

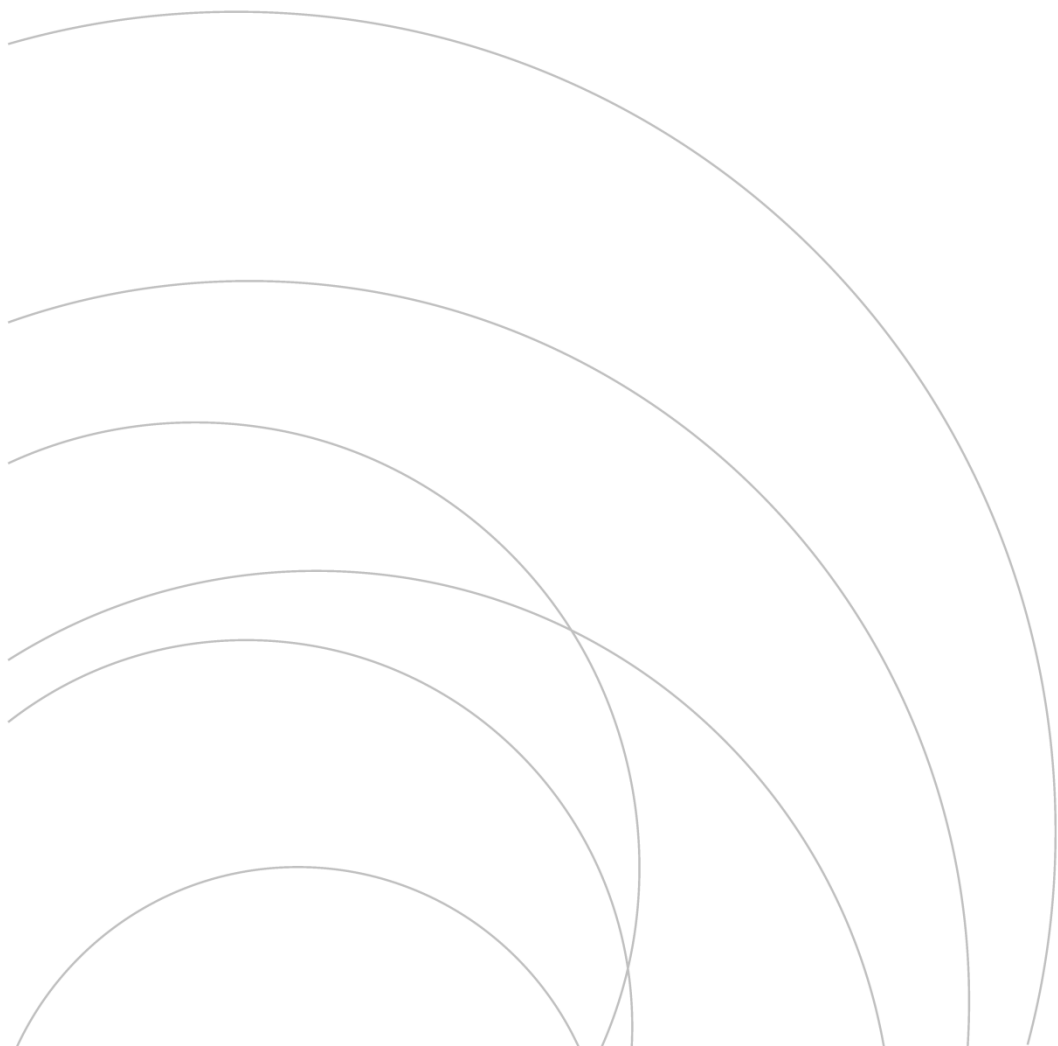
APsystems EMA API Operation Manual

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1. Introduction

APsystems EMA API is an interface that provides access to EMA system or ECU from EMA data base for the third party users(or applications).

This document introduces the design of APsystems EMA API and how to use it,how third party users(or applications) access to EMA database and get the performance data from their authorized EMA systems or ECU, and the functions of the API , the URL , the request parameters.

2. Technical information

APsystems EMA API is built as RESTful service.

It is built-in HTTP capabilities for passing parameters via the API.

It returns the results by the format of JSON.

3. Acronyms and abbreviations

Abbreviation	Meaning
API	Application Programming Interface
ECU	Energy Control Unit
EMA	Energy Monitoring and Analysis

4. Business overview

4.1. The access URL and Parameters

Access URL: <http://api.apssystemsema.com:8073>

Parameters format: <http://api.apssystemsema.com:8073/API interface name + request parameters>

There is no requirement for the order of the request parameters

4.2. Third party application access description

4.2.1. Get access permissions

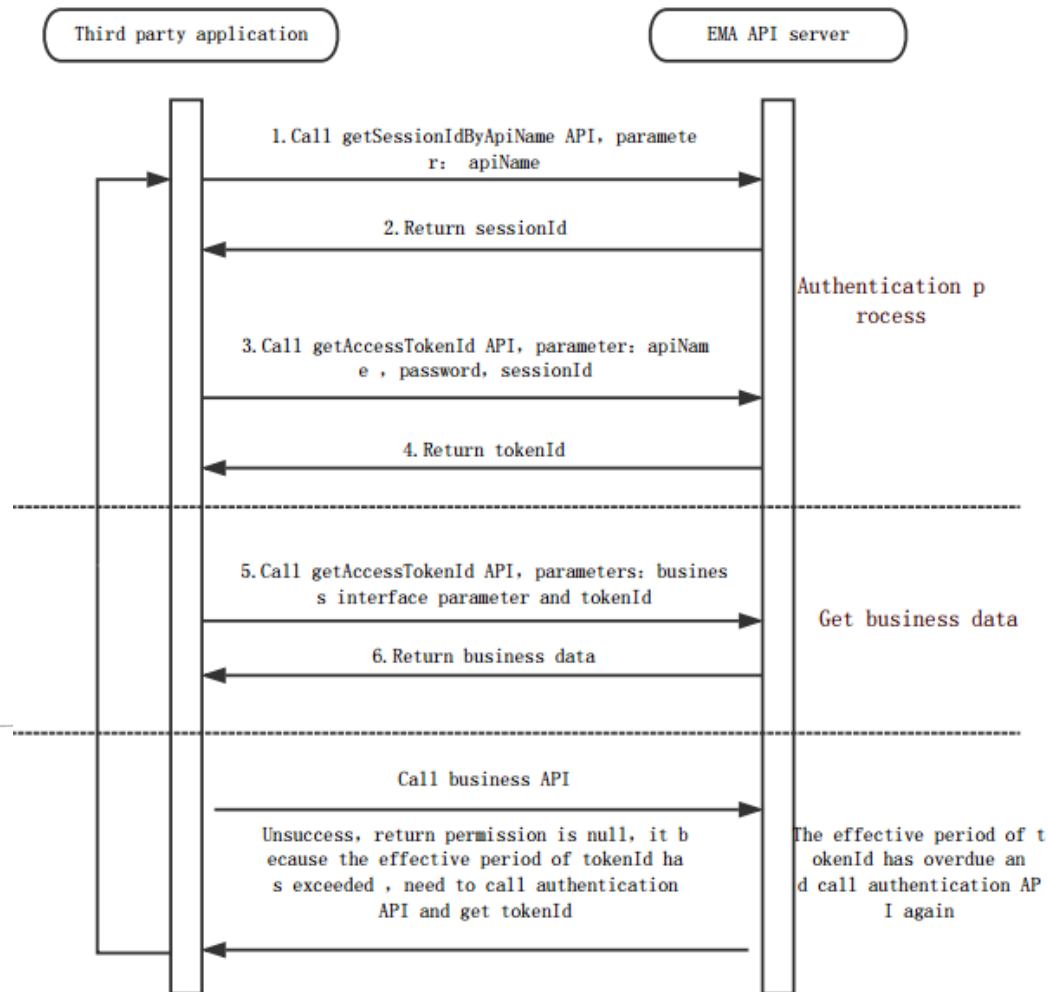
- . The access permissions of EMA API is independent of EMA account, customer needs to apply to APsystems for the access permissions of EMA API.
- . Third party applications could access multiple EMA accounts after get the authorization from the EMA account owner.

4.2.2. Access frequency limit

- . The number of access times is limited per half hour and per month, the upper limit of access times will be noticed when customer apply for the EMA API account (By default the limitation of access number is : 500 times/30minutes and 20000 times/month).
- . If the number of access times reach the upper limit per half hour, third party application could not access EMA API and it will last at most half an hour.
- . If the number of access times reach the upper limit per month, third party application could not access EMA API during this month.

4.3. The data interaction between third party application and EMA API

The work flow of third party application access EMA API:



- Step 1.get sessionId

Third party user could get sessionId by its apiName(using getSessionIdByApiName interface)

- Step 2.get tokenId

After getting sessionId, third party user could get third party interface identification code - tokenId by sessionId and apiName. There is a effective period of tokenId, during effective period other business interface could be access by tokenId,if the effective period is overdue, third party user should get a new tokenId.

- Step 3.access business interface

When third party application access business interface, should pass the parameters of this interface and also pass the tokenId.If the effective period of tokenId is overdue, third party user should get another tokenId by step1 and step2.

5. API request and response format

5.1. Authentication interface

5.1.1. get sessionid

Interface description:

Customer could get sessionId by this API, and then get tokenId(third party interface identification code) by sessionId. The sessionId will be invalidate after getting a tokenId.

If the effective period of tokenId is overdue, customer needs to get sessionId again to get another tokenId.

Request URL: <http://api.apssystemsema.com:8073/apsema/v1/apiusers/getSessionIdByApiName>

Request method: POST

- Request parameter: apiName=APIUserName

Parameter	Type	Description
apiName	string	The user name of third party user

- API response:

Parameter	Type	Description
code	string	Get data success/fail (1 means success)
sessionId	string	sessionId , 32-bit string

- Response example:

```
{ "code " : 1,
```

```
" sessionId " : 402981d451419ece0151419ece360010
}
```

■ Error code:

Error code	Return	Description
0	APiUser is null	There is no such API user

■ Error code example:

```
{
" code " : 0,
" msg " : " APiUser is null "
}
```

5.1.2. Get third party interface identification code - tokenId

Interface description:

Customer could get third party interface identification code - tokenId by this API, after getting tokenId, customer could get performance data of EMA systems or ECUs which is within the privilege of this customer.

tokenId is a unique code for identification the permissions of API user, tokenId must be passed when access to a business interface. The effective period of tokenId is 30 minutes, after 30 minutes customer needs to get another tokenId.

Request URL: <http://api.apssystemsema.com:8073/apsema/v1/apiusers/getAccessTokenId>

Request method: POST

■ Request parameter:

apiName=APIUserName&password=123456&sessionId=53e2c6425147809b015147809b390000

Parameter	Type	Description
apiName	string	The user name of third party user
password	string	The password of third party user
sessionId	string	sessionId(get by getSessionIdByApiName interface)

■ API response:

Parameter	Type	Description
code	string	Get data success/fail (1 means success)
tokenId	string	tokenId, 32-bit string
expires_in	string	The effective period of tokenId(in minutes)

■ Response example:

```
{ " code " : 1,
  " tokenId " : 302981d451419ece0151423d82be0007,
  " expair_in " :30}
```

■ Error code:

Error code	Return	Description
0	permission is null	API user name or sessionId not existed
2	your password is invalid	The password of this API user is incorrect
3	your APiUser is overdue	The authorization period has expired, this API user has no permissions to access EMA data base

5.2. API user information

5.2.1. Get the EMA accounts list that the API user can be access

Interface description:

Get the information of the API user, it will return the EMA system list and ECU list hat allowed to

be access.

Request URL: <http://api.apsystemsema.com:8073/apsema/v1/apisystem/getEmaUserAndEcus>

Request method: POST

Request parameter: tokenId=302981d451419ece0151423d82be0007

Parameter	Type	Description
tokenId	string	tokenId

■ API response:

Parameter	Type	Description
code	string	Get data success/fail (1 means success)
username	string	The EMA system user name that allowed third party application to access, it may has multiple EMA systems
ecuList	string	The ECU list that belongs to the EMA system, it may has multiple ECUs

■ Response example:

```
{ "code": 1
  "data": [
    { "username": "EMAUser1",
      "ecuList": ["203000018206", "203000018207"] },
    { "username": "EMAUser2",
      "ecuList": ["203000018277", "203000018278"] }
  ]
}
```

■ Error code:

Error code	Return	Description
3	permission is null	tokenId invalid

5.3. Get EMA systems output power information

5.3.1. Get system output power by real-time, day, month,year and lifetime

Interface description:

Get system output power by real-time, day, month,year and lifetime

Request URL: <http://api.apsystemsema.com:8073/apsema/v1/apisystem/getSystemPowerInfo>

Request method: POST

Request parameter:

username=EmaSystemName&filter=total&tokenId=402981d451429b190151429fbb800001

Parameter	Type	Description
username	string	The username of EMA systems
filter	string	Using keyword 'total' to get system output power of real-time, toady, this month,this year and lifetime
tokenId	string	tokenId

■ API response:

Parameter	Type	Description
code	string	Get data success/fail (1 means success)
power	string	System real-time output power, unit is W
day	string	System output power of today, unit is kWh
month	string	System output power of this month, unit is kWh
year	string	System output power of this year, unit is kWh
all	string	System output power of lifetime, unit is kWh

■ Response example:

```
{
  "code" :1;
  "data" :{
    "all" : "523220.70",
    "day" : "12.51",
    "month" : "772.14",
    "power" : 815,
    "year" : "123467.48"
  }
}
```

■ Error code:

Error code	Return	Description
3	permission is null	Do not have permission to access or tokenId is invalid
4	access times reach the upper limit	The access times reach the limit

5.3.2. System real-time output power

Interface description:

Get system real-time output power

Request URL: <http://api.apssystemsema.com:8073/apsema/v1/apisystem/getSystemPowerInfo>

Request method: POST

Request parameter:

username=EmaSystemName&filter=current&tokenId=402981d451467830151467a07830001

Parameter	Type	Description
username	string	The user name of EMA system
filter	string	Using keyword 'current' to get system real-time output power
tokenId	string	tokenId

■ API response:

Parameter	Type	Description
code	string	Get data success/fail (1 means success)
energy	string	System real-time output power, unit is W

■ Response example:

```
{  
  "code" :1,  
  "data" :{ " power " : " 54 " }  
}
```

■ Error code:

Error code	Return	Description
0	power is null	There is no output power
3	permission is null	Do not have permission to access or tokenId is invalid
4	access times reach the upper limit	The access times reach the limit

5.3.3. System output power of toady

Interface description:

Get system output power by day

Request URL: <http://api.apssystemsema.com:8073/apsema/v1/apisystem/getSystemPowerInfo>

Request method: POST

Request parameter:

username=EmaSystemName&filter=day&tokenId=402981d4514678f30151467a07830001

Parameter	Type	Description
username	string	The username of EMA system
filter	string	Using keyword 'day' to get output power of toady
tokenId	string	tokenId

■ API response:

Parameter	Type	Description
code	string	Get data success/fail (1 means success)
energy	string	System output power of toady,unit is kWh

■ Response example:

```
{
  " code " :1,
  " data " :{ " energy " : " 54.32 " }
}
```

■ Error code:

Error code	Return	Description
0	energy is null	There is no output power
3	permission is null	Do not have permission to access or tokenId is invalid
4	access times reach the upper limit	The access times reach the limit

5.3.4. The output power of this month

Interface description:

Get system output power of this month

Request URL: <http://api.apssystemsema.com:8073/apsema/v1/apisystem/getSystemPowerInfo>

Request method: POST

Request parameter:

username=EmaSystemName&filter=month&tokenId=402981d451468f30151467a07830001

Parameter	Type	Description
username	string	The user name of EMA system
filter	string	Using keyword 'month' to get output power of this month
tokenId	string	tokenId

■ API response:

Parameter	Type	Description
code	string	Get data success/fail (1 means success)
energy	string	System output power of this month,unit is kWh

■ Response example:

```
{
  "code": 1,
  "data": { "energy": "684.32" }
}
```

■ Error code:

Error code	Return	Description
0	energy is null	There is no output power
3	permission is null	Do not have permission to access or tokenId is invalid
4	access times reach the upper limit	The access times reach the limit

5.3.5. The output power of this year

Interface description:

Get system output power by year

Request URL: <http://api.apssystemsema.com:8073/apsema/v1/apisystem/getSystemPowerInfo>

Request method: POST

Request parameter:

username=EmaSystemName&filter=year&tokenId=402981d4514678f30151467a07830001

Parameter	Type	Description
username	string	The username of EMA system
filter	string	Use keyword 'year' to get output power of this year
tokenId	string	tokenId

■ API response:

Parameter	Type	Description
code	string	Get data success/fail (1 means success)
energy	string	System output power of this year,unit is kWh

■ Response example:

```
{
  " code " :1,
  " data " :{ " energy " : " 3684.32 " }
}
```

■ Error code:

Error code	Return	Description
0	energy is null	There is no output power
3	permission is null	Do not have permission to access or tokenId is invalid
4	access times reach the upper limit	The access times reach the limit

5.3.6. Lifetime output power

Interface description:

Get system lifetime output power

Request URL: <http://api.apssystemsema.com:8073/apsema/v1/apisystem/getSystemPowerInfo>

Request method: POST

Request parameter:

username=EmaSystemName&filter=all&tokenId=402981d4514678f30151467a0783000

Parameter	Type	Description
username	string	The user name of EMA system
filter	string	Use keyword 'all' to get output power of lifetime
tokenId	string	tokenId

■ API response:

Parameter	Type	Description
code	string	Get data success/fail (1 means success)
energy	string	System output power of lifetime,unit is kWh

■ Response example:

```
{
  " code " :1,
  " data " :{ " energy " : " 3684.32 " }
}
```

■ Error code:

Error code	Return	Description
0	energy is null	Get data success/fail (1 means success)
3	permission is null	Do not have permission to access or tokenId is invalid
4	access times reach the upper limit	The access times reach the limit

5.4. Get ECU output power information

5.4.1. Get ECU power curve of a specific day

Interface description:

Get ECU power curve of a specific year

Request URL: <http://api.apssystemsema.com:8073/apsema/v1/apiecuenergy/getEcuEnergyInfo>

Request method: POST

Request parameter:

ecuId=200000000746&filter=powerlist&date=20120101&tokenId=402981d451617d810151617e14550001

Parameter	Type	Description
ecuId	string	ECU number
filter	string	Using keyword 'powerlist' to get output power of a specific day
date	string	Pass a specific year, the format is yyyyMMdd
tokenId	string	tokenId

■ API response:

Parameter	Type	Description
code	string	Get data success/fail (1 means success)
time	List<String>	ECU time list of the special year
power	List<String>	ECU power list of the special year,unit is W

■ Response example:

```
{
  "code": 1,
  "data": {
    "time": "[06:45,06:50,06:55,07:00...]",
    "power": "[40.3,50.6,52.6,55.3...]"
  }
}
```

■ Error code:

Error code	Return	Description
0	energy is null	There no output power of this ECU
3	permission is null	Do not have permission to access this ECU or tokenId is invalid
4	access times reach the upper limit	The access times reach the limit

5.4.2. Get ECU output power of a special day

Interface description:

Get ECU output power of a specialday

Request URL: <http://api.apssystemsema.com:8073/apsema/v1/apiecuenergy/getEcuEnergyInfo>

Request method: POST

Request parameter:

001

Parameter	Type	Description
ecuId	string	ECU number
filter	string	Using keyword 'day' to get output power of a specific day
date	string	Pass a specific day, the format is yyyyMMdd
tokenId	string	tokenId

■ API response:

Parameter	Type	Description
code	string	Get data success/fail (1 means success)
energy	string	ECU output power of the specific day,unit is kWh

■ Response example:

```
{
  " code " :1,
  " data " :{ " energy " : " 44.32 " }
}
```

■ Error code:

Error code	Return	Description
0	energy is null	There no output power of this ECU
3	permission is null	Do not have permission to access or

		tokenId is invalid
4	access times reach the upper limit	The access times reach the limit

5.4.3. Get ECU output power of a specific month

Interface description:

Get ECU output power of a specific month

Request URL: <http://api.apssystemsema.com:8073/apsema/v1/apiecuenergy/getEcuEnergyInfo>

Request method: POST

Request parameter:

ecuId=200000000746&filter=month&date=20120101&tokenId=402981d451617d810151617e14550001

Parameter	Type	Description
ecuId	string	ECU number
filter	string	Using keyword 'month' to get output power of a specific month
date	string	Pass a specific month, the format is yyyyMMdd
tokenId	string	tokenId

■ API response:

Parameter	Type	Description
code	string	Get data success/fail (1 means success)
energy	string	ECU output power of the special month,unit is kWh

■ Response example:

```
{
```

```
" code " :1,
" data " :{ " energy " : " 3684.32 " }
}
```

■ Error code:

Error code	Return	Description
0	energy is null	There no output power of this ECU
3	permission is null	Do not have permission to access this ECU or tokenId is invalid
4	access times reach the upper limit	The access times reach the limit

5.4.4. Get ECU output power of a specific year

Interface description:

Get ECU output power of a specific year

Request URL: <http://api.apssystemsema.com:8073/apsema/v1/apiecuenergy/getEcuEnergyInfo>

Request method: POST

Request parameter:

ecuId=200000000746&filter=year&date=20120101&tokenId=402981d451617d810151617e14550001

Parameter	Type	Description
ecuId	string	ECU number
filter	string	Using keyword 'year' to get output power of a specific day
date	string	Pass a specific year, the format is yyyyMMdd
tokenId	string	tokenId

■ API response:

Parameter	Type	Description
code	string	Get data success/fail (1 means success)
energy	string	ECU output power of the special year,unit is kWh

■ Response example:

```
{
  " code " :1,
  " data " :{ " energy " : " 36584.32 " }
}
```

■ Error code:

Error code	Return	Description
0	energy is null	There no output power of this ECU
3	permission is null	Do not have permission to access this ECU or tokenId is invalid
4	access times reach the upper limit	The access times reach the limit

5.4.5. Get ECU total output power

Interface description:

Get ECU total output power

Request URL: <http://api.apssystemsema.com:8073/apsema/v1/apiecuenergy/getEcuEnergyInfo>

Request method: POST

Request parameter:

ecuId=200000000746&filter=total&date=20120101&tokenId=402981d451617d810151617e1455

0001

Parameter	Type	Description
ecuId	string	ECU number
filter	string	Using keyword 'total' to get output power of total
date	string	Pass a specific year, the format is yyyyMMdd
tokenId	string	tokenId

■ API response:

Parameter	Type	Description
code	string	Get data success/fail (1 means success)
energy	string	ECU output power of total,unit is kWh

■ Response example:

```
{
  "code": "1",
  "data": { "energy": "36584.32" }
}
```

■ Error code:

Error code	Return	Description
0	energy is null	There no output power of this ECU
3	permission is null	Do not have permission to access this ECU or tokenId is invalid
4	access times reach the upper limit	The access times reach the limit

5.5. Get Meter energy production and energy consumption

5.5.1. Get Meter energy production and energy consumption of a special day

Interface description:

Get Meter energy production and energy consumption of a special day

Request URL: <http://api.apsystemsema.com:8073/apsema/v1/apimeterenergy/getMeterEnergyInfo>

Request method: POST

Request parameter:

ecuId=200000000746&filter=day&date=20120101&tokenId=402981d451617d810151617e14550001

Parameter	Type	Description
ecuId	string	Meter number
filter	string	Using keyword 'day' to get energy production and energy consumption of a specific day
date	string	Pass a specific day, the format is yyyyMMdd
tokenId	string	tokenId

■ API response:

Parameter	Type	Description
code	string	Get data success/fail (1 means success)
production	string	Meter energy production of the specific day, unit is kWh
consumption	string	Meter energy consumption of the specific day, unit is kWh

■ Response example:

```
{
```

```

" code " :1,
" data " :{ " production " : " 44.32 " ,
           " consumption " : " 54.38 "
           }
}

```

■ Error code:

Error code	Return	Description
0	energy is null	There no data of this Meter
3	permission is null	Do not have permission to access or tokenId is invalid
4	access times reach the upper limit	The access times reach the limit

5.5.2. Get Meter energy production and energy consumption of a special month

Interface description:

Get Meter energy production and energy consumption of a special month

Request URL: <http://api.apsystemsema.com:8073/apsema/v1/apimeterenergy/getMeterEnergyInfo>

Request method: POST

Request parameter:

ecuId=200000000746&filter=month&date=20120101&tokenId=402981d451617d810151617e145

50001

Parameter	Type	Description
ecuId	string	Meter number
filter	string	Using keyword 'month' to get energy production and energy consumption of a specific month
date	string	Pass a specific month, the format is yyyyMMdd
tokenId	string	tokenId

■ API response:

Parameter	Type	Description
code	string	Get data success/fail (1 means success)
production	string	Meter energy production of the specific month, unit is kWh
consumption	string	Meter energy consumption of the specific month, unit is kWh

■ Response example:

```
{
  "code": 1,
  "data": {
    "production": "122.32",
    "consumption": "546.38"
  }
}
```

■ Error code:

Error code	Return	Description
0	energy is null	There no data of this Meter
3	permission is null	Do not have permission to access this ECU or tokenId is invalid
4	access times reach the upper limit	The access times reach the limit

5.5.3. Get Meter energy production and energy consumption of a special year

Interface description:

Get Meter energy production and energy consumption of a special year

Request URL: <http://api.apssystemsema.com:8073/apsema/v1/apimeterenergy/getMeterEnergyInfo>

Request method: POST

Request parameter:

ecuId=200000000746&filter=year&date=20120101&tokenId=402981d451617d810151617e1455

0001

Parameter	Type	Description
ecuId	string	Meter number
filter	string	Using keyword 'year' to get energy production and energy consumption of a specific year
date	string	Pass a specific year, the format is yyyyMMdd
tokenId	string	tokenId

■ API response:

Parameter	Type	Description
code	string	Get data success/fail (1 means success)
production	string	Meter energy production of the specific year,unit is kWh
consumption	string	Meter energy consumptionof the specific year,unit is kWh

■ Response example:

```
{
  " code " :1,
  " data " :{ " production " : " 122.32 " ,
             " consumption " : " 546.38 "
           }
}
```

■ Error code:

Error code	Return	Description
0	energy is null	There no data of this Meter
3	permission is null	Do not have permission to access this ECU or tokenId is invalid
4	access times reach the upper limit	The access times reach the limit

6. Common questions

1. Before access to the EMA API, customer needs to apply to APsystems for the access permissions of EMA API, and confirm the authorized EMA system and ECU.

2. There is a effective period of API user, if the effective period has overdue ,API user can't access EMA API, and it will return 'your APIUser is overdue'.

3. If return error code '3 - permission is null' please check:

- a) The effective period of tokenId is overdue - Try to get another tokenId
- b) The EMA system or ECU that try to access has not been authorized - Confirm if the EMA system or ECU has been authorized
- c) The effective period of API user account has overdue - Check the effective period of API user account

4. If return error code '4 - access times reach the upper limit', please check

- a) The access times reach the limit of per half hour - Please try again after half hour
- b) The access times reach the limit of per month - Please try again next month