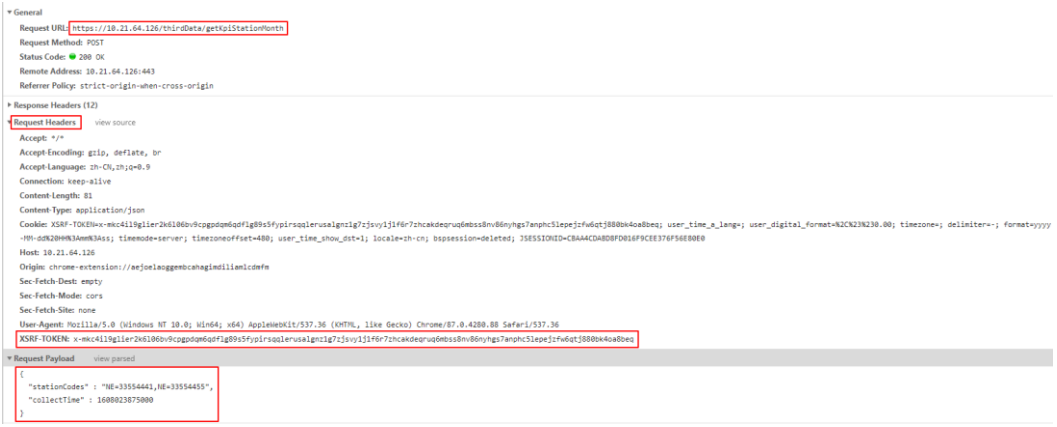
```
            "stationCode":"5D02E8B40AD342159AC8D8A2BCD4FAB5",
            "collectTime":1501516800000
        },
        {
            "dataItemMap":{
                "use_power":null,
                "radiation_intensity":1.4123,
                "reduction_total_co2":0.897,
                "reduction_total_coal":0.36,
                "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 account allocated by the system administrator must have the permission to invoke this interface.

Request example:





3.4.5 Yearly Plant Data 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 4.5 Yearly Plant Data Interface.

Request URL

https://*Domain name or IP address of the management system*/thirdData/getKpiStationYear

Request Method

HTTP method: POST

Access Restrictions

The maximum number of access times of each NBI account per minute is 1.

The data on this interface is updated once a day. It is recommended that the interface be invoked once an hour at most.

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

Request Parameters

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

Response Packet

Parameter		Description	Data Type	Remarks
success		Request success or failure flag. Value: true: The request succeeded. false: The request failed.	boolean	Request success or failure flag
failCode		Error code 0 indicates that the status is normal. For definitions of other error codes, see 7 Error Code List.	Integer	-
params	The following parameters are included:	-	-	-
	stationCodes	Plant ID list in the request parameter	String	-
	collectTime	Collection time in milliseconds in the request parameter	Long	-
	currentTime	Current system time, expressed by milliseconds	Long	-
message		Optional message	String	-
data	The following parameters are included:	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, expressed by milliseconds	Long	-
	dataItemMap	Content of each data item, which is returned in key-value format. For details about the data item list, see 4.5 Yearly Plant Data Interface.	Map	-

Examples

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: The yearly plant data is returned.

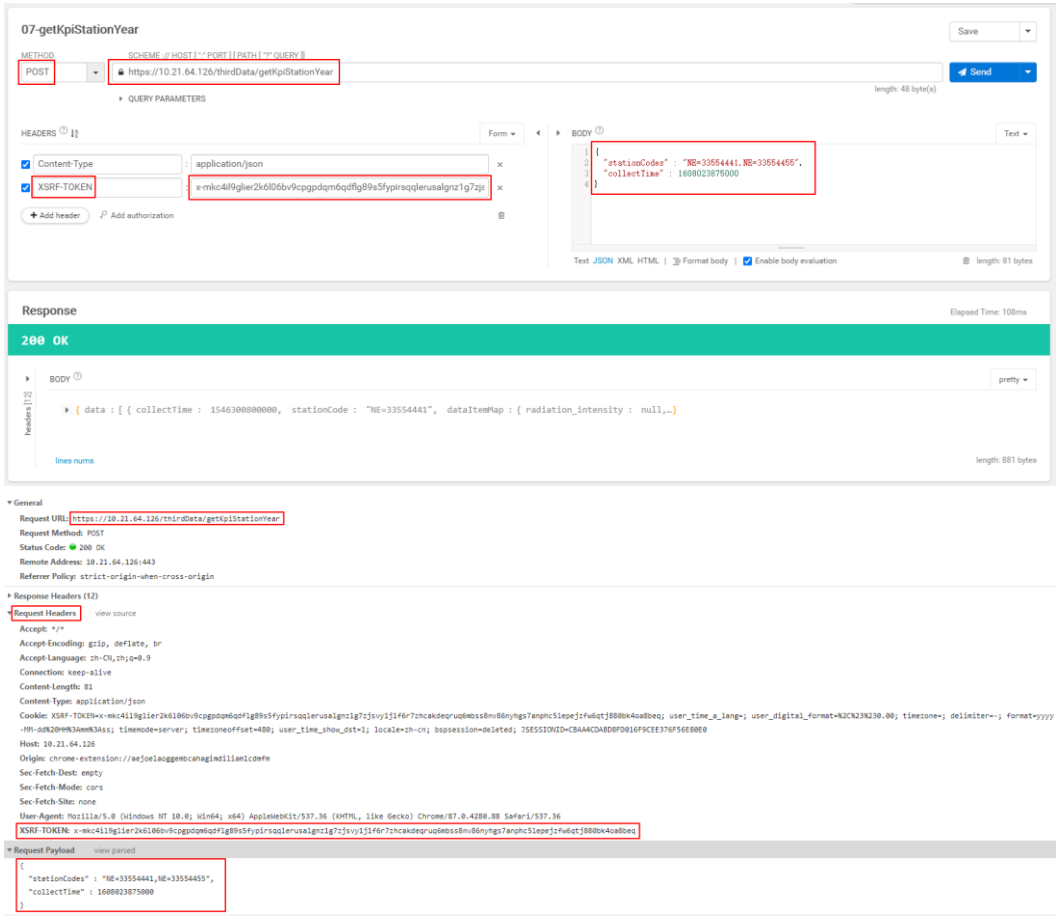
```
{
   "success":true,
   "data":[
      {
         "dataItemMap":{
            "use power":288760,
            "radiation intensity":0.6968,
            "reduction total co2":18.275,
            "reduction total coal":7.332,
            "inverter power":null,
            "theory power":17559.36,
            "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 account allocated by the system administrator must have the permission to invoke this interface.

Request example:



3.5 Device List 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.

You can query devices by plant ID set. Devices of a maximum of 100 plants can be queried at a time.

Request URL

https://*Domain name or IP address of the management system*/thirdData/getDevList

Request Method

HTTP method: POST

Access Restrictions

The maximum number of access times of each NBI account per minute is 10.

The data on this interface will not be updated if the device information has not changed. It is recommended that this interface be invoked at most once an hour.

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

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. Value: true: The request succeeded. false: The request failed.	boolean	Request success or failure flag
failCode	Error code 0 indicates that the status is normal. For definitions of other error codes, see 7 Error Code List.	Integer	-

Parameter		Description	Data Type	Remarks
params	The following parameters are included:	-	-	-
	stationCodes	Plant ID list in the request parameter	String	-
	currentTime	Current system time, expressed by milliseconds	Long	-
message		Optional message	String	-
data	The following parameters are included:	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. The following device types are supported: **1**: String inverter **2**: SmartLogger **8**: Transformer **10**: EMI **13**: Protocol converter **16**: General device **17**: Grid meter **22**: PID **37**: Pinnet data logger **38**: Residential inverter **39**: Battery **40**: Backup box **45**: PLC **46**: Optimizer **47**: Power Sensor **62**: Dongle **63**: Distributed SmartLogger **70**: Safety box	Integer	-
	softwareVersion	Software version	String	-

Parameter		Description	Data Type	Remarks
	invType	Model (only for inverters)	String	-
	longitude	Longitude	Double	-
	latitude	Latitude	Double	-

Examples

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",
```

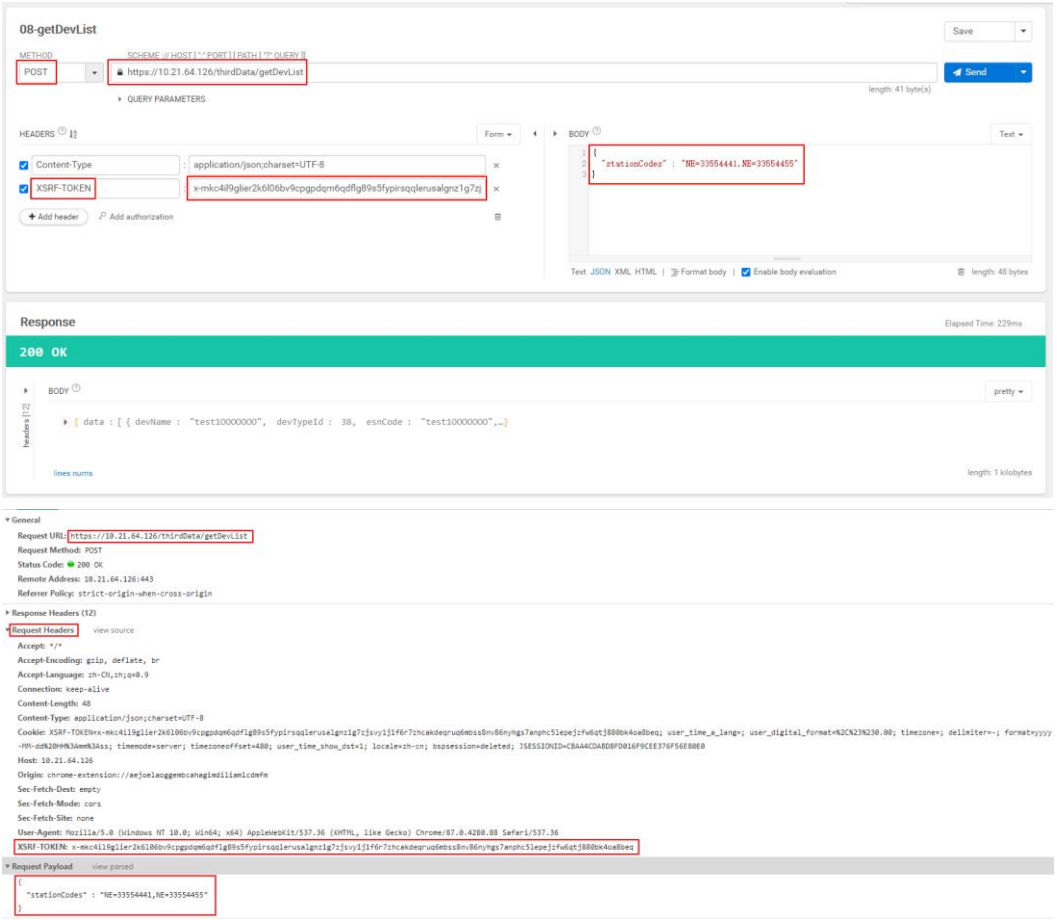


```
            "devTypeId":1,
            "softwareVersion":"V100R001PC666",
            "invType":"SUN2000-17KTL",
            "longitude":null,
            "latitude":null
        }
    ],
    "failCode":0,
    "params":{

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


NOTE

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

Request example:



3.6 Device Data Interfaces

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

3.6.1 Real-Time Device Data Interface

Description

This interface is used to obtain real-time device data by device type and device ID set. The data varies according to 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 4.6 Real-Time Device Data Interface.

Request URL

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

Request Method

HTTP method: POST

Access Restrictions

The maximum number of access times of each NBI account per minute is 10.

The data on this interface is updated every 5 minutes. It is recommended that the interface be invoked every 5 minutes at most.

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

Request Parameters

Parameter	Description	Data Type	Mandatory/Optional
devIds	Device ID list. Multiple device IDs are separated by commas (,).	String	Mandatory
devTypeId	Device type ID. Use the device type ID obtained in 3.5 Device List Interface. The following device types are supported: **1**: String inverter **10**: EMI **17**: Grid meter **38**: Residential inverter **39**: Battery **47**: Power Sensor	Integer	Mandatory

Response Packet

Parameter		Description	Data Type	Remarks
success		Request success or failure flag. Value: true: The request succeeded. false: The request failed.	boolean	Request success or failure flag
failCode		Error code 0 indicates that the status is normal. For definitions of other error codes, see 7 Error Code List.	Integer	-
params	The following parameters are included:	-	-	-
	devIds	Device ID list in the request parameter	String	-
	devTypeId	Device type ID in the request parameter	Integer	-
	currentTime	Current system time, expressed by milliseconds	Long	-
message		Optional message	String	-
data	The following parameters are included:	Returned data. The data contains the real-time data object list of each device.	List	-
	devId	Device ID	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 4.6 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: The real-time device data 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,
            "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,
```

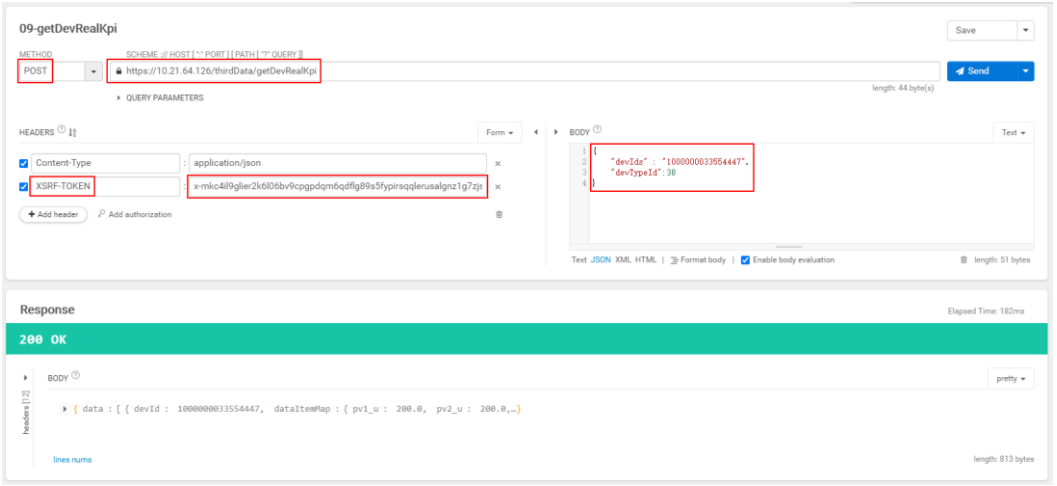
```
            "open_time":0,
            "b_i":0,
            "bc_u":0,
            "pv9_u":0,
            "pv8_u":0,
            "c_i":0,
            "mppt_total_cap":0,
            "pv9_i":0,
            "mppt_3_cap":0,
            "run_state":0,
            "mppt_2_cap":0,
            "inverter_state":0,
            "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,
```

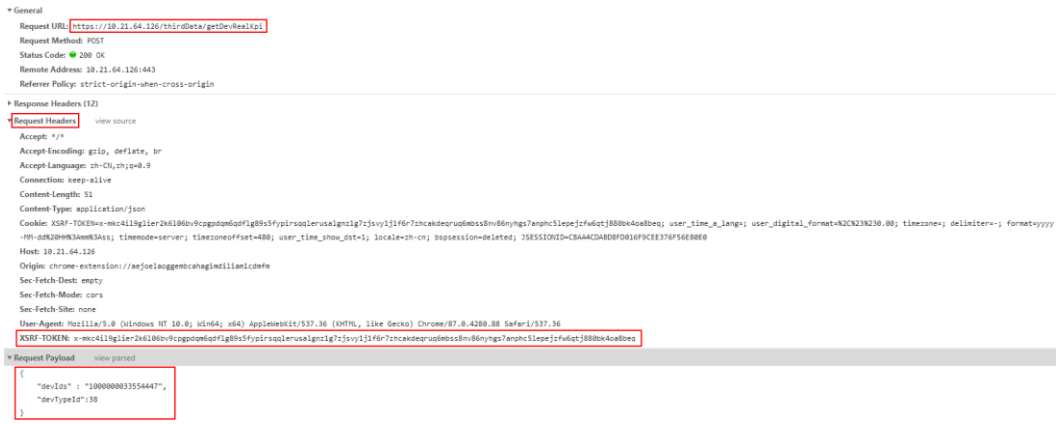
```
                "pv16_u":0,
                "pv16_i":0,
                "pv17_u":0,
                "pv17_i":0,
                "pv18_u":0,
                "pv18_i":0,
                "pv19_u":0,
                "pv19_i":0,
                "pv20_u":0,
                "pv20_i":0,
                "pv21_u":0,
                "pv21_i":0,
                "pv22_u":0,
                "pv22_i":0,
                "pv23_u":0,
                "pv23_i":0,
                "pv24_u":0,
                "pv24_i":0,
                "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 account allocated by the system administrator must have the permission to invoke this interface.

Request example:





3.6.2 5-minute Device Data Interface

Description

This interface is used to obtain 5-minute device data. 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 on the day based on the device ID.

If there is data for n ($0 \leq n \leq 288$) 5 minutes of the day, n ($0 \leq n \leq 288$) records will be returned.

For details about the data list that can be queried using this interface, see 4.7 5-minute Device Data Interface.

Request URL

https://*Domain name or IP address of the management system*/thirdData/getDevFiveMinutes

Request Method

HTTP method: POST

Access Restrictions

The maximum number of access times of each NBI account per minute is 10.

The data on this interface is updated every 5 minutes. It is recommended that the interface be invoked every 5 minutes at most.

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

Request Parameters

Parameter	Description	Data Type	Mandatory/Optional

Parameter	Description	Data Type	Mandatory/Optional
devIds	Device ID list. Multiple device IDs are separated by commas (,).	String	Mandatory
devTypeId	Device type ID. Use the device type ID obtained in 3.5 Device List Interface. The following device types are supported: **1**: String inverter **10**: EMI **17**: Grid meter **38**: Residential inverter **39**: Battery **47**: Power Sensor	Integer	Mandatory
collectTime	Collection time, expressed by milliseconds	Long	Mandatory

Response Packet

Parameter		Description	Data Type	Remarks
success		Request success or failure flag. Value: true: The request succeeded. false: The request failed.	boolean	Request success or failure flag
failCode		Error code 0 indicates that the status is normal. For definitions of other error codes, see 7 Error Code List.	Integer	-
params	The following parameters are included:	-	-	-
	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, expressed by milliseconds	Long	-

Parameter		Description	Data Type	Remarks
message		Optional message	String	-
data	The following parameters are included:	Returned data. The data contains the 5-minute data object list of each device.	List	5-minute data of a device on a day
	devId	Device ID	Long	-
	collectTime	Collection time, expressed by 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 4.7 5-minute Device Data Interface.	Map	5-minute data of a device

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: The 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,
            "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,
```

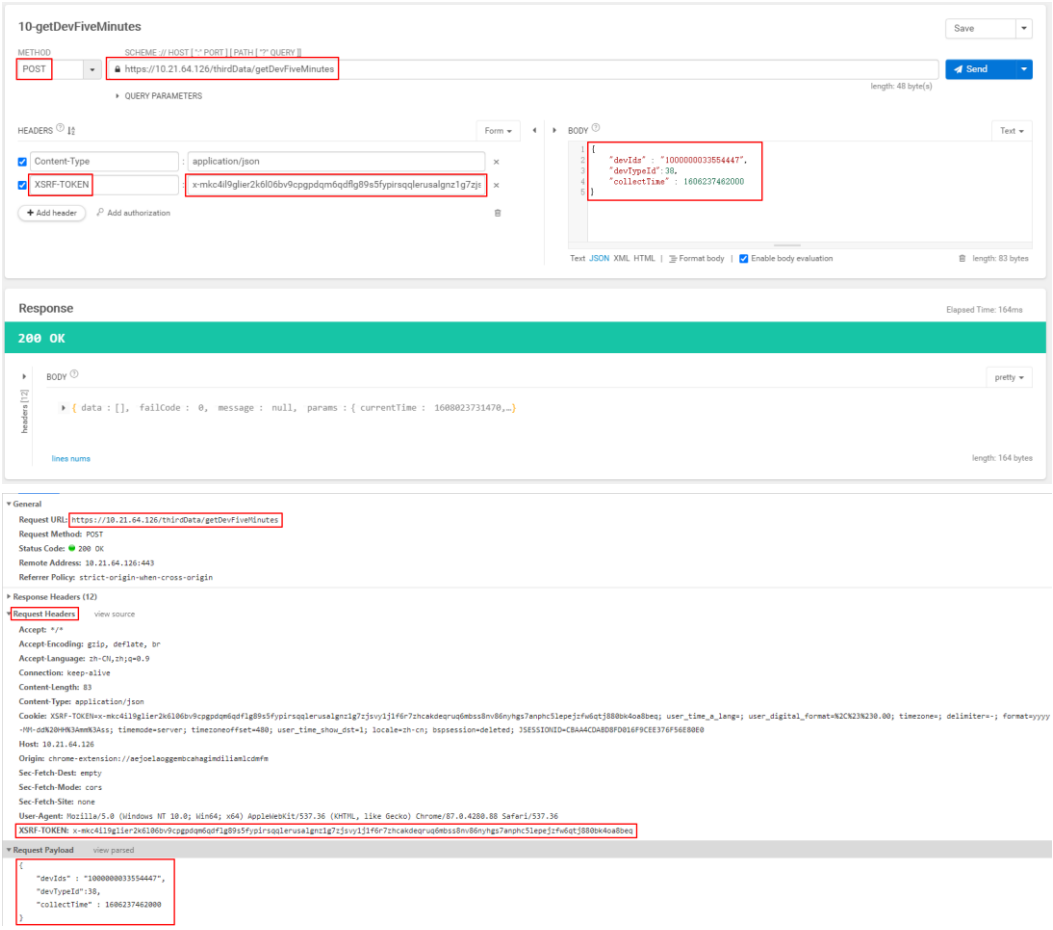
```
            "ab_u":495.4,
            "pv7_i":null,
            "pv13_u":null,
            "reactive_power":20.95,
            "pv10_u":null,
            "pv12_i":null,
            "pv11_i":null,
            "pv3_i":7.1,
            "pv11_u":null,
            "pv2_i":7.1,
            "pv13_i":null,
            "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,
```

```
                "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 must have the permission to invoke this interface.

Request example:



3.6.3 Daily Device Data Interface

Description

This interface is used to obtain daily device data. 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 in the month based on the device ID.

If there is data for n ($0 \leq n \leq 31$) days of the month, n ($0 \leq n \leq 31$) records will be returned.

For details about the data list that can be queried using this interface, see 4.8 Daily Device Data Interface.

Request URL

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

Request Method

HTTP method: POST

Access Restrictions

The maximum number of access times of each NBI account per minute is 1.

The interface data is updated once an hour. It is recommended that the interface be invoked once an hour at most.

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

Request Parameters

Parameter	Description	Data Type	Mandatory/Optional
devIds	Device ID list. Multiple device IDs are separated by commas (,).	String	Mandatory
devTypeId	Device type ID. Use the device type ID obtained in 3.5 Device List Interface. The following device types are supported: **1**: String inverter **38**: Residential inverter **39**: Battery	Integer	Mandatory
collectTime	Collection time, expressed by milliseconds	Long	Mandatory

Response Packet

Parameter		Description	Data Type	Remarks
success		Request success or failure flag. Value: true: The request succeeded. false: The request failed.	boolean	Request success or failure flag
failCode		Error code 0 indicates that the status is normal. For definitions of other error codes, see 7 Error Code List.	Integer	-
params	The following parameters are included:	-	-	-
	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, expressed by milliseconds	Long	-
message		Optional message	String	-
data	The following parameters are included:	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	-
	collectTime	Collection time, expressed by 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 4.8 Daily Device Data Interface.	Map	Data of a device on 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: The 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
      }
   ],
```

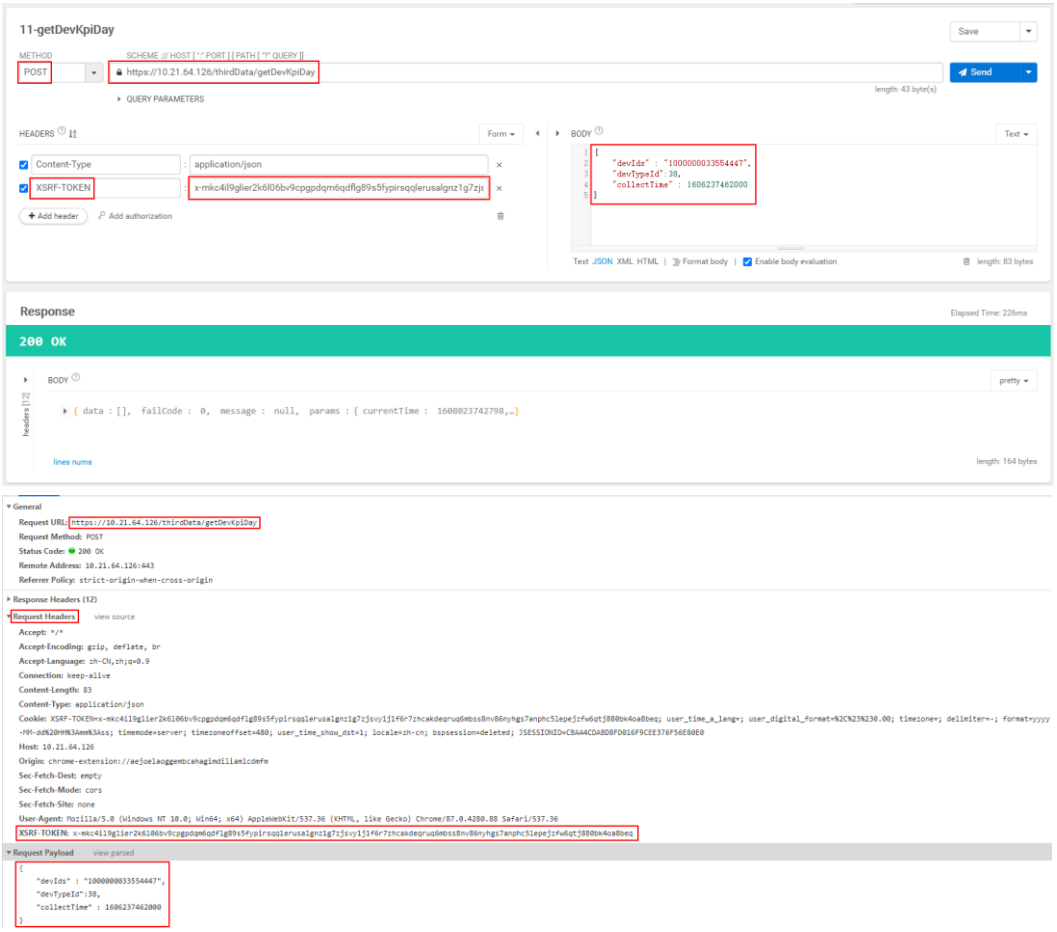


```
    "failCode":0,
    "params":{
        "devIds":"214060404588862,213472461631079",
        "devTypeId":1,
        "collectTime":1501862400000,
        "currentTime":1503046597854
    },
    "message":null
}
```

NOTE

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

Request example:



3.6.4 Monthly Device Data Interface

Description

This interface is used to obtain monthly device data. 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 daily data of the device in the year based on the device ID.

If there is data for n ($0 \leq n \leq 12$) months of the year, n ($0 \leq n \leq 12$) records will be returned.

For details about the data list that can be queried using this interface, see 4.9 Monthly Device Data Interface.

Request URL

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

Request Method

HTTP method: POST

Access Restrictions

The maximum number of access times of each NBI account per minute is 1.

The data on this interface is updated once a day. It is recommended that the interface be invoked once an hour at most.

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

Request Parameters

Parameter	Description	Data Type	Mandatory/Optional
devIds	Device ID list. Multiple device IDs are separated by commas (,).	String	Mandatory
devTypeId	Device type ID. Use the device type ID obtained in 3.5 Device List Interface. The following device types are supported: **1**: String inverter **38**: Residential inverter **39**: Battery	Integer	Mandatory
collectTime	Collection time, expressed by milliseconds	Long	Mandatory

Response Packet

Parameter	Description	Data Type	Remarks
success	Request success or failure flag. Value: true: The request succeeded. false: The request failed.	boolean	Request success or failure flag
failCode	Error code	Integer	-

Parameter		Description	Data Type	Remarks
		0 indicates that the status is normal. For definitions of other error codes, see 7 Error Code List.		
params	The following parameters are included:	-	-	-
	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, expressed by milliseconds	Long	-
message		Optional message	String	-
data	The following parameters are included:	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	-
	collectTime	Collection time, expressed by 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 4.9 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
}
```

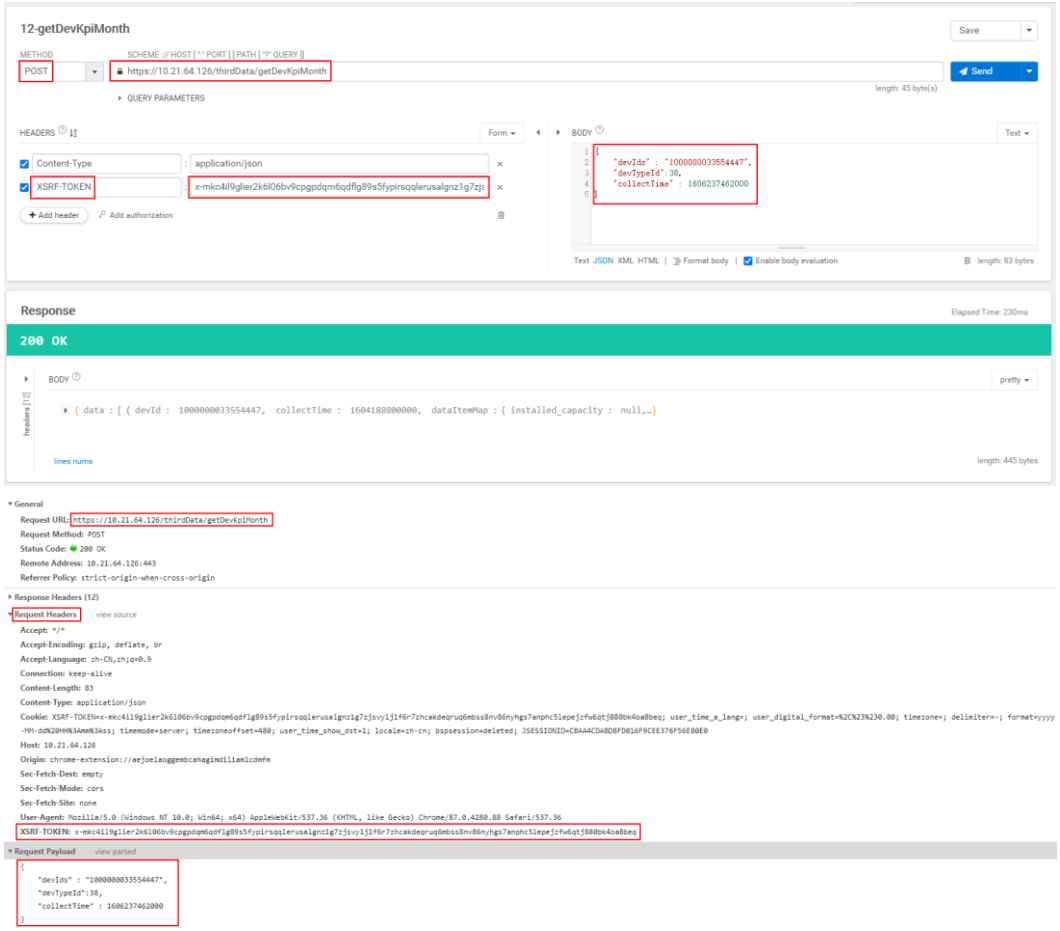
Example 2: The monthly device data is returned.

```
{
   "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 account allocated by the system administrator must have the permission to invoke this interface.

Request example:



3.6.5 Yearly Device Data Interface

Description

This interface is used to obtain yearly device data. 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 4.10 Yearly Device Data Interface.

Request URL

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

Request Method

HTTP method: POST

Access Restrictions

The maximum number of access times of each NBI account per minute is 1.

The data on this interface is updated once a day. It is recommended that the interface be invoked once an hour at most.

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

Request Parameters

Parameter	Description	Data Type	Mandatory/Optional
devIds	Device ID list. Multiple device IDs are separated by commas (,).	String	Mandatory
devTypeId	Device type ID The following device types are supported: **1**: String inverter **38**: Residential inverter **39**: Battery	Integer	Mandatory
collectTime	Collection time, expressed by milliseconds	Long	Mandatory

NOTE

Related KPIs must be configured before data can be obtained.

Response Packet

Parameter		Description	Data Type	Remarks
success		Request success or failure flag. Value: true: The request succeeded. false: The request failed.	boolean	Request success or failure flag
failCode		Error code 0 indicates that the status is normal. For definitions of other error codes, see 7 Error Code List.	Integer	-
params	The following parameters are included:	-	-	-
	devIds	Device ID list in the request parameter	String	-
	devTypeId	Device type ID in the request parameter	Integer	-

Parameter		Description	Data Type	Remarks
	collectTime	Collection time in milliseconds in the request parameter	Long	-
	currentTime	Current system time, expressed by milliseconds	Long	-
message	-	Optional message	String	-
data	The following parameters are included:	Returned data. The data contains the yearly data object list of each device.	List	List of data of each year since the device is connected.
	devId	Device ID	Long	-
	collectTime	Collection time, expressed by 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 4.10 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
}
```

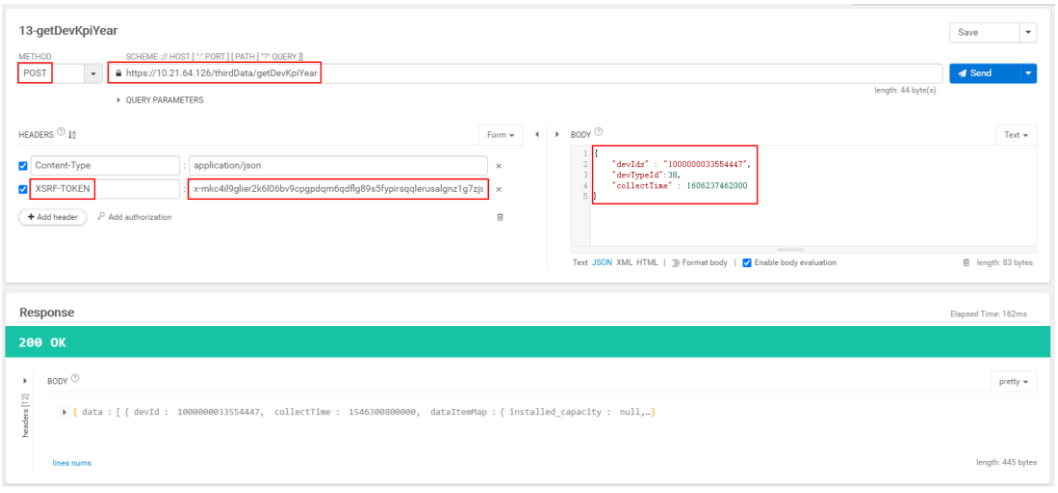
Example 2: The yearly device data is returned.

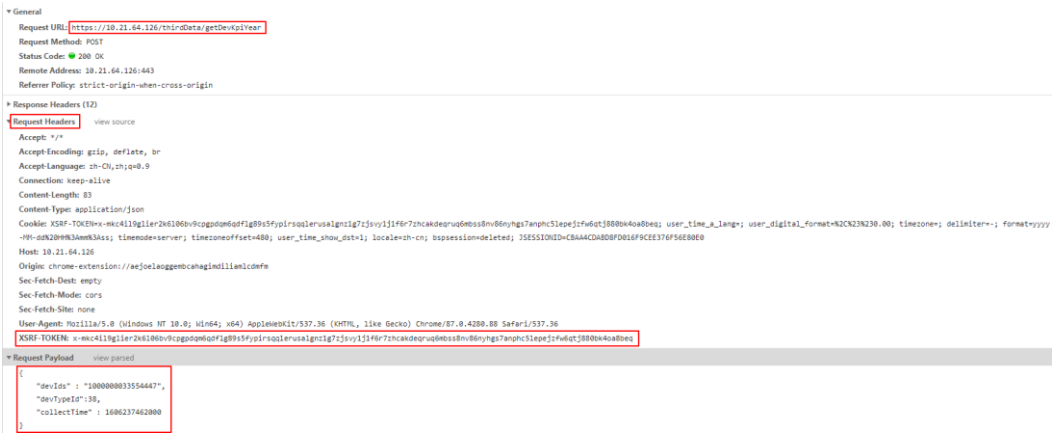
```
{
    "success":true,
    "data":[
        {
            "dataItemMap":{
                "installed capacity":30.24,
                "perpower ratio":null,
                "product_power":300
            },
            "devId":213472461631079,
            "collectTime":1501516800000
        }
  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

NOTE

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

Request example:





3.7 Device Alarm Interface

Description

This interface is used to query device alarms. A maximum of 100 plants can be queried at a time.

Request URL

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

Request Method

HTTP method: POST

Access Restrictions

The maximum number of access times of each NBI account per minute is 1.

The data on this interface is updated every 5 minutes. It is recommended that the interface be invoked every 5 minutes at most.

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

Request Parameters

Parameter	Description	Data Type	Mandatory/Optional
stationCodes	Plant ID list. Multiple plant IDs are separated by commas (,).	String	Mandatory
beginTime	Start time in milliseconds	Long	Mandatory
endTime	End time in milliseconds	Long	Mandatory

Parameter	Description	Data Type	Mandatory/Optional
language	Language. The value must be **zh_CN**, **en_UK**, **ja_JP**, **it_IT**, **nl_NL**, **pt_BR**, **de_DE**, **fr_FR**, **es_ES**, or **po_PO**. zh_CN: Chinese en_UK: English ja_JP: Japanese it_IT: Italian nl_NL: Dutch pt_BR: Portuguese de_DE: German fr_FR: French es_ES: Spanish po_PO: Polish	String	Mandatory
status	Alarm status. Multiple alarm states are separated by commas (,), for example, **1,2**. If this parameter is not transferred or is left empty, alarms in all states are queried by default. The following alarm states are supported: **1**: not processed (active) **2**: acknowledged (by the user) **3**: being handled (transferred to a defect elimination ticket) **4**: handled (defect handling has ended) **5**: cleared (by the user) **6**: cleared (automatically by the device)	String	Optional
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. The following alarm severities are supported: **1**: critical **2**: Major **3**: Minor **4**: Warning	String	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. The following device types are supported:	String	Optional

Parameter	Description	Data Type	Mandatory/Optional
	1: String inverter **2**: SmartLogger **8**: Transformer **10**: EMI **13**: Protocol converter **16**: General device **17**: Grid meter **22**: PID **37**: Pinnet data logger **38**: Residential inverter **39**: Battery **40**: Backup box **45**: PLC **46**: Optimizer **47**: Power Sensor **62**: Dongle **63**: Distributed SmartLogger **70**: Safety box		
types	Alarm type. Multiple alarm types are separated by commas (,), for example, **1,2**. If this parameter is not transferred or is left empty, alarms of all types are queried by default. The following alarm types are supported: **1**: transposition signal **2**: exception alarm **3**: protection event **4**: notification status **5**: alarm information	String	Optional
devName	Device name. If this parameter is not transferred or is left empty, the device names in the alarms are not filtered.	String	Optional

Response Packet

Parameter	Description	Data Type	Remarks
success	Request success or failure flag true: The request succeeded.	boolean	Request success or failure

Parameter		Description	Data Type	Remarks
		false: The request failed.		flag
failCode		Error code 0 indicates that the status is normal. For definitions of other error codes, see 7 Error Code List.	Integer	-
params	The following parameters are included:	-	-	-
	stationCodes	Plant ID list in the request parameter	String	-
	beginTime	Start time in milliseconds in the request parameter	Long	-
	endTime	End time in milliseconds in the request parameter	Long	-
	language	Language in the request parameter	String	-
	status	Status in the request parameter	String	
	levels	Alarm severity in the request parameter	String	-
	devTypes	Device type in the request parameter	String	-
	types	Alarm type in the request parameter	String	
	devName	Device name in the request parameter	String	
	currentTime	Current system time, expressed by milliseconds	Long	-
message		Optional message	String	-
data	The following parameters are included:	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	Repair suggestion	String	-
	esnCode	Device SN	String	-

Parameter		Description	Data Type	Remarks
	devTypeId	Device type ID The following device types are supported: **1**: String inverter **2**: SmartLogger **8**: Transformer **10**: EMI **13**: Protocol converter **16**: General device **17**: Grid meter **22**: PID **37**: Pinnet data logger **38**: Residential inverter **39**: Battery **40**: Backup box **45**: PLC **46**: Optimizer **47**: Power Sensor **62**: Dongle **63**: Distributed SmartLogger **70**: Safety box	Integer	-
	causeId	Cause ID	Integer	-
	alarmCause	Alarm cause	String	-
	alarmType	Alarm type The following alarm types are supported: **1**: transposition signal **2**: exception alarm **3**: protection event **4**: notification status **5**: alarm information	Integer	-
	raiseTime	Alarm generation time in milliseconds	Long	-
	alarmId	Alarm ID	Integer	-
	stationName	Plant name	String	-
	lev	Alarm severity The following alarm severities are supported:	Integer	-

Parameter		Description	Data Type	Remarks
		1: critical **2**: Major **3**: Minor **4**: Warning		
	status	Alarm status The following alarm states are supported: **1**: not processed (active) **2**: acknowledged (by the user) **3**: being handled (transferred to a defect elimination ticket) **4**: handled (defect handling has ended) **5**: cleared (by the user) **6**: cleared (automatically by the device)	Integer	-

Examples

Request example:

```
{
   "stationCodes":"NE=33554434,NE=33554467",
   "beginTime":1505337987000,
   "endTime":1607447501000,
   "language":"zh_CN",
   "status":"1,2,3,4,5,6",
   "levels":"1,2,3,4",
   "devTypes":"1,2,38,46,62",
   "types":"1,2,3,4,5"
}
```

Response example:

Example 1: An error code is returned.

```
{
   "data":null,
   "failCode":20010,
   "message":null,
   "params":{
      "currentTime":1606479094342,
      "types":"1,2,3,4,5",
      "language":"zh CN",
      "beginTime":1505337987000,
      "devTypes":"1,2,38,46,62",
      "endTime":1607447501000,
```

```
      "devName":"",
      "levels":"1,2,3,4",
      "stationCodes":"",
      "status":"1,2,3,4,5,6"
   },
   "success":false
}
```


Example 2: Alarm data of the device is returned.

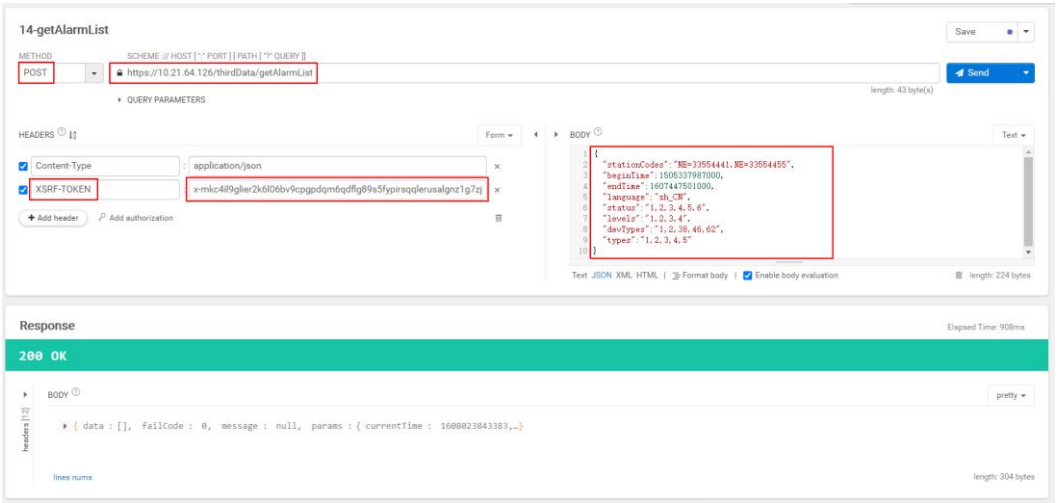

```
{
   "data": [
      {
"alarmCause": "The PV string arcs or is in poor contact. (string-level precise
detection)"
         "alarmId": 2003,
"alarmName": "DC arc fault"
         "alarmType": 2,
         "causeId": 1,
         "devName": "ESN03337000000000001",
         "devTypeId": 38,
         "esnCode": "ESN03337000000000001",
         "lev": 2,
         "raiseTime": 1606418089000,
"repairSuggestion": "Check whether the PV string has arcs or is in poor contact. \n
The following is the mapping between PV strings and alarm cause IDs:\n ID1: string 1."
         "stationCode": "NE=33554434",
         "stationName": "myStation",
         "status": 1
      },
      {
"alarmCause": "1. The flash memory space is insufficient. \n 2. The flash memory has
bad sectors."
         "alarmId": 61440,
"alarmName": "The monitoring unit is faulty.",
         "alarmType": 2,
         "causeId": 1,
         "devName": "ESN03337000000000001",
         "devTypeId": 38,
         "esnCode": "ESN03337000000000001",
         "lev": 2,
         "raiseTime": 1606418089000,
         "repairSuggestion": "Turn off the AC output switch and DC input switch, and
then turn them on after 5 minutes. If the fault persists, replace the monitoring board
or contact your dealer or Huawei technical support."
         "stationCode": "NE=33554434",
         "stationName": "myStation",
         "status": 1
      }
   ],
   "failCode": 0,
   "message": null,
   "params": {
      "currentTime": 1606479126223,
      "types": "1,2,3,4,5",
      "language": "zh_CN",
```

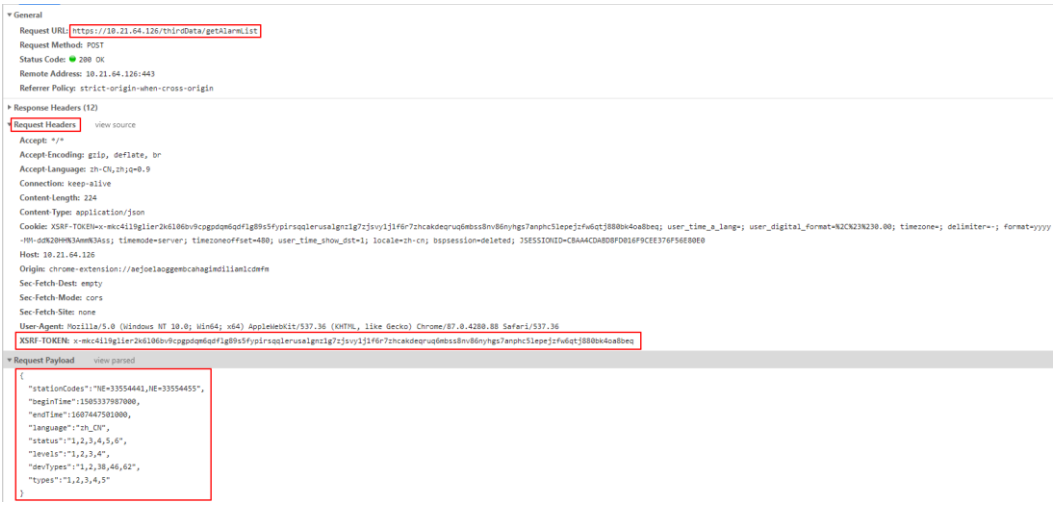
```
        "beginTime": 1505337987000,
        "devTypes": "1,2,38,46,62",
        "endTime": 1607447501000,
        "devName": "",
        "levels": "1,2,3,4",
        "stationCodes": "NE=33554434,NE=33554467",
        "status": "1,2,3,4,5,6"
    },
    "success": true
}
```

NOTE

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

Request example:





4 List of Northbound Interface Indicators

4.1 Real-Time Plant Data Interface

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 value changes with the currency type (exchange rate conversion is not performed).	Double
total_income	Total revenue	The value changes with the currency type (exchange rate	Double

Key	Name	Unit	Return Value Type
		conversion is not performed).	
real_health_state	Plant health status The following plant health states are supported: **1**: disconnected **2**: faulty 3: healthy	N/A	Integer

4.2 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	Grid feed-in	kWh	Double
power_profit	Revenue	The value changes with the currency type (exchange rate conversion is not performed).	Double

4.3 Daily Plant Data Interface

Key	Name	Unit	Return Value Type

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	Grid feed-in	kWh	Double
use_power	Consumption	kWh	Double
power_profit	Revenue	The value changes with the currency type (exchange rate conversion is not performed).	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 tree planted	N/A	Double

4.4 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	Grid feed-in	kWh	Double

Key	Name	Unit	Return Value Type
use_power	Consumption	kWh	Double
power_profit	Revenue	The value changes with the currency type (exchange rate conversion is not performed).	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 tree planted	N/A	Double

4.5 Yearly 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	Grid feed-in	kWh	Double
use_power	Consumption	kWh	Double
power_profit	Revenue	The value changes with the currency type (exchange rate conversion	Double

Key	Name	Unit	Return Value Type
		is not performed).	
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 tree planted	N/A	Double

4.6 Real-Time Device Data Interface

Device Type	Key	Name	Unit	Return Value Type
ID: 1 String inverter	inverter_state	For details about inverter status, see Table 4-1.	N/A	Double
	ab_u	Grid AB voltage	V	Double
	bc_u	Grid BC voltage	V	Double
	ca_u	Grid CA voltage	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	A	Double
	b_i	Phase B current	A	Double
	c_i	Phase C current	A	Double
	efficiency	Inverter efficiency (manufacturer)	%	Double
	temperature	Inverter internal temperature	℃	Double
	power_factor	Power factor	N/A	Double
	elec_freq	Grid frequency	Hz	Double
	active_power	Active power	kW	Double

Device Type	Key	Name	Unit	Return Value Type
	reactive_power	Reactive output 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
	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
	pv1_i	PV1 input current	A	Double

Device Type	Key	Name	Unit	Return Value Type
	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
	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
	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

Device Type	Key	Name	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
	mppt_5_cap	MPPT 5 DC total yield	kWh	Double
	mppt_6_cap	MPPT6 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	MPPT9 DC total yield	kWh	Double
	mppt_10_cap	MPPT 10 DC total yield	kWh	Double
	run_state	Status (**0**: disconnected; **1**: connected)	N/A	Long
ID: 38 Residential inverter	inverter_state	For details about inverter status, see Table 4-1.	N/A	Double
	ab_u	Grid AB voltage	V	Double
	bc_u	Grid BC voltage	V	Double
	ca_u	Grid CA voltage	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	A	Double
	b_i	Phase B current	A	Double
	c_i	Phase C current	A	Double
	efficiency	Inverter efficiency (manufacturer)	%	Double

Device Type	Key	Name	Unit	Return Value Type
	temperature	Inverter internal temperature	°C	Double
	power_factor	Power factor	N/A	Double
	elec_freq	Grid frequency	Hz	Double
	active_power	Active power	kW	Double
	reactive_power	Reactive output 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	Name	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
	run_state	Status (0: disconnected; 1: connected)	N/A	Long
ID: 10 EMI	temperature	Temperature	°C	Double
	pv_temperature	PV temperature	°C	Double
	wind_speed	Wind speed	m/s	Double
	wind_direction	Wind direction	How	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	Status (**0**: disconnected; **1**: connected)	N/A	Long
ID: 17 Grid meter	ab_u	Grid AB voltage	V	Double
	bc_u	Grid BC voltage	V	Double
	ca_u	Grid CA voltage	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 (IA)	A	Double
	b_i	Phase B current (IB)	A	Double
	c_i	Phase C current (IC)	A	Double
	active_power	Active power	kW	Double

Device Type	Key	Name	Unit	Return Value Type
	power_factor	Power factor	N/A	Double
	active_cap	Active energy (forward active energy)	kWh	Double
	reactive_power	Reactive power	kVar	Double
	reverse_active_cap	Reverse active energy	kWh	Double
	forward_reactive_cap	Forward reactive energy	kWh	Double
	reverse_reactive_cap	Reverse 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	Reverse active energy (peak)	kWh	Double
	reverse_active_power	Reverse active energy (shoulder)	kWh	Double
	reverse_active_valley	Reverse active energy (off-peak)	kWh	Double
	reverse_active_top	Reverse active energy (sharp)	kWh	Double
	positive_active_peak	Forward active energy (peak)	kWh	Double
	positive_active_power	Forward active energy (shoulder)	kWh	Double
	positive_active_valley	Forward active energy (off-peak)	kWh	Double
	positive_active_top	Forward active	kWh	Double

Device Type	Key	Name	Unit	Return Value Type
		energy (sharp)		
	reverse_reactive_peak	Reverse reactive energy (peak)	kVar	Double
	reverse_reactive_power	Reverse reactive energy (shoulder)	kVar	Double
	reverse_reactive_valley	Reverse reactive energy (off-peak)	kVar	Double
	reverse_reactive_top	Reverse reactive energy (sharp)	kVar	Double
	positive_reactive_peak	Forward reactive energy (peak)	kVar	Double
	positive_reactive_power	Forward reactive energy (shoulder)	kVar	Double
	positive_reactive_valley	Forward reactive energy (off-peak)	kVar	Double
	positive_reactive_top	Forward reactive energy (sharp)	kVar	Double
ID: 47 Power sensor	meter_status	Meter status (**0**: offline; **1**: normal)	N/A	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	N/A	Double
	grid_frequency	Grid frequency	Hz	Double
	active_cap	Active energy (forward active energy)	kWh	Double
	reverse_active_cap	Reverse active energy	kWh	Double
	run_state	Status (**0**: disconnected; **1**: connected)	N/A	Long
ID: 39 Battery (only LG batteries	battery_status	Battery running status (**0**: offline; **1**: standby; **2**: running; **3**: faulty; **4**:	N/A	Double

Device Type	Key	Name	Unit	Return Value Type
are supported)		hibernation)		
	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 state of charge (SOC)	%	Double
	battery_soh	Battery state of health (SOH)	N/A	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)	N/A	Double
	charge_cap	Charging capacity	kWh	Double
	discharge_cap	Discharging capacity	kWh	Double
	run_state	Status (**0**: disconnected; **1**: connected)	N/A	Long

Table 4-1 Inverter status (**inverter_state**)

Status Value	Description
0	Standby: initializing
1	Standby: insulation resistance detection
2	Standby: sunlight detection
3	Standby: power grid detection
256	Start
512	Grid connection

Status Value	Description
513	Grid connection: limited power
514	Grid connection: self-derating
768	Shutdown: unexpected shutdown
769	Shutdown: commanded shutdown
770	Shutdown: OVGR
771	Shutdown: communication disconnection
772	Shutdown: limited power
773	Shutdown: manual startup is required
774	Shutdown: DC switch disconnected
1025	Grid scheduling: cosψ-P curve
1026	Grid scheduling: Q-U curve
1280	Spot-check ready
1281	Spot-checking
1536	Inspecting
1792	AFCI self-check
2048	I-V scanning
2304	DC input detection
40960	Standby: no sunlight
45056	Communication disconnection (written by the SmartLogger)
49152	Loading (written by the SmartLogger)

4.7 5-minute Device Data Interface

Device Type	Key	Name	Unit	Return Value Type
ID: 1 String inverter	inverter_state	For details about inverter status, see Table 4-2.	N/A	Double
	ab_u	Grid AB voltage	V	Double
	bc_u	Grid BC voltage	V	Double

Device Type	Key	Name	Unit	Return Value Type
	ca_u	Grid CA voltage	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	A	Double
	b_i	Phase B current	A	Double
	c_i	Phase C current	A	Double
	efficiency	Inverter efficiency (manufacturer)	%	Double
	temperature	Inverter internal temperature	°C	Double
	power_factor	Power factor	N/A	Double
	elec_freq	Grid frequency	Hz	Double
	active_power	Active power	kW	Double
	reactive_power	Reactive output 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

Device Type	Key	Name	Unit	Return Value Type
	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
	pv23_u	PV23 input voltage	V	Double
	pv24_u	PV24 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

Device Type	Key	Name	Unit	Return Value Type
	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
	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	MPPT6 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	MPPT9 DC total yield	kWh	Double
	mppt_10_cap	MPPT 10 DC total yield	kWh	Double
ID: 38	inverter_state	For details about inverter status, see	N/A	Double

Device Type	Key	Name	Unit	Return Value Type
Residential inverter		Table 4-2.		
	ab_u	Grid AB voltage	V	Double
	bc_u	Grid BC voltage	V	Double
	ca_u	Grid CA voltage	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	A	Double
	b_i	Phase B current	A	Double
	c_i	Phase C current	A	Double
	efficiency	Inverter efficiency (manufacturer)	%	Double
	temperature	Inverter internal temperature	°C	Double
	power_factor	Power factor	N/A	Double
	elec_freq	Grid frequency	Hz	Double
	active_power	Active power	kW	Double
	reactive_power	Reactive output 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

Device Type	Key	Name	Unit	Return Value Type
	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 EMI	temperature	Temperature	°C	Double
	pv_temperature	PV temperature	°C	Double
	wind_speed	Wind speed	m/s	Double
	wind_direction	Wind direction	How	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 Grid meter	ab_u	Grid AB voltage	V	Double
	bc_u	Grid BC voltage	V	Double
	ca_u	Grid CA voltage	V	Double
	a_u	Phase A voltage (AC	V	Double

Device Type	Key	Name	Unit	Return Value Type
		output)		
	b_u	Phase B voltage (AC output)	V	Double
	c_u	Phase C voltage (AC output)	V	Double
	a_i	Phase A current (IA)	A	Double
	b_i	Phase B current (IB)	A	Double
	c_i	Phase C current (IC)	A	Double
	active_power	Active power	kW	Double
	power_factor	Power factor	N/A	Double
	active_cap	Active energy (forward active energy)	kWh	Double
	reactive_power	Reactive power	kVar	Double
	reverse_active_cap	Reverse active energy	kWh	Double
	forward_reactive_cap	Forward reactive energy	kWh	Double
	reverse_reactive_cap	Reverse 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	Reverse active energy (peak)	kWh	Double
	reverse_active_power	Reverse active energy (shoulder)	kWh	Double
	reverse_active_valle	Reverse active	kWh	Double

Device Type	Key	Name	Unit	Return Value Type
	y	energy (off-peak)		
	reverse_active_top	Reverse active energy (sharp)	kWh	Double
	positive_active_peak	Forward active energy (peak)	kWh	Double
	positive_active_power	Forward active energy (shoulder)	kWh	Double
	positive_active_valley	Forward active energy (off-peak)	kWh	Double
	positive_active_top	Forward active energy (sharp)	kWh	Double
	reverse_reactive_peak	Reverse reactive energy (peak)	kVar	Double
	reverse_reactive_power	Reverse reactive energy (shoulder)	kVar	Double
	reverse_reactive_valley	Reverse reactive energy (off-peak)	kVar	Double
	reverse_reactive_top	Reverse reactive energy (sharp)	kVar	Double
	positive_reactive_peak	Forward reactive energy (peak)	kVar	Double
	positive_reactive_power	Forward reactive energy (shoulder)	kVar	Double
	positive_reactive_valley	Forward reactive energy (off-peak)	kVar	Double
	positive_reactive_top	Forward reactive energy (sharp)	kVar	Double
ID: 47 Power Sensor	meter_status	Meter status (**0**: offline; **1**: normal)	N/A	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	N/A	Double
	grid_frequency	Grid frequency	Hz	Double
	active_cap	Active energy	kWh	Double

Device Type	Key	Name	Unit	Return Value Type
		(forward active energy)		
	reverse_active_cap	Reverse active energy	kWh	Double
ID: 39 Battery (only LG batteries are supported)	battery_status	Battery running status (**0**: offline; **1**: standby; **2**: running; **3**: faulty; **4**: hibernation)	N/A	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 state of charge (SOC)	%	Double
	battery_soh	Battery state of health (SOH)	N/A	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)	N/A	Double
	charge_cap	Charging capacity	kWh	Double
	discharge_cap	Discharging capacity	kWh	Double

Table 4-2 Inverter status (**inverter_state**)

Status Value	Description
0	Standby: initializing
1	Standby: insulation resistance detection
2	Standby: sunlight detection

Status Value	Description
3	Standby: power grid detection
256	Start
512	Grid-connected
513	Grid connection: limited power
514	Grid connection: self-derating
768	Shutdown: unexpected shutdown
769	Shutdown: commanded shutdown
770	Shutdown: OVGR
771	Shutdown: communication disconnection
772	Shutdown: limited power
773	Shutdown: manual startup is required
774	Shutdown: DC switch disconnected
1025	Grid scheduling: cosψ-P curve
1026	Grid scheduling: Q-U curve
1280	Spot-check ready
1281	Spot-checking
1536	Inspecting
1792	AFCI self-check
2048	I-V scanning
2304	DC input detection
40960	Standby: no sunlight
45056	Communication disconnection (written by the SmartLogger)
49152	Loading (written by the SmartLogger)

4.8 Daily Device Data Interface

Device Type	Key	Name	Unit	Return Value Type
ID: 39 Battery (only	charge_cap	Charging capacity	kWh	Double
	discharge_cap	Discharging capacity	kWh	Double

Device Type	Key	Name	Unit	Return Value Type
LG batteries are supported)	charge_time	Charging duration	h	Double
	discharge_time	Discharging duration	h	Double
ID: 1 String inverter	installed_capacity	Installed capacity	kW	Double
	product_power	Yield	kWh	Double
	perpower_ratio	Specific energy (kWh/kWp)	h	Double
ID: 38 Residential inverter	installed_capacity	Installed capacity	kW	Double
	product_power	Yield	kWh	Double
	perpower_ratio	Specific energy (kWh/kWp)	h	Double

4.9 Monthly Device Data Interface

Device Type	Key	Name	Unit	Return Value Type
ID: 39 Battery (only LG batteries are supported)	charge_cap	Charging capacity	kWh	Double
	discharge_cap	Discharging capacity	kWh	Double
	charge_time	Charging duration	h	Double
	discharge_time	Discharging duration	h	Double
ID: 1 String inverter	installed_capacity	Installed capacity	kW	Double
	product_power	Yield	kWh	Double
	perpower_ratio	Specific energy (kWh/kWp)	h	Double
ID: 38 Residential inverter	installed_capacity	Installed capacity	kW	Double
	product_power	Yield	kWh	Double
	perpower_ratio	Specific energy (kWh/kWp)	h	Double

4.10 Yearly Device Data Interface

Device Type	Key	Name	Unit	Return Value Type
ID: 39 Battery (only LG batteries are supported)	charge_cap	Charging capacity	kWh	Double
	discharge_cap	Discharging capacity	kWh	Double
	charge_time	Charging duration	h	Double
	discharge_time	Discharging duration	h	Double
ID: 1 String inverter	installed_capacity	Installed capacity	kW	Double
	product_power	Yield	kWh	Double
	perpower_ratio	Specific energy (kWh/kWp)	h	Double
ID: 38 Residential inverter	installed_capacity	Installed capacity	kW	Double
	product_power	Yield	kWh	Double
	perpower_ratio	Specific energy (kWh/kWp)	h	Double

5 V7 Interface Reference

5.1 Security Management Interfaces

5.1.1 Login Interface

Interface Description

This is the login interface for northbound management. You must log in to the system through the login interface before obtaining data. Contact Huawei technical support engineers to obtain the login user name and password.

Request URL

https://x.x.x.x:27200/rest/openapi/pvms/v1/login

Request Mode

HTTP method: POST

Interface Invoking Suggestion

Each time you successfully log in to the system through this interface, a new XSRF-TOKEN message is returned, consuming a client login resource. The idle timeout interval of the XSRF-TOKEN message is 30 minutes. Therefore, if you need to reinvoke the WebService interface for multiple times within 30 minutes, reuse XSRF-TOKEN. If XSRF-TOKEN is invalid, error 305 is returned.

The maximum number of access times of each NBI account per minute is 1.

It is recommended that the interface be invoked every 30 minutes.

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

Request Parameters

Parameter	Description	Data Type	Mandatory/Optional
username	User name of the third-party system	String	Mandatory
password	Password of the third-party system	String	Mandatory

Response Packet

Parameter	Description	Data Type	Remarks
success	Request success or failure flag true: The request succeeded. false: The request failed.	boolean	Request success or failure flag
failCode	Error code 0 indicates that the status is normal. For definitions of other error codes, see 7 Error Code List.	Integer	-
message	Optional message	String	-

NOTICE

The header of the login success response contains the XSRF-TOKEN parameter 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.

Example

Request example:


```
{
  "username": "admin4",
  "password": "Admin@1234"
}
```

Response example:

Example 1: successful login

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

Example 2: failed login

```
{
  "failCode": 20001,
  "message": "",
  "success": false
}
```

NOTICE

- The header of the login success response contains the XSRF-TOKEN parameter 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.
- The validity period of XSRF-TOKEN is 30 minutes. The time starts when the system receives the last interaction request.

5.1.2 Logout Interface

Interface Description

This is the interface used to log out a northbound user.

Request URL

https://x.x.x.x:27200/rest/openapi/pvms/v1/logout

Request Mode

HTTP method: POST

Interface Invoking Suggestion

If the XSRF-TOKEN is not used for a long time, you can invoke this interface to release the XSRF-TOKEN.

The maximum number of access times of each NBI account per minute is 1.

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 third-party system successfully logs in through the login interface.	String	Mandatory

Response Packet

Parameter	Description	Data Type	Remarks
success	Request success or failure flag true: The request succeeded. false: The request failed.	boolean	Request success or failure flag
failCode	Error code 0 indicates that the status is normal. For definitions of other error codes, see 7 Error Code List.	Integer	-
message	Optional message	String	-

Example

Request URL example:

```
{
  "xsrfToken":
"x-apepjy1fpd2ptete1f7zuqimep7wuqen9hkb3xaourelbyrx9jio7s09hgk6ca2mdlksjdglasdhjak
lsdfhhdsahwedyuioqwehjkd"
}
```

Response example:

Example 1: successful logout

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

Example 2: failed logout


```
{
  "success": false,
  "failCode": 20004,
  "message": null
}
```

5.2 Configuration Management Interfaces

5.2.1 Interface for Power Plant List Querying

Interface Description

This interface is used to obtain the basic information about a power plant. Before opening other interfaces, you need to configure this interface.

Request URL

https://x.x.x.x:27200/rest/openapi/pvms/v1/plants

Request Mode

HTTP method: POST

Interface Invoking Suggestion

The maximum number of access times of each NBI account per minute is 1.

The data on this interface will not be updated if the plant information has not changed. It is recommended that this interface be invoked at most once an hour.

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

Request Parameters

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 10, 20, 30, 50, or 100.	Integer	Mandatory

NOTE

- After the plant list is obtained and the page No. and number of results on each page are specified, the backend obtains the plant resources of the user. If the returned data is incomplete, contact Huawei engineers to check whether the user is bound.
- The VPP user can register and bind a PV plant through the registration interface.
- Only logged-in users can obtain the plant list.

- This interface does not need to be invoked each time. It is recommended that the third-party system obtain the PV plant list once a day, update the PV plant list, and save the list to the third-party system.
- Deleted PV plants will not be displayed.

Response Packet

Parameter	Description	Data Type	Remarks
success	Request success or failure flag true: The request succeeded. false: The request failed.	boolean	Request success or failure flag
failCode	Error code 0 indicates that the status is normal. For definitions of other error codes, see 7 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	String	-

Parameter	Description	Data Type	Remarks
	email address		
>> gridConnectionDate	Grid connection time of the plant, including the time zone	String	2020-02-06T00:00:00 +08:00

Example

Request example:

```
{
  "pageNo": 1,
  "pageSize": 10
}
```

Response example:

Example 1: An error code is returned.

```
{
  "success": false,
  "data": null,
  "failCode": 20004,
  "message": null
}
```

Example 2: The plant list is returned.

```
{
  "success": true,
  "data": [
    {
      "plantCode": "NE=12345678",
      "plantName": "NMplant1",
      "plantAddress": null,
      "longitude": null,
      "latitude": null,
      "capacity": 146.5,
      "contactPerson": "",
      "contactMethod": "",
      "gridConnectionDate": "2020-02-06T00:00:00+08:00"
    },
    {
      "plantCode": "NE=23456789",
      "plantName": "plant2",
      "plantAddress": null,
      "longitude": null,
      "latitude": null,
      "capacity": 123.3,
      "contactPerson": "",
      "contactMethod": "",
      "gridConnectionDate": "2020-02-06T00:00:00+08:00"
    }
  ],
```



```
  "failCode": 0,
  "message": null
}
```

5.2.2 Interface for Device List Querying

Interface Description

This interface is used to obtain basic device information. Before opening the device data interfaces, you must configure this interface. You can query device information by plant ID. A maximum of 100 plants can be queried at a time.

Request URL

https://x.x.x.x:27200/rest/openapi/pvms/v1/devices

Request Mode

HTTP method: POST

Interface Invoking Suggestion

The maximum number of access times of each NBI account per minute is 10.

The data on this interface will not be updated if the device information has not changed. It is recommended that this interface be invoked at most once an hour.

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

Request Parameters

Parameter	Description	Data Type	Mandatory/Optional
plantCodes	Plant ID list. Plant IDs are separated by commas (,).	String	Mandatory
deviceTypeId	Device type ID. For details, see 6 Device Type List.	Integer	Optional. When the device type is specified, only devices of the specified type are returned.
pageNo	Page No. of the results	Integer	Mandatory
pageSize	Number of results on each page. The value can be 10, 20, 30, 50, or 100.	Integer	Mandatory

NOTE

- Input parameters are required to obtain the device list under a plant. The background obtains the device resources of the third-party login user. If the returned data is incomplete, contact Huawei engineers to check whether the third-party user is bound.
- Only logged-in users can obtain the device list.
- This interface does not need to be invoked each time. It is recommended that the third-party system obtain the device list once a day, update the device list, and save the list to the third-party system.

Response Packet

Parameter	Description	Data Type	Remarks
success	Request success or failure flag true: The request succeeded. false: The request failed.	boolean	Request success or failure flag
failCode	Error code 0 indicates that the status is normal. For definitions of other error codes, see 7 Error Code List.	Integer	-
message	Optional message	String	-
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	Device information list. The device information is as follows:	List	List of device-related data objects
>> plantCode	Plant ID	String	-
>> deviceTypeId	Device type ID. For details, see 6 Device Type List.	Integer	-
>> dn	Unique device ID in the system	String	-
>> sn	Device SN	String	-
>> deviceName	Device name	String	-
>> dataItemMap	The content of each data item is returned in key-value	Map	Basic device information, which

Parameter	Description	Data Type	Remarks
	format. Map<String,Object>		varies depending on the device type.

Basic Device Information Dataset

Device Type	Device Type ID	key	Item	Unit	Return Value Type
MPPT	20811				
PV	20812				
PV module	20813				
Optimizer	20814				
Battery	20815	model	Battery model	-	String
		ratedCapacity	Rated capacity	kWh	Double
		usableCapacity	Available capacity	kWh	Double
		dod	Depth of discharge of the battery	Percentage	Double
Meter	20816				
Backup Box	20817				
Safety box	20818				
Communication module	20819				
SmartLogger	20821				
Inverter	208	model	Inverter model	-	String

Device Type	Device Type ID	key	Item	Unit	Return Value Type
	22	ratedPower	Rated power	kW	Double
		softwareVersion	Software version	-	String
		optimizerNumber	Quantity of optimizers	-	Integer
Environmental monitoring instrument	20824				
PID	20825				
PLC	20826				
Central inverter	20827				
DC combiner box	20828				
STS	20829				
STS meter	20830				
AC combiner box	20831				
Communication management unit	20833				

Example

Request example:

```
{
  "plantCodes": "NE=12345678,NE=23456789"
}
```


Response example:

Example 1: An error code is returned.

```
{
  "success": false,
  "data": null,
  "failCode": 20007,
  "message": null
}
```

Example 2: The device list is returned.

```
{
  "success": true,
  "data": [
    {
      "plantCode": "NE=12345678",
      "dn": "NE=33333",
      "sn": "5fbfk4",
      "deviceName": "5fbfk4",
      "deviceTypeId": 20822,
      "dataItemMap": {
        "model": "SUN2000L",
        "ratedPower": 12.0,
        "softwareVersion": "V100R001C00SPC333"
      }
    },
    {
      "plantCode": "NE=23456789",
      "dn": "NE=44444",
      "sn": "6fbfk11",
      "deviceName": "6fbfk11",
      "deviceTypeId": 20822,
      "dataItemMap": {
        "model": "SUN2000L",
        "ratedPower": 12.0,
        "softwareVersion": "V100R001C00SPC333"
      }
    }
  ],
  "failCode": 0,
  "message": null
}
```

5.3 Interfaces for Virtual Power Plants

The interfaces provide basic plant data query, battery charge/discharge task management, and remote shutdown management capabilities of the virtual power plants (VPPs).

5.3.1 Plant SN Registration Interface

Interface Description

This interface is used to register a power plant with no permission based on the device SN and authorize the plant to which the device belongs to the VPP.

Request URL

https://x.x.x.x:27200/rest/openapi/pvms/v1/vpp/snEnrolment

Request Mode

HTTP method: POST

Interface Invoking Suggestion

Invoke the interface as required. You do not need to register the plant that has been registered successfully.

The maximum number of access times of each NBI account per minute is 10.

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

Request Parameters

Parameter	Description	Data Type	Mandatory/Optional
devices	Device ID list. A maximum of 1000 SNs can be registered at a time	List	Mandatory
> sn	Device SN, and SN of any inverter, SmartLogger, or Dongle in the plant. Only one SN in a plant needs to be registered.	String	Mandatory
> username	Login account of the owner under in the SmartPVMS	String	Mandatory At least one of the three parameters must be set.
> email	Verified email address of the owner in the SmartPVMS system	String	
> phone	Verified mobile phone number of the owner in the SmartPVMS system	String	

NOTE

- At least one of username, email address, and phone number must be entered, and the user information must be associated with the corresponding plant in the SmartPVMS. Otherwise, the registration fails.

Response Packet

Parameter	Description	Data Type	Remarks
success	Request success or failure flag true: The request succeeded. false: The request failed.	boolean	Request success or failure flag
failCode	Error code 0 indicates that the status is normal. For definitions of other error codes, see 7 Error Code List.	Integer	-
message	Optional response message	-	-
data	The returned data contains the following device and plant registration status information:	List	-
> sn	Device SN	String	-
> success	Registration result: true: succeeded (If different SNs of the same PV plant are registered, this message is also returned.) false: failed	Boolean	-
> errorMsg	Registration failure cause description	String	-
> plantCode	Plant ID, which uniquely identifies a plant.	String	If the registration fails, the value is null.
> plantName	Plant name	String	If the registration fails, the value is null.

Example

Request example:

```
{
  "devices": [
    {
```

```
    "sn": "HV1920000027",
    "username": null,
    "phone": null,
    "email": "mark@email.com"
   },
   {
    "sn": "HV1920000028",
    "username": null,
    "phone": null,
    "email": "mark@email.com"
   }
  ]
}
```

Response example:

Example 1: An error code is returned.

```
{
  "success": false,
  "data": null,
  "failCode": 20004,
  "message": null
}
```

Example 2: The plant registration result is returned.

```
{
  "success": true,
  "data": [
    {
      "sn": "HV1920000027",
      "success": true,
      "errorMsg": "",
      "plantCode": "DN=822AB065017416F",
      "plantName": "Mark's Palnt"
    },
    {
      "sn": "HV1920000028",
      "success": false,
      "errorMsg": "No SN/username, email, or phone number is found",
      "plantCode": null,
      "plantName": null
    }
  ],
  "failCode": 0,
  "message": null
}
```

5.3.2 Plant AC Registration Interface

Interface Description

This interface is used to register a power plant with no permission based on the device authorization code (AC) and authorize the plant to which the device belongs to the VPP.

Request URL

https://x.x.x.x:27200/rest/openapi/pvms/v1/vpp/acEnrolment

Request Mode

HTTP method: POST

Interface Invoking Suggestion

Invoke the interface as required. You do not need to register the plant that has been registered successfully.

The maximum number of access times of each NBI account per minute is 10.

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

Request Parameters

Parameter	Description	Data Type	Mandatory/Optional
authorizationCodes	List of authorization codes bound to the plant. A maximum of 1000 authorization codes can be registered at a time. Multiple authorization codes are separated by commas (,).	String	Mandatory

NOTE

- **authorizationCode** is the authorization code bound to the plant. The authorization code is entered and bound by the installer when the plant is created in the system.
- Ensure that the installer has correctly entered the AC.
- For VPPs in South Australia, the National Metering Identifier (NMI) that contains the parity bit and has a length of 11 bits is the authorization code.

Response Packet

Parameter	Description	Data Type	Remarks
success	Request success or failure flag true: The request succeeded. false: The request failed.	boolean	Request success or failure flag
failCode	Error code 0 indicates that the status is normal. For definitions of other error codes, see 7 Error Code List.	Integer	-

Parameter	Description	Data Type	Remarks
message	Optional response message	-	-
data	The returned data contains the following device and plant registration status information:	List	-
> authorizationCode	Authorization code bound to the plant	String	-
> success	Registration result: **true**: success false: failed	Boolean	-
> errorMsg	Registration failure cause description	String	-
> plantCode	Plant ID, which uniquely identifies a plant.	String	If the registration fails, the value is null.
> plantName	Plant name	String	If the registration fails, the value is null.

Example

Request example:

```
{
  "authorizationCodes": "20019857328,QAAAVZZZZZ3"
}
```

Response example:

Example 1: An error code is returned.

```
{
  "success": false,
  "data": null,
  "failCode": 20004,
  "message": null
}
```

Example 2: The plant registration result is returned.

```
{
  "success": true,
  "data": [
    {
      "authorizationCode": "20019857328",
      "success": true,
      "errorMsg": "",
      "plantCode": "DN=822AB065017416F",
      "plantName": "Mark's Palnt"
```



```
    },
    {
      "authorizationCode": "QAAAVZZZZZ3",
      "success": false,
      "errorMsg": "Not found authorization code",
      "plantCode": null,
      "plantName": null
    }
  ],
  "failCode": 0,
  "message": null
}
```


5.3.3 Basic Plant Information Interface

Interface Description

This interface is used to obtain basic plant information based on plant codes. A maximum of 100 plant codes can be queried at a time.

The plant accessed through this interface must be a plant that is successfully registered through the plant registration interface or a plant bound to the system.

Request URL

https://x.x.x.x:27200/rest/openapi/pvms/v1/vpp/plants

Request Mode

HTTP method: POST

Interface Invoking Suggestion

The maximum number of access times of each NBI account per minute is 1.

The data on this interface will not be updated if the plant information has not changed. It is recommended that this interface be invoked at most once an hour.

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

Request Parameters

Parameter	Description	Data Type	Mandatory/Optional
plantCodes	Plant code list. Plants are separated by commas (,).	String	Mandatory

Response Packet

Parameter	Description	Data Type	Remarks

Parameter	Description	Data Type	Remarks
success	Request success or failure flag true: The request succeeded. false: The request failed.	boolean	Request success or failure flag
failCode	Error code 0 indicates that the status is normal. For definitions of other error codes, see 7 Error Code List.	Integer	-
message	Optional message	String	-
data	Returned data, which contains the all device data, including the following information:	List	Device information
> plantCode	Plant code	String	-
> address	Plant address	String	-
> longitude	Longitude	Double	-
> latitude	Latitude	Double	-
> installationTime	Plant creation time, including the time zone information	String	2020-02-06T00:00:00+08:00
> inverterPower	Rated power of inverters. If multiple inverters exist, the value is the total rated power of all inverters.	Double	watt
> capacity	Installed capacity	Double	kWp
> inverterModel	Inverter model. If multiple models of inverters exist, the models are separated by commas (,).	String	-
> batteryInstallCapacity	Rated battery capacity. If multiple batteries exist, the value is the total capacity of all batteries.	Double	kWh
> batteryUsableCapacity	Available battery capacity (rated battery capacity x SOC x SOH). If multiple batteries exist, the value is the total available capacity of all batteries.	Double	kWh
> batteryModel	Battery model. If multiple models of batteries exist, the models are separated by	String	-

Parameter	Description	Data Type	Remarks
	commas (,).		

Example

Request example:

```
{
  "plantCodes": "NE=12345678,NE=23456789"
}
```

Response example:

Example 1: An error code is returned.

```
{
  "success": false,
  "data": null,
  "failCode": 20007,
  "message": null
}
```

Example 2: The basic plant information is returned.

```
{
  "success": true,
  "data": [
    {
      "plantCode": "NE=12345678",
      "address": "xx Rai Dr, CRESTMEAD QLD xxx",
      "longitude": 153.069656,
      "latitude": -30.689608,
      "installationTime": "2020-02-06T08:10:05+08:00",
      "inverterPower": 5000,
      "pvPower": 7000.05,
      "inverterModel": "SUN2000-17KTL",
      "batteryInstallCapacity": 12.00,
      "batteryUsableCapacity": 12.00,
      "batteryModel": "HUAWEI-LUNA2000"
     },
    {
      "plantCode": "NE=23456789",
      "address": "xx Rai Dr, CRESTMEAD QLD xxxx",
      "longitude": 153.069656,
      "latitude": -30.689608,
      "installationTime": "2020-02-06T08:10:05+08:00",
      "inverterPower": 5000,
      "pvPower": 7000.05,
      "inverterModel": "SUN2000-17KTL",
      "batteryInstallCapacity": 12.00,
      "batteryUsableCapacity": 12.00,
      "batteryModel": "HUAWEI-LUNA2000"
    }
```



```
 ],
 "failCode": 0,
 "message": null
}
```

5.3.4 Interface for Real-time Plant Data

Interface Description

This interface is used to obtain the real-time statistics of plants. You can query statistics by plant ID. A maximum of 100 plants can be queried at a time.

The plant accessed through this interface must be a plant that is successfully registered through the plant registration interface or a plant bound to the system.

Request URL

https://x.x.x.x:27200/rest/openapi/pvms/v1/vpp/plantRealtimeKpi

Request Mode

HTTP method: POST

Interface Invoking Suggestion

The maximum number of access times of each NBI account per minute is 10.

The data on this interface is updated every 5 minutes. It is recommended that the interface be invoked every 5 minutes at most.

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

Request Parameters

Parameter	Description	Data Type	Mandatory/Optional
plantCodes	Plant ID list. Plants are separated by commas (,).	String	Mandatory

Response Packet

Parameter	Description	Data Type	Remarks
success	Request success or failure flag true: The request succeeded. false: The request failed.	boolean	Request success or failure flag
failCode	Error code	Integer	-

Parameter	Description	Data Type	Remarks
	0 indicates that the status is normal. For definitions of other error codes, see 7 Error Code List.		
message	Optional message	String	-
data	The returned data includes the real-time data of each plant, including the following information:	List	-
> plantCode	Plant ID	String	-
> dataItemMap	The content of each data item is returned in key-value format. Map<String,Object>	Map	Real-time plant data

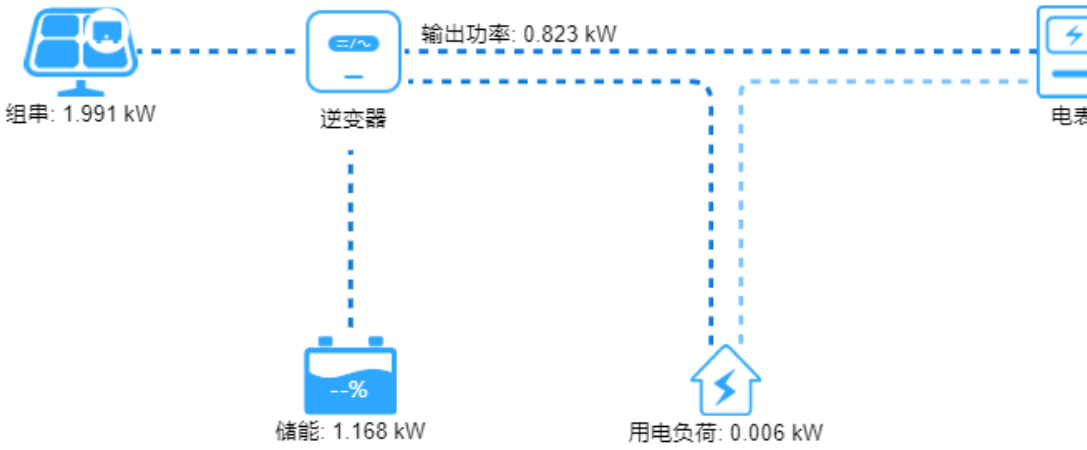
Real-time plant dataset

key	Item	Unit	Return Value Type
dayEnergy	Daily energy yield	kWh	Double
monthEnergy	Monthly energy yield	kWh	Double
totalEnergy	Total energy yield	kWh	Double
pvPower	PV output power. The value 0 indicates that there is no PV power. If the value is greater than 0, the value is the solar output power. In the example figure, the output power of the PV string is 1.991 kW.	kW	Double
meterPower	Active power from the grid meter. On-grid power and consumed grid power The value 0 indicates no power, a value smaller than 0 indicates the power of electricity drawn from the grid, and a value greater than 0 indicates the power of electricity fed back to the grid. In the example figure, the power of electricity fed back to the grid is 0.817 kW.	kW	Double
batteryPower	Battery charge/discharge power. The value 0 indicates	kW	Double

key	Item	Unit	Return Value Type
	that the battery is not discharged or charged, or that no battery exists. A value greater than 0 indicates the battery discharge power. A value smaller than 0 indicates the battery charge power. In the example figure, the battery discharge power is 1.168 kW.		
loadPower	Power consumed by the load. The value 0 indicates that there is no load power consumption. A value greater than 0 indicates that there is load power consumption. In the example figure, the load consumption power is 0.006 kW.	kW	Double
batterySOC	Plant-level battery SOC. In the example figure, **-- %** indicates that the SOC cannot be calculated. In this case, null is returned.	Percentage	Double
batteryDOD	Depth of discharge (DOD) of the battery. The value is calculated using the following formula: charging cutoff SOC – end-of-discharge SOC. If multiple SOCs exist, the value is a weighted average value: [(charging cutoff SOC1 – end-of-discharge SOC1) x rated battery capacity 1 + (charging cutoff SOC2 – end-of-discharge SOC2) x rated battery capacity 2)]/(rated battery capacity 1 + rated battery capacity 2). If the SOCs cannot be calculated, null is returned.	Percentage	Double
healthState	Plant health status	0: healthy 1: disconnected 2: faulty Note: Disconnected: All devices	Integer

key	Item	Unit	Return Value Type
		are disconnected. Faulty: The devices are not disconnected. However, major or critical faults occur on some devices. Healthy: No preceding situations occurred.	

Energy flow example:



Example

Request example:

```
{
  "plantCodes": "NE=12345678,NE=23456789"
}
```

Response example:

Example 1: An error code is returned.

```
{
  "success": false,
  "data": null,
  "failCode": 20007,
  "message": null
}
```

Example 2: Real-time plant data is returned.

```
{
  "success": true,
  "data": [
    {
      "plantCode": "NE=12345678",
      "dataItemMap": {
        "dayEnergy": 100,
        "monthEnergy": 900.000,
        "totalEnergy": 11900.000,
        "pvPower": 7.000,
        "pmeterPower": -1.000,
        "batteryPower": 5.000,
        "loadPower": 1.000,
        "batterySOC": 90.1,
        "batteryDOD": null,
        "healthState": 3
      }
    },
    {
      "plantCode": "NE=23456789",
      "dataItemMap": {
        "dayEnergy": 100,
        "monthEnergy": 900.000,
        "totalEnergy": 11900.000,
        "pvPower": 7.000,
        "pmeterPower": -1.000,
        "batteryPower": 5.000,
        "loadPower": 1.000,
        "batterySOC": 90.1,
        "batteryDOD": 37.3,
        "healthState": 3
      }
    }
  ],
  "failCode": 0,
  "message": null
}
```

5.3.5 Interface for 5-minute Plant Data

Interface Description

Used to obtain the 5-minute statistical indicators of a single plant. You can query data by plant ID and time range. A maximum of 288 5-minute periods (in one day) can be queried at a time. Cross-day query is not supported.

The plant accessed through this interface must be a plant that is successfully registered through the plant registration interface or a plant bound to the system.

Request URL

https://x.x.x.x:27200/rest/openapi/pvms/v1/vpp/plantFiveMinutesKpi

Request Mode

HTTP method: POST

Interface Invoking Suggestion

The maximum number of access times of each NBI account per minute is 10.

The data on this interface is updated every 5 minutes. It is recommended that the interface be invoked every 5 minutes at most.

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

Request Parameters

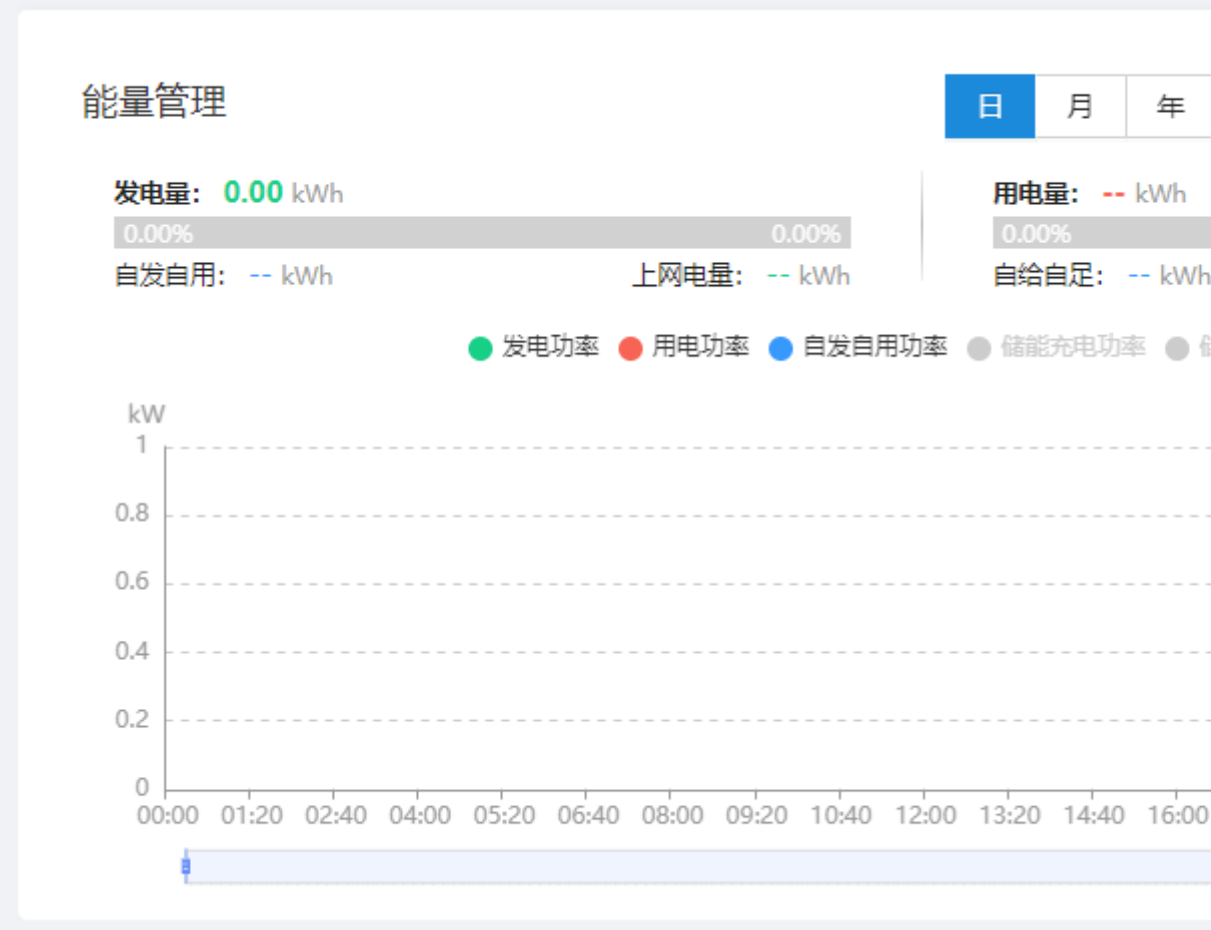
Parameter	Description	Data Type	Mandatory/Optional
plantCode	Plant ID	String	Mandatory
startTime	Start time, in milliseconds. The background processes the time based on the time zone where the plant is located. The time is accurate to milliseconds.	Long	Mandatory
endTime	End time, in milliseconds. The background processes the time based on the time zone where the plant is located. The time is accurate to milliseconds. The start time and end time must be on the same day. The data time must be in the following range: [startTime, endTime).	Long	Mandatory

Response Packet

Parameter	Description	Data Type	Remarks
success	Request success or failure flag **true**: The request succeeded. false: The request failed.	boolean	Request success or failure flag
failCode	Error code 0 indicates that the status is normal. For definitions of other error codes, see 7 Error Code List.	Integer	-
message	Optional message	String	-
data	Returned 5-minute plant data, which includes the following information:	List	Five-minute KPI data of the plant
> dataTime	Data time, including the time zone.	String	2020-02-06T00:00:00+08:00
> gridABWireVoltage	A-B line voltage of the power grid. Data is collected in real time. Therefore, data generated when the devices are disconnected will not be collected.	V	Double
> gridBCWireVoltage	B-C line voltage of the power grid. Data is collected in real time. Therefore, data generated when the devices are disconnected will not be collected.	V	Double
> gridCAWireVoltage	C-A line voltage of the power grid. Data is collected in real time. Therefore, data generated when the devices are disconnected will not be collected.	V	Double
> gridAPhaseVoltage	Phase A voltage of the power grid. Data is collected in real time. Therefore, data generated when the devices are disconnected will not be collected.	V	Double
> gridBPhaseVoltage	Phase B voltage of the power grid. Data is collected in real time. Therefore, data generated when the devices are disconnected will not be	V	Double

Parameter	Description	Data Type	Remarks
	collected.		
> gridCPhaseVoltage	Phase C voltage of the power grid. Data is collected in real time. Therefore, data generated when the devices are disconnected will not be collected.	V	Double
> inputEnergy	Amount of power supplied from the grid, including the power consumed by devices and the power used for charging batteries. If there is no grid meter, the data cannot be obtained and the returned value is NULL.	kWh	Double
> loadEnergy	Power consumed by all the loads. If there is no grid meter, the data cannot be obtained and the returned value is NULL.	kWh	Double
> ongridEnergy	Total amount of power fed back to the grid. If there is no grid meter, the data cannot be obtained and the returned value is NULL.	kWh	Double
> pvEnergy	Total energy yield of all PV modules.	kWh	Double
> grid2loadEnergy	Total amount of power supplied from the grid to the loads. If there is no grid meter, the data cannot be obtained and the returned value is NULL.	kWh	Double
> grid2batteryEnergy	Total amount of power supplied from the grid for charging batteries. If there is no grid meter, the data cannot be obtained and the returned value is NULL.	kWh	Double
> pv2loadEnergy	Total amount of PV power consumed by loads. If there is no grid meter, the data cannot be obtained and the returned value is NULL	kWh	Double
> batteryEnergy	Total amount of power of batteries. If there is no battery, the returned value is NULL.	kWh	Double

Parameter	Description	Data Type	Remarks
	Amount of battery power = rated capacity of the parallel system x SOC of the parallel system x SOH of the parallel system		
> chargeEnergy	Total amount of power charged to batteries. If there is no battery, the returned value is NULL.	kWh	Double
> dischargeEnergy	Total amount of power discharged from batteries. If there is no battery, the returned value is NULL.	kWh	Double
> batterySOC	Plant-level SOC. If there is no battery, the returned value is NULL.	Percentage	Double



Example

Request example:

```
{
  "plantCode": "NE=12345678",
  "startTime": 1501862400000,
  "endTime": 1501891500000
}
```

Response example:

Example 1: An error code is returned.

```
{
  "success": false,
  "data": NULL,
  "failCode": 20007,
  "message": NULL
}
```

Example 2: 5-minute plant data is returned.

```
{
  "success": true,
  "data": [
    {
      "dataTime": "2017-08-05T00:00:00.000+0800",
      "gridVoltage": 0,
      "inputEnergy": 0,
      "loadEnergy": 0,
      "ongridEnergy": 0,
      "pvEnergy": 0,
      "grid2loadEnergy": 0,
      "grid2batteryEnergy": 0,
      "pv2loadEnergy": 0,
      "batteryEnergy": 0,
      "chargeEnergy": 0,
      "dischargeEnergy": 0,
      "batterySOC": 0
    },
    {
      "dataTime": "2017-08-05T00:05:00.000+0800",
      "gridVoltage": 0,
      "inputEnergy": 0,
      "loadEnergy": 0,
      "ongridEnergy": 0,
      "pvEnergy": 0,
      "grid2loadEnergy": 0,
      "grid2batteryEnergy": 0,
      "pv2loadEnergy": 0,
      "batteryEnergy": 0,
      "chargeEnergy": 0,
      "dischargeEnergy": 0,
      "batterySOC": 0
    }
  ],
```



```
  "failCode": 0,
  "message": null
}
```

5.3.6 Interface for Delivering Battery Charge and Discharge Tasks

Interface Description

Used to deliver battery charge and discharge tasks based on plant codes. A task can be delivered to a maximum of 100 plants at a time. If there are multiple ESSs in the power plant, the task is executed on every ESS.

Request URL

https://x.x.x.x:27200/rest/openapi/pvms/v1/vpp/chargeAndDischarge

Request Mode

HTTP method: POST

Interface Invoking Suggestion

Invoke the interface only when necessary to reduce the access frequency.

For the same PV plant, do not invoke this interface repeatedly before a task is complete.

The maximum number of access times of each NBI account per minute is 100.

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

Request Parameters

Parameter	Description	Data Type	Mandatory/Optional
plantCodes	Plant code list. Plant codes are separated by commas (,).	String	Mandatory
dispatchSwitch	Charge/Discharge switch 0: stop forced charge and discharge 1: forced charge 2: forced discharge	Integer	Mandatory
controlType	1: SOC control. The target SOC is set in the forced charge/discharge command. Legacy versions may need an update to support SOC control.	Integer	Optional for stopping forced charge/discharge.

Parameter	Description	Data Type	Mandatory/Optional
	2: duration control. The duration is set in the forced charge/discharge command.		
targetSOC	Target SOC for charge/discharge, in percentage	Double	Optional. This parameter is mandatory for SOC control.
dispatchTime	Charge/Discharge duration in minutes. Value range: [0,1440]	Integer	Optional. This parameter is mandatory for time control.
powerDispatch	Power of forced charge and discharge in watt. If the value exceeds the range, the maximum value is used. The value should be greater than 0 during forced charge and smaller than 0 during forced discharge.	Integer	Optional. If this parameter is left blank, the default power is used for charge and discharge.
requestID	Unique ID of the requested task	Long	Mandatory

NOTICE

- This interface will change the device running parameters. Exercise caution when invoking this interface.
- The value of requestID must be unique.

Response Packet

Parameter	Description	Data Type	Remarks
success	Request success or failure flag **true**: The request succeeded. false: The request failed.	boolean	Request success or failure flag
failCode	Error code Value 0 indicates that the status is normal. For other error codes, see 7 Error Code	Integer	-

Parameter	Description	Data Type	Remarks
	List.		
message	Optional message	String	-
data	Returned data, which contains the returned information of the request execution, including the following information:	List	-
> plantCode	Plant ID	String	-
> sn	Inverter SN	String	-
> dispatchResult	Charge/Discharge task delivery result	Integer	0: succeeded 1: failed
> remoteID	Unique subtask ID	String	-

Interface Error Code List

No.	Error Code	Description
1	305	You are not online and need to log in again.
2	401	You do not have the related data interface permission.
3	407	The interface access frequency is too high.
4	20010	The plant list cannot be empty.
5	20015	A maximum of 100 plants can be queried at a time.
6	20040	The charge/discharge parameter value is invalid.
7	20041	The control type cannot be empty during forced charge and discharge.
8	20042	The target SOC for charge/discharge is empty or invalid.
9	20043	The charge/discharge duration is empty or invalid.
10	20044	The unique ID of a charge/discharge task cannot be empty.
11	20045	Unauthorized PV plants exist in the input parameters.
12	20047	The forced charge/discharge power in the input parameters is invalid.
13	20048	Duplicate charge/discharge task ID.
14	20049	Failed to deliver the charge/discharge task.
15	20053	SOC control is not supported and an update is needed.

Example

Request example:

Example 1: time control

```
{
  "plantCodes": "NE=12345678,NE=23456789",
  "controlType": 2,
  "dispatchTime": 600,
  "dispatchSwitch": 1,
  "powerDispatch": 5000,
  "requestID": 432523532523
}
```

Example 2: SOC control

```
{
  "plantCodes": "NE=12345678,NE=23456789",
  "controlType": 1,
  "targetSOC": 100,
  "dispatchSwitch": 1,
  "powerDispatch": 5000,
  "requestID": 432523532523
}
```

Response example:

Example 1: An error code is returned.

```
{
  "success": false,
  "data": null,
  "failCode": 20007,
  "message": null
}
```

Example 2: The system returns a message indicating that the time control is set successfully.

```
{
  "success": true,
  "data": [
    {
      "plantCode": "NE=12345678",
      "sn": "5fbfk4",
      "dispatchResult": 0,
      "remoteID": "12345678"
    },
    {
      "plantCode": "NE=23456789",
      "sn": "6fbfk11",
      "dispatchResult": 0,
      "remoteID": "23456789"
    }
  ],
  "failCode": 0,
```



```
  "message": null
}
```

Example 3: The system returns a message indicating that the SOC control is set successfully.

```
{
  "success": true,
  "data": [
    {
      "plantCode": "NE=12345678",
      "sn": "5fbfk4",
      "dispatchResult": 0,
      "remoteID": "12345678"
    },
    {
      "plantCode": "NE=23456789",
      "sn": "6fbfk11",
      "dispatchResult": 0,
      "remoteID": "23456789"
    }
  ],
  "failCode": 0,
  "message": null
}
```

5.3.7 Interface for Querying Battery Charge and Discharge Tasks

Interface Description

Used to query the execution status of battery charge and discharge tasks based on requestID. One task can be queried at a time.

Request URL

https://x.x.x.x:27200/rest/openapi/pvms/v1/vpp/chargeAndDischargeStatus

Interface Invoking Suggestion

Invoke the interface only when necessary to reduce the access frequency.

For the same PV plant, do not invoke this interface repeatedly before a task is complete.

The maximum number of access times of each NBI account per minute is 100.

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

Request Mode

HTTP method: POST

Request Parameters

Parameter	Description	Data Type	Mandatory/Optional

Parameter	Description	Data Type	Mandatory/Optional
requestID	Unique ID of the requested task	Long	Mandatory

Response Packet

Parameter	Description	Data Type	Remarks
success	Request success or failure flag true: The request succeeded. false: The request failed.	boolean	Request success or failure flag
failCode	Error code Value 0 indicates that the status is normal. For other error codes, see 7 Error Code List.	Integer	-
message	Optional message	String	-
data	Returned data, which contains the returned information of the request execution, including the following information:	Map	-
> plantCode	Plant ID	String	-
> sn	Inverter SN	String	-
> remoteID	Unique subtask ID	String	-
> status	Event status. The execution status is updated every 3 minutes. If the task is not completed within 24 hours, the task times out.	Integer	**0**: complete 1: in progress 2: timeout
> chargedCapacity	Amount of power that has been forcibly charged into batteries. If **dispatchSwitch** is not 1, null is returned.	Double	kWh
> dischargedCapacity	Amount of power that has been forcibly discharged from batteries. If **dispatchSwitch** is not 2, null is returned.	Double	kWh
> execStartTime	Time when a task is received, including the time	String	2020-02-06T00:00:00+08:00

Parameter	Description	Data Type	Remarks
	zone information		
> execEndTime	Time when a task is completed, including the time zone information. If a task is not completed, null is returned.	String	2020-02-06T00:00:00+08:00

Interface Error Code List

No.	Error Code	Description
1	305	You are not online and need to log in again.
2	401	You do not have the related data interface permission.
3	407	The interface access frequency is too high.
4	20044	The unique ID of a charge/discharge task cannot be empty.
5	20050	The charge/discharge task query parameter does not exist.

Example

Request example:

```
{
  "requestID": 432523532523
}
```

Response example:

Example 1: An error code is returned.

```
{
  "success": false,
  "data": null,
  "failCode": 20008,
  "message": null
}
```

Example 2: The task status data is returned.

```
{
   "success":true,
   "failCode":0,
   "message":null,
   "data":[
      {
         "plantCode":"NE=12345678",
         "sn":"5fbfk4",
```

```
            "remoteID":"12345678",
            "status":0,
            "chargedCapacity":1000,
            "execStartTime":"2020-02-06T00:00:10+08:00",
            "execEndTime":"2020-02-06T00:01:10+08:00"
        },
        {
            "plantCode":"NE=23456789",
            "sn":"6fbfk11",
            "remoteID":"23456789",
            "status":0,
            "chargedCapacity":2000,
            "startTime":"2020-02-06T00:00:00+08:00",
            "endTime":"2020-02-06T00:01:00+08:00"
        }
    ]
}
```


5.3.8 Battery DoD Setting Interface

Interface Description

Used to deliver DoD settings to a maximum of 100 batteries at a time.

Request URL

https://x.x.x.x:27200/rest/openapi/pvms/v1/vpp/dod

Request Mode

HTTP method: POST

Interface Invoking Suggestion

Invoke the interface only when necessary to reduce the access frequency.

For the same PV plant, do not invoke this interface repeatedly before a task is complete.

The maximum number of access times of each NBI account per minute is 10.

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

Request Parameters

Parameter	Description	Data Type	Mandatory/Optional
dns	List of unique IDs of battery devices. Multiple device IDs are separated by commas (,). A maximum of 100 device IDs can be set at a time. The device DN information (deviceTypeId: 20815) can be queried through the 5.2.2	String	Mandatory

Parameter	Description	Data Type	Mandatory/Optional
	Interface for Device List Querying.		
dod	Target DoD value. If the DoD value is out of range, the closest allowed DoD value will be used.	Integer	Mandatory

NOTICE

- This interface will change the device running parameters. Exercise caution when invoking this interface.

Response Packet

Parameter	Description	Data Type	Remarks
success	Request success or failure flag true: The request succeeded. false: The request failed.	boolean	Request success or failure flag
failCode	Error code Value 0 indicates that the status is normal. For other error codes, see 7 Error Code List.	Integer	-
message	Optional message	String	-
data	Returned data for each request, including the following information:	-	Returned information for requests
> dn	Unique ID of a battery device	String	-
> result	Setting result	Integer	0: succeeded 1: failed
> setDOD	DoD value that has been successfully set (charging cutoff SOC – end-of-discharge SOC)	Integer	End-of-discharge SOC = 100% – DoD Range of end-of-discharge SOC for LG batteries: [12,20] Range of end-of-discharge SOC for Huawei

Parameter	Description	Data Type	Remarks
			batteries: [0,20]

Interface Error Code List

No.	Error Code	Description
1	305	You are not online and need to log in again.
2	401	You do not have the related data interface permission.
3	407	The interface access frequency is too high.
4	20011	The device list cannot be empty.
5	20017	A maximum of 100 devices can be queried at a time.
6	20039	The DoD value is empty or out of range. The allowed range is [0,100].
7	20046	Unauthorized devices exist in the input parameters.
8	20051	Battery DoD setting failed.

Example

Request example:

```
{
  "dns": "BA4372D08E0,5D02E8B40AD",
  "dod": 90
}
```

Response example:

Example 1: An error code is returned.

```
{
  "success": false,
  "data": null,
  "failCode": 20008,
  "message": null
}
```

Example 2: The parameter delivery result is returned.

```
{
   "success":true,
   "data":[
      {
         "dn":"BA4372D08E0",
         "result":0,
         "setDOD":90
```



```
        },
        {
            "dn":"5D02E8B40AD",
            "result":0,
            "setDOD":88
        }
    ],
    "failCode":0,
    "message":null
}
```


5.3.9 Inverter Power-On/Off Interface

Interface Description

Used to deliver a startup or shutdown command to a maximum of 100 inverters at a time.

Request URL

https://x.x.x.x:27200/rest/openapi/pvms/v1/vpp/devOnOff

Request Mode

HTTP method: POST

Interface Invoking Suggestion

Invoke the interface only when necessary to reduce the access frequency.

For the same PV plant, do not invoke this interface repeatedly before a task is complete.

The maximum number of access times of each NBI account per minute is 10.

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

Request Parameters

Parameter	Description	Data Type	Mandatory/Optional
dns	List of unique IDs of inverters. Multiple IDs are separated by commas (,). A maximum of 100 device IDs can be set at a time. The device DN information can be queried through the 5.2.2 Interface for Device List Querying.	String	Mandatory
controlType	Power-on/off control 1: on 2: off	Integer	Mandatory

NOTICE

- This interface will change the device running status. Exercise caution when invoking this interface.

Response Packet

Parameter	Description	Data Type	Remarks
success	Request success or failure flag true: The request succeeded. false: The request failed.	boolean	Request success or failure flag
failCode	Error code Value 0 indicates that the status is normal. For other error codes, see 7 Error Code List.	Integer	-
message	Optional message	String	-
data	Returned data for each request, including the following information:	-	Returned information for requests
> dn	Unique device ID	String	-
> result	Setting result	Integer	0: succeeded 1: failed

Interface Error Code List

No.	Error Code	Description
1	305	You are not online and need to log in again.
2	401	You do not have the related data interface permission.
3	407	The interface access frequency is too high.
4	20011	The device list cannot be empty.
5	20017	A maximum of 100 devices can be queried at a time.
6	20019	The switch type parameter value is invalid (1 for switch-on and 2 for switch-off).
7	20046	Unauthorized devices exist in the input parameters.
8	20052	Failed to start or shut down the inverter.

Example

Request example:

```
{
  "dns": "BA4372D08E0,5D02E8B40AD",
  "controlType": 1
}
```

Response example:

Example 1: An error code is returned.

```
{
  "success": false,
  "data": null,
  "failCode": 20008,
  "message": null
}
```

Example 2: The parameter delivery result is returned.

```
{
  "success": true,
  "data": [
    {
      "dn": "BA4372D08E0",
      "result": 0
    },
    {
      "dn": "5D02E8B40AD",
      "result": 0
    }
  ],
  "failCode": 0,
  "message": null
}
```

5.4 PV Community Interfaces

Used to connect to the Huawei smart PV community (official website: http://community.solar.huawei.com/) to verify whether the device with a specific SN isassociated with a plant.

5.4.1 SN Registration Query Interface

Interface Description

Used to enter the account, email address, or phone number, and device SN to verify the relationship between the SN and installer.

Request URL

https://x.x.x.x:27200/rest/openapi/pvms/v1/community/snIsRegister

Request Mode

HTTP method: POST

Interface Invoking Suggestion

Invoke the interface only when necessary to reduce the access frequency.

The maximum number of access times of each NBI account per minute is 100.

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

Request Parameters

Parameter	Description	Data Type	Mandatory/Optional
sns	SNs of the devices to be queried. A maximum of 50 SNs can be queried at a time. Use commas (,) to separate multiple SNs.	String	Mandatory
account	Account used to log in to the management system. It can be a username, email address, or phone number.	String	Mandatory

Response Packet

Parameter	Description	Data Type	Remarks
success	Request success or failure flag true: The request succeeded. false: The request failed.	boolean	Request success or failure flag
failCode	Error code 0 indicates that the status is normal. For definitions of other error codes, see 7 Error Code List.	Integer	
message	Access error message, which is optional	String	
data	Returned data. **data** contains the query result list, including the following information:	Map	

Parameter	Description	Data Type	Remarks
> sn	Device SN	String	
> result	0: The SN has not been registered in the system, the account does not have the management permission on the device of the SN (the SN must be bound to a non-shared plant or a company), or the account is an owner account. 1: The SN has been registered in the system, the SN is not bound to a commissioning user, and the current account has the permission to manage the device of the SN. 2: The SN has been registered in the system and bound to a commissioning user, who is not the current account. 3: The SN has been registered in the system and bound to a commissioning user, who is the current account.	Integer	
> plantCreateTime	Plant creation time (grid-connection time of the plant). When the result is 0 or 2, null is returned.	String	2020-02-06T00:00:00+08:00

NOTE

Commissioning user: a bound user on the device connection screen, that is, an administrator user who logs in to the local app during local deployment commissioning.

Management permission: indicates whether the user has been bound to the plant where the device of the SN is deployed.

Example

Request example:

```
{
  "sns": "BA4372D08E0,5D02E8B40AD,5D02E8BFFFF,5D02E8BEEEE",
  "account": "admin@qq.com"
}
```

Response example:

Example 1: An error code is returned.

```
{
  "success": false,
  "data": null,
  "failCode": 20004,
  "message": null
}
```

Example 2: The registration query result is returned, indicating that the user does not exist.

```
{
  "success": true,
  "data": null,
  "failCode": 20028,
  "message": "user does not exist"
}
```

Example 3: The query result is returned.

```
{
  "success": true,
  "data": [
    {
      "sn": "BA4372D08E0",
      "result": 0
    },
    {
      "sn": "5D02E8B40AD",
      "result": 1,
      "plantCreateTime": "2020-02-06T00:00:00+08:00"
    },
    {
      "sn": "5D02E8BFFFF",
      "result": 2
    },
    {
      "sn": "5D02E8BEEEE",
      "result": 3,
      "plantCreateTime": "2020-02-06T00:00:00+08:00"
    }
  ],
  "failCode": 0,
  "message": null
}
```


6 Device Type List

No.	Device Type	Device Type ID	Supported Interface
1	MPPT	20811	
2	PV	20812	
3	PV module	20813	
4	Optimizer	20814	
5	Battery	20815	
6	Meter	20816	
7	Backup Box	20817	
8	Safety box	20818	
9	Communication module	20819	
10	SmartLogger	20821	
11	Inverter	20822	
12	Environmental monitoring instrument	20824	
13	PID	20825	
14	PLC	20826	
15	Central inverter	20827	
16	DC combiner	20828	

No.	Device Type	Device Type ID	Supported Interface
	box		
17	STS	20829	
18	STS meter	20830	
19	AC combiner box	20831	
20	Communication management unit	20833	

7 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.
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

No.	Error Code	Description
		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	I-V diagnosis task creation failure cause: The irradiation may not meet the minimum diagnosis requirement.
33	20031	I-V diagnosis task creation failure cause:
34	20032	I-V diagnosis task creation failure cause:
35	20033	I-V diagnosis task creation failure cause:
36	20034	The task does not exist.
37	20035	MPPT devices do not support backfeed current.
38	20036	The backfeed current duration of the MPPT device exceeds the maximum limit.
39	20037	The backfeed current of the MPPT device is out of range. The allowed value is (0, 15]
40	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].
41	20039	In the input parameters, the DOD value is out of range. The allowed range is [0, 100].
42	20040	The charge/discharge switch parameter value is invalid.
43	20041	The control type cannot be empty for forced charge and discharge.
44	20042	The target SOC for charge/discharge is empty or invalid.
45	20043	The charge/discharge duration is empty or invalid.
46	20044	The unique ID of a charge/discharge task cannot be empty.

No.	Error Code	Description
47	20045	Unauthorized PV plants exist in the input parameters.
48	20046	Unauthorized PV plants exist in the input parameters.
49	20047	The forced charge/discharge power in the input parameters is invalid.
50	20048	Duplicate charging and discharging task ID
51	20049	Failed to deliver the charging and discharging task.
52	20050	The charging and discharging task query parameter does not exist.
53	20051	Failed to set the battery DOD.
54	20400	The username or password of the third-party system is incorrect.
55	20403	The login of the third-party system user is restricted.
56	30001	The device ESN list cannot be empty.
57	30002	The ESNs queried at a time cannot exceed 50.
58	30003	The account cannot be empty in the input parameter.
59	30004	The value of **pageNo** cannot be empty.
60	30005	The value of **pageSize** cannot be empty.
61	30006	The value of **pageSize** is out of range. The allowed range is {10, 20, 30, 50, 100}.
62	30007	The values of **startTime** and **endTime** must be both provided or empty.
63	30008	Failed to invoke the internal interface.
64	30009	The value of **taskName** is empty.
65	30010	The value of **nds** is empty.
66	30011	The value of **cleanStatus** is empty or invalid.
67	30012	The value of **environmentalParameters** is empty or invalid.
68	30013	The value of **modulePlaneIrradiance** or **moduleBackSurfaceTemperature** is empty when **environmentalParameters** is set to 1.
69	30014	The value of **scanPointNum** must be set to 128.
70	30015	The value of **taskId** is empty.
71	30016	The value of **dn** is empty.
72	30017	The value of **dns** is invalid. The number of devices exceeds 100 or devices on which the user does not have permission exist.
73	30018	The value of **taskName** is invalid (for example, null field).

No.	Error Code	Description
74	30019	The value of **moduleBackSurfaceTemperature** is out of range. The allowed range is [0.0, 100.0].
75	30020	The value of **modulePlaneIrradiance** is out of range. The allowed range is [400.0, 1500.0].
76	30021	The value of **pageNo** is smaller than 0.
77	30022	The value of **timestamp** is empty.
78	30023	The command type is invalid (for example, null).
79	30024	The power supply duration is invalid.
80	30025	The MPPT list is empty.
81	30026	The value of **mppts** is empty.
82	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).
83	30028	The backfeed current input value is invalid.
84	30029	Authentication failed.

