FlexAPI Reference

For LAN application (REST API Version)

Revision History

Revision	Date	Author	Item(s) changed	Note
1.0.0	29/7/2020	dengzt, ganjx, wucl	Create document.	

1. Introduction

We introduced FlexAPI for the fast evolving IoT applications, which highly value easy integration, openness, flexibility, extensibility and programmability.

FlexAPI is designed to be efficient, clean and ready to use. It's network oriented and programming language independent, and is ideal for application integration inside the vehicle.

FlexAPI provides unified data and control service via REST API for LAN access.

For data service, we have ready to use reserved groups such as: GNSS, OBD, Motion, IO and Summary.
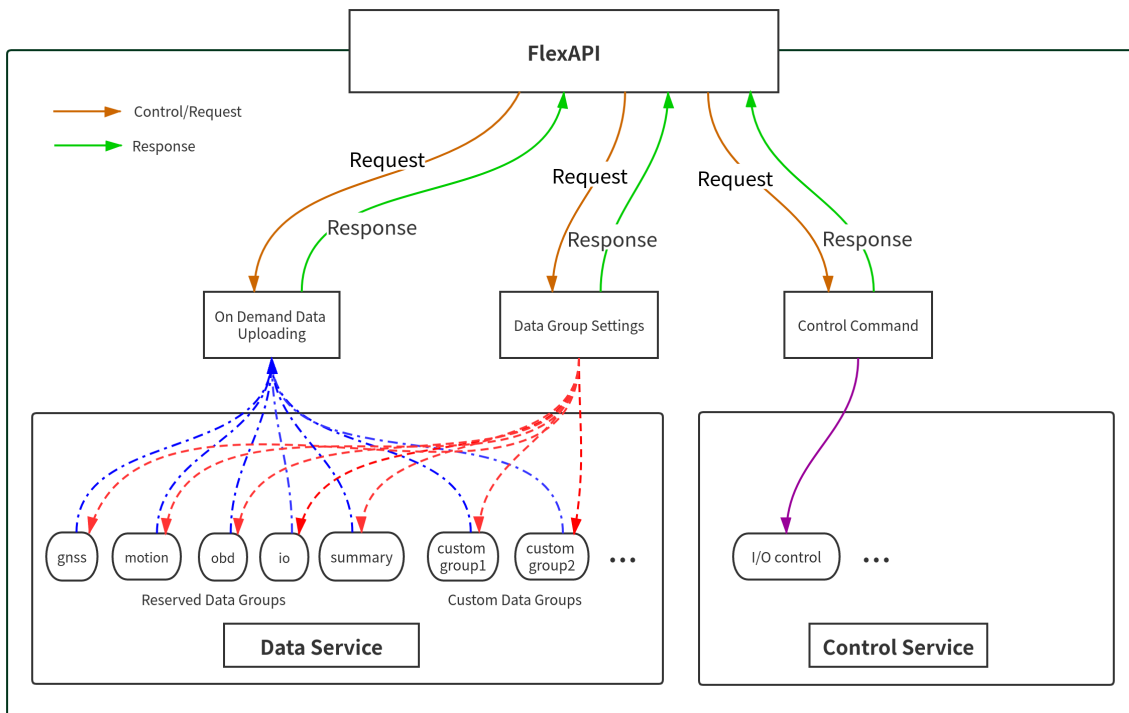
Note that the Summary group is the all in one data group which includes all the data from our reserved OBD, GNSS, Motion and IO groups.

In general, reserved groups are enough for user's need.

FlexAPI also provides REST API for users to apply control, such as turn on/off the digital output.

For advanced users, they can even define their interested groups.

1.1 Architecture

1.2 REST API Introduction

REpresentational **S**tate **T**ransfer (REST) is an architectural style that defines a set of constraints to be used for creating web services. **REST API** is a way of accessing the web services in a simple and flexible way without having any processing.

1.3 REST API settings

REST API is disabled by default, you need to enable it first on VG710 for your subsequent service access.

- **Enable**: Options include **None**, **localhost** and **localhost & LAN**.
- **Localhost Listen Address**: Server settings for APPs run on VG710
- **LAN Listen Address**: Server settings for APPs within VG710 LAN
- **LAN Access Token**: Required **ONLY** for **Bearer** authentication in HTTP header for LAN Access.
- **Include Invalid Data**: if enabled, FlexAPI will also return invalid data items with `null` value besides valid data items.
- **FlexAPI Config File**: Mange FlexAPI configuration file of REST API

2 FlexAPI Overview

FlexAPI organizes data as groups and provides ready to use reserved groups for users to develop their applications.

FlexAPI allow users to change reserved and custom group settings.

This overview part gives summary on: FlexAPI general information, error codes and supported REST APIs.

For Basic Usage, see [3. Basic usage](#).
For Advanced Usage, see [4. Advanced usage](#).
For FlexAPI supported Parameters, see [Appendix A. FlexAPI supported Parameters](#).

FlexAPI Limits：

Resource	Limit
Minimum retry interval of `settings`, `refresh`, `get` requests	2 s
Minimum retry interval of `io control` request	5 s
Available custom groups	up to 16
Maximum data items per group	256

2.1 FlexAPI Return information and Errors

2.1.1 General information

Parameter Name	Description	Type	Note
result	result	object	When the request succeeds, there will be result field in response message body.
error	error code	string	When the request fails, it is added to the response message body. For more information, see [General Error Codes](#)
error_desc	error description	string	When the request fails, it is added to the response message body. For more information, see [General Error Codes](#)
ts	time stamp	number	UNIX timestamp since Epoch. Indicates when the message was transmitted by device.

2.1.2 General Error Codes

Status code	Error Code	Description	Error Handling
401	auth_failed	authentication failed	check username and password
400	invalid_parameter	invalid parameter	check request parameter
404	not_found	resource not exist	make sure related service is enabled and running
503	device_busy	device busy	retry request
500	device_error	device internal error	retry request
500	data_invalid	resource invalid	retry request

2.2 FlexAPI supported APIs

2.2.1 Data service

2.2.1.1 Reserved group settings

Reserved groups provide ready to use data service.

Users can use the following REST APIs to define their interested data group.

URL	HTTP Method	Description
/v1/summary/set	POST	Set Summary group setting. See Summary settings.
/v1/obd/set	POST	Set OBD group setting. See OBD settings.
/v1/gnss/set	POST	Set GNSS group setting. See GNSS settings.
/v1/motion/set	POST	Set Motion group setting. See Motion settings.
/v1/io/set	POST	Set IO group setting. See IO settings.

2.2.1.2 Get reserved group data

Users can use the following REST APIs to get data.

URL	HTTP Method	Description
/v1/summary/refresh	GET	Get Summary data. See Summary Data.
/v1/obd/refresh	GET	Get OBD data. See OBD data.
/v1/gnss/refresh	GET	Get GNSS data. See GNSS Data.
/v1/motion/refresh	GET	Get Motion data. See Motion Data.
/v1/io/refresh	GET	Get IO data. See IO Data.

2.2.2 Control Service

2.2.2.1 IO control

Users can use the following REST APIs to turn on/off the digital output.

URL	HTTP Method	Description
/v1/io/control	POST	IO control. See IO Control.

2.2.3 Advanced usage

Advanced users can use the following REST APIs to define their interested groups.

2.2.3.1 Custom group settings

2.2.3.1.1 Create/Update custom group

URL	HTTP Method	Description
/v1/group/set	POST	Create/Update group. See Create/Update custom group.

2.2.3.1.2 Get custom group settings

URL	HTTP Method	Description
/v1/group/get	GET	Get group settings. See Get custom group settings.

2.2.3.1.3 Remove custom group

URL	HTTP Method	Description
/v1/group/set	POST	Remove group. See Remove custom group.

2.2.3.2 Get custom group data

URL	HTTP Method	Description
/v1/{group_name}/refresh	GET	Get group data. See [On demand custom group data get]().

URL	HTTP Method	Description
/v1/{group_name}/refresh	GET	Get group data. See [On demand custom group data get]().

3. Basic usage

3.1 Reserved group settings

3.1.1 General settings

Parameter Name	Description	Type	Range	Units	Optional	Note
interest	interest parameter List of interested item, each item is represented as key: alias. alias is used in reported messages to rewrite key, a value of "" means no alias. For example, set interest with alias: {"obd.mil": "MIL", "obd.dtcs": "dtcNum"} reported data: {"MIL": "1", "dtcNum": "3"} set interest without alias: {"obd.mil": "", "obd.dtcs": ""} reported data: {"obd.mil": "1", "obd.dtcs": "3"}	object			optional	'key': FlexAPI Supported parameters 'alias': parameter alias OBD group, see OBD Parameters GNSS group, see GNSS Parameters Motion group, see Motion Parameters IO group, see IO Parameters

For both reserved and custom groups, you can redefine your interested data, simply use the following API to specify your interested data items using `interest` parameter.

Request Syntax：

Note : `{deviceIP}` and `{port}` differ per your access mode(`localhost` or `localhost & LAN`), please refer to listen address of REST API settings.

Note: Authorization field in HTTP request header is only required for LAN access mode. So if your APPs run on VG710, you don't need to specify this field. Also note that all the examples in this document are for LAN access mode.

```
 1  POST /v1/{group_name}/set HTTP/1.1
 2  Host: {deviceIP}:{port}
 3  Authorization: Bearer iWUFB4y7720f841yLcR10dLTuo2TO4JR
 4  Content-type: application/json
 5
 6  {
 7      "interest": {
 8          "gnss.latitude": "lat",
 9          "gnss.longitude": "lon",
10          "obd.speed": "speed",
11          "obd.odo": ""
12      }
13  }
```

Response Syntax：

Success：

```
 1  HTTP/1.1 200
 2  Content-type: application/json
 3
 4  {
 5      "result": {
 6          "interest": {
 7              "gnss.latitude": "lat",
 8              "gnss.longitude": "lon",
 9              "obd.speed": "speed",
10              "obd.odo": ""
11          }
12      }
13  }
```

Failure：

```
 1  HTTP/1.1 400
 2  Content-type: application/json
 3
 4  {
 5      "error": "invalid_parameter",
 6      "error_desc": "Invalid request parameter"
 7  }
```

Parameter description, see General Information.

3.1.2 Summary settings

Use this REST API to set your interested summary data.

Note that the Summary group is the all in one data group which includes all the data from our reserved OBD, GNSS, Motion and IO groups.

Default interest is available parameters from the FlexAPI supported Parameters.

Request Syntax：

```
POST /v1/summary/set HTTP/1.1
Host: {deviceIP}:{port}
Authorization: Bearer iWUFB4y7720f841yLcR10dLTuo2TO4JR
Content-Type: application/json

{
    "interest": {
        "gnss.latitude": "lat",
        "gnss.longitude": "lon",
        "obd.speed": "speed",
        "obd.odo": ""
    }
}
```

Response Syntax:

Success:

```
HTTP/1.1 200
Content-type: application/json

{
    "result": {
        "interest": {
            "gnss.latitude": "lat",
            "gnss.longitude": "lon",
            "obd.speed": "speed",
            "obd.odo": ""
        }
    }
}
```

Failure:

```
HTTP/1.1 400
Content-type: application/json

{
    "error": "invalid_parameter",
    "error_desc": "Invalid request parameter"
}
```

Parameter description, see General Information.

3.1.3 OBD settings

Use this REST API to set your interested OBD data.

Default interest is available parameters from the OBD Parameters.

Request Syntax：

```
POST /v1/obd/set HTTP/1.1
Host: {deviceIP}:{port}
Authorization: Bearer iWUFB4y7720f841yLcR10dLTuo2TO4JR
Content-Type: application/json

{
  "interest": {
    "obd.mil": "MIL",
    "obd.dtcs": "dtcNum",
    "obd.rpm": "engineSpeed"
  }
}
```

Response Syntax :

Success：

```
HTTP/1.1 200
Content-type: application/json

{
    "result": {
        "interest": {
            "obd.mil": "MIL",
            "obd.dtcs": "dtcNum",
            "obd.rpm": "engineSpeed"
        }
    }
}
```

Failure：

```
HTTP/1.1 400
Content-type: application/json

{
    "error": "invalid_parameter",
    "error_desc": "Invalid request parameter"
}
```

Parameter description, see General Information.

3.1.4 GNSS settings

Use this REST API to set your interested GNSS data.

Default interest is available parameters from the GNSS Parameters.

Request Syntax：

```
POST /v1/gnss/set HTTP/1.1
Host: {deviceIP}:{port}
Authorization: Bearer iWUFB4y7720f841yLcR10dLTuo2TO4JR
Content-Type: application/json

{
    "interest": {
        "gnss.latitude": "lat",
        "gnss.longitude": "lon",
        "gnss.altitude": "alt"
    }
}
```

Response Syntax：

Success：

```
HTTP/1.1 200
Content-type: application/json

{
    "result": {
        "interest": {
            "gnss.latitude": "lat",
            "gnss.longitude": "lon",
            "gnss.altitude": "alt"
        }
    }
}
```

Failure：

```
HTTP/1.1 400
Content-type: application/json

{
    "error": "invalid_parameter",
    "error_desc": "Invalid request parameter"
}
```

Parameter description, see General Information.

3.1.5 Motion settings

Use this REST API to set your interested motion data.

Default interest is available parameters from the [Motion Parameters](#).

Request Syntax：

```
1  POST /v1/motion/set HTTP/1.1
2  Host: {deviceIP}:{port}
3  Authorization: Bearer iWUFB4y7720f841yLcR10dLTuo2TO4JR
4  Content-Type: application/json
5
6  {
7      "interest": {
8          "motion.ax": "acceleration_x",
9          "motion.ay": "acceleration_y",
10         "motion.az": "acceleration_z"
11     }
12 }
```

Response Syntax：

Success：

```
1  HTTP/1.1 200
2  Content-type: application/json
3
4  {
5      "result": {
6          "interest": {
7              "motion.ax": "acceleration_x",
8              "motion.ay": "acceleration_y",
9              "motion.az": "acceleration_z"
10         }
11     }
12 }
```

Failure：

```
1  HTTP/1.1 400
2  Content-type: application/json
3
4  {
5      "error": "invalid_parameter",
6      "error_desc": "Invalid request parameter"
7  }
```

Parameter description, see [General Information](#).

3.1.6 IO settings

Use this REST API to set your interested IO data.

Default interest is available parameters from the [IO Parameters](#).

Request Syntax：

```
1   POST /v1/io/set HTTP/1.1
2   Host: {deviceIP}:{port}
3   Authorization: Bearer iWUFB4y7720f841yLcR10dLTuo2TO4JR
4   Content-Type: application/json
5
6   {
7       "interest": {
8           "io.AI1": "ai1",
9           "io.AI2": "ai2",
10          "io.AI3": "ai3"
11      }
12  }
```

Response Syntax：

Success：

```
1   HTTP/1.1 200
2   Content-type: application/json
3
4   {
5       "result": {
6           "interest": {
7               "io.AI1": "ai1",
8               "io.AI2": "ai2",
9               "io.AI3": "ai3"
10          }
11      }
12  }
```

Failure：

```
1   HTTP/1.1 400
2   Content-type: application/json
3
4   {
5       "error": "invalid_parameter",
6       "error_desc": "Invalid request parameter"
7   }
```

Parameter description, see [General Information](#).

3.2 Get reserved group data

3.2.1 Summary data

Use this REST API to get summary data.

REST API：`/v1/summary/refresh`

Request Syntax：

```
GET /v1/summary/refresh HTTP/1.1
Host: {deviceIP}:{port}
Authorization: Bearer iWUFB4y7720f841yLcR10dLTuo2TO4JR
```

Response Syntax：

Success：

```
HTTP/1.1 200
Content-type: application/json

{
    "result": {
        "gnss.latitude": 40.232213,
        "gnss.longitude": 116.34366,
        "gnss.altitude": 346.0,
        "gnss.speed": 87.6,
        "gnss.heading": 234.0,
        "gnss.hdop": 1.2,
        "gnss.pdop": 2.1,
        "gnss.hacc": 1.0,
        "gnss.fix": 3,
        "gnss.date": "2020-4-17",
        "gnss.time": "10:16:21",
        "obd.rpm" : 1234,
        "obd.speed" : 20,
        "obd.odo": 1400,
        "obd.up_time": 3600,
        "io.AI1": 0.0,
        "io.AI2": 0.0,
        "io.AI3": 0.0,
        "io.AI4": 0.0,
        "io.AI5": 0.0,
        "io.AI6": 0.0,
        "io.DI1": 0,
        "io.DI1_pullup": 0,
        "io.DI2": 0,
        "io.DI2_pullup": 0,
        "io.DI3": 0,
        "io.DI3_pullup": 0,
        "io.DI4": 0,
        "io.DI4_pullup": 0,
        "io.DI5": 0,
        "io.DI5_pullup": 0,
        "io.DI6": 0,
        "io.DI6_pullup": 0,
```

```
39          "io.DO1": 0,
40          "io.DO1_pullup": 0,
41          "io.DO2": 0,
42          "io.DO2_pullup": 0,
43          "io.DO3": 0,
44          "io.DO3_pullup": 0,
45          "io.DO4": 0,
46          "io.DO4_pullup": 0
47      }
48  }
```

Failure：

```
1  HTTP/1.1 400
2  Content-type: application/json
3
4  {
5      "error": "invalid_parameter",
6      "error_desc": "Invalid request parameter"
7  }
```

Parameter description, see General Information & FlexAPI supported Parameters.

3.2.2 OBD data

Use this REST API to get OBD data.

Request Syntax：

```
GET /v1/obd/refresh HTTP/1.1
Host: {deviceIP}:{port}
Authorization: Bearer iWUFB4y7720f841yLcR10dLTuo2TO4JR
```

Response Syntax：

Success：

```
HTTP/1.1 200
Content-type: application/json

{
    "result": {
        "obd.rpm": 34245,
        "obd.speed": 53255
    }
}
```

Failure：

```
HTTP/1.1 400
Content-type: application/json

{
    "error": "invalid_parameter",
    "error_desc": "Invalid request parameter"
}
```

Parameter description, reference General Information & OBD Parameters.

3.2.3 GNSS data

Use this REST API to get GNSS data.

Request Syntax：

```
1  GET /v1/gnss/refresh HTTP/1.1
2  Host: {deviceIP}:{port}
3  Authorization: Bearer iWUFB4y7720f841yLcR10dLTuo2TO4JR
```

Response Syntax：

Success：

```
1   HTTP/1.1 200
2   Content-type: application/json
3
4   {
5       "result": {
6           "gnss.latitude": 40.232213,
7           "gnss.longitude": 116.34366,
8           "gnss.altitude": 346.0,
9           "gnss.speed": 87.6,
10          "gnss.heading": 234.0,
11          "gnss.hdop": 1.2,
12          "gnss.pdop": 2.1,
13          "gnss.hacc": 1.0,
14          "gnss.fix": 3,
15          "gnss.date": "2020-4-17",
16          "gnss.time": "10:16:21"
17      }
18  }
```

Failure：

```
1   HTTP/1.1 400
2   Content-type: application/json
3
4   {
5       "error": "invalid_parameter",
6       "error_desc": "Invalid request parameter"
7   }
```

Parameter description, reference General Parameter & GNSS Parameters.

3.2.4 Motion data

Use this REST API to get motion data.

Request Syntax：

```
GET /v1/motion/refresh HTTP/1.1
Host: {deviceIP}:{port}
Authorization: Bearer iWUFB4y7720f841yLcR10dLTuo2TO4JR
```

Response Syntax：

Success：

```
HTTP/1.1 200
Content-type: application/json

{
    "result": {
        "motion.ax": 0.08,
        "motion.ay": 0.0,
        "motion.az": 0.0,
        "motion.gx": 0.15,
        "motion.gy": 0.03,
        "motion.gz": -0.47,
        "motion.roll": -0.65,
        "motion.pitch": 1.03,
        "motion.yaw": 302.49
    }
}
```

Failure：

```
HTTP/1.1 400
Content-type: application/json

{
    "error": "invalid_parameter",
    "error_desc": "Invalid request parameter"
}
```

Parameter description, reference General Parameter & Motion Parameters.

3.2.5 IO data

Use this REST API to get IO data.

Request Syntax：

```
GET /v1/io/refresh HTTP/1.1
Host: {deviceIP}:{port}
Authorization: Bearer iWUFB4y7720f841yLcR10dLTuo2TO4JR
```

Response Syntax：

Success：

```
HTTP/1.1 200
Content-type: application/json

{
    "result": {
        "io.AI1": 0.0,
        "io.AI2": 0.0,
        "io.AI3": 0.0,
        "io.AI4": 0.0,
        "io.AI5": 0.0,
        "io.AI6": 0.0,
        "io.DI1": 0,
        "io.DI1_pullup": 0,
        "io.DI2": 0,
        "io.DI2_pullup": 0,
        "io.DI3": 0,
        "io.DI3_pullup": 0,
        "io.DI4": 0,
        "io.DI4_pullup": 0,
        "io.DI5": 0,
        "io.DI5_pullup": 0,
        "io.DI6": 0,
        "io.DI6_pullup": 0,
        "io.DO1": 0,
        "io.DO1_pullup": 0,
        "io.DO2": 0,
        "io.DO2_pullup": 0,
        "io.DO3": 0,
        "io.DO3_pullup": 0,
        "io.DO4": 0,
        "io.DO4_pullup": 0
    }
}
```

Failure：

```
1  HTTP/1.1 400
2  Content-type: application/json
3
4  {
5      "error": "invalid_parameter",
6      "error_desc": "Invalid request parameter"
7  }
```

Parameter description, reference [General Parameter](#) & [IO Parameters](#).

```
1  HTTP/1.1 400
2  Content-type: application/json
3
4  {
5      "error": "invalid_parameter",
6      "error_desc": "Invalid request parameter"
7  }
```

3.3 Control Service

3.3.1 IO Control

Use this REST API to turn on/off the digital output.

Request Syntax：

```
POST /v1/io/control HTTP/1.1
Host: {deviceIP}:{port}
Authorization: Bearer iWUFB4y7720f841yLcR10dLTuo2TO4JR
Content-Type: application/json

{
    "io.DO1": 0,
    "io.DO1_pullup": 0,
    "io.DO2": 0,
    "io.DO2_pullup": 0,
    "io.DO3": 0,
    "io.DO3_pullup": 0,
    "io.DO4": 0,
    "io.DO4_pullup": 0
}
```

Response Syntax：

Success：

```
HTTP/1.1 200
Content-type: application/json

{
    "result": {
        "io.DO1": 0,
        "io.DO1_pullup": 0,
        "io.DO2": 0,
        "io.DO2_pullup": 0,
        "io.DO3": 0,
        "io.DO3_pullup": 0,
        "io.DO4": 0,
        "io.DO4_pullup": 0
    }
}
```

Failure：

```
HTTP/1.1 400
Content-type: application/json

{
    "error": "invalid_parameter",
    "error_desc": "Invalid request parameter"
}
```

Parameter description, see General Information & IO Parameters digital output part。

4. Advanced usage

4.1 Custom group settings

4.1.1 Create/Update custom group

Use this REST API to define your interested groups.

For `interest` parameters, please refer to [General settings](#) for details.

Request Syntax：

```
POST /v1/group/set HTTP/1.1
Host: {deviceIP}:{port}
Authorization: Bearer iWUFB4y7720f841yLcR10dLTuo2TO4JR
Content-Type: application/json

{
    "settings": [
        {
            "group_name": "group1",
            "interest": {
                "gnss.latitude": "lat",
                "gnss.longitude": "lon",
                "gnss.altitude": "alt",
                "obd.speed": "speed",
                "obd.odo": "odo"
            }
        },
        {
            "group_name": "group2",
            "interest": {
                "io.DI1": "DI1",
                "io.DI2": "DI2",
                "io.DI3": "DI3",
                "io.DI4": "DI4",
                "io.DO1": "DO1",
                "io.DO2": "DO2",
                "io.DO3": "DO3"
            }
        }
    ]
}
```

Response Syntax：

Success：

```
HTTP/1.1 200
Content-type: application/json

{
    "result": [
        {
            "group_name": "group1",
            "interest": {
```

```
  9                  "gnss.latitude": "lat",
 10                  "gnss.longitude": "lon",
 11                  "gnss.altitude": "alt",
 12                  "obd.speed": "speed",
 13                  "obd.odo": "odo"
 14              }
 15          },
 16          {
 17              "group_name": "group2",
 18              "interest": {
 19                  "io.DI1": "DI1",
 20                  "io.DI2": "DI2",
 21                  "io.DI3": "DI3",
 22                  "io.DI4": "DI4",
 23                  "io.DO1": "DO1",
 24                  "io.DO2": "DO2",
 25                  "io.DO3": "DO3"
 26              }
 27          }
 28      ]
 29  }
```

Failure：

```
 1  HTTP/1.1 400
 2  Content-type: application/json
 3
 4  {
 5      "error": "invalid_parameter",
 6      "error_desc": "Invalid request parameter"
 7  }
```

Parameter description, see General Information & General settings.

4.1.2 Get custom group settings

Use this REST API to get custom group settings.

Request Syntax：

```
1  GET /v1/group/get HTTP/1.1
2  Host: {deviceIP}:{port}
3  Authorization: Bearer iWUFB4y7720f841yLcR10dLTuo2TO4JR
```

Response Syntax：

Success：

```
1  HTTP/1.1 200
2  Content-type: application/json
3
4  {
5      "result": [
6          {
7              "group_name": "group1",
8              "interest": {
9                  "gnss.latitude": "lat",
10                 "gnss.longitude": "lon",
11                 "gnss.altitude": "alt",
12                 "obd.speed": "speed",
13                 "obd.odo": "odo"
14             }
15         },
16         {
17             "group_name": "group2",
18             "interest": {
19                 "io.DI1": "DI1",
20                 "io.DI2": "DI2",
21                 "io.DI3": "DI3",
22                 "io.DI4": "DI4",
23                 "io.DO1": "DO1",
24                 "io.DO2": "DO2",
25                 "io.DO3": "DO3"
26             }
27         }
28     ]
29 }
```

Failure：

```
1  HTTP/1.1 400
2  Content-type: application/json
3
4  {
5      "error": "invalid_parameter",
6      "error_desc": "Invalid request parameter"
7  }
```

Parameter description, see General Information & General settings.

4.1.3 Remove custom group

Use this REST API to remove group.

Request Syntax：

```
1   POST /v1/group/set HTTP/1.1
2   Host: {deviceIP}:{port}
3   Authorization: Bearer iWUFB4y7720f841yLcR10dLTuo2TO4JR
4   Content-Type: application/json
5
6   {
7       "settings": [{
8               "group_name": "group1",
9               "interest": null
10          },{
11              "group_name": "group2",
12              "interest": null
13          }
14      ]
15  }
```

Response Syntax：

Success：

```
1   HTTP/1.1 200
2   Content-type: application/json
3
4   {
5       "settings": [{
6               "group_name": "group1",
7               "interest": null
8           },{
9               "group_name": "group2",
10              "interest": null
11          }
12      ]
13  }
```

Failure：

```
1   HTTP/1.1 400
2   Content-type: application/json
3
4   {
5       "error": "invalid_parameter",
6       "error_desc": "Invalid request parameter"
7   }
```

Parameter description, see General Information & General settings.

4.2 Get custom group data

Use this REST API to get `group_name` data.

Request Syntax：

```
GET /v1/{group_name}/set HTTP/1.1
Host: {deviceIP}:{port}
Authorization: Bearer iWUFB4y7720f841yLcR10dLTuo2TO4JR
```

Response Syntax：

Success：

```
HTTP/1.1 200
Content-type: application/json

{
    "result": {
        "lat": 40.232213,
        "ai1": 1.0,
        "obd.speed": 50
    }
}
```

Failure：

```
HTTP/1.1 400
Content-type: application/json

{
    "error": "invalid_parameter",
    "error_desc": "Invalid request parameter"
}
```

Parameter description, see General Information & FlexAPI supported Parameters.

Appendix A. FlexAPI supported Parameters

A.1 GNSS Parameters

Parameter Name	Description	Type	Range	Units	Optional	Note
gnss.latitude	latitude	float		deg	mandatory	
gnss.longitude	longitude	float		deg	mandatory	
gnss.altitude	altitude	float		deg	mandatory	
gnss.speed	speed	float		km/h	mandatory	from GNSS modem
gnss.heading	heading	float	[0.0,360.0]	°		
gnss.hdop	Horizontal DOP	float				
gnss.pdop	Position DOP	float				
gnss.hacc	Horizontal accuracy estimate	float		m		
gnss.fix	GNSS fix status	int	0: NoFix; 1: DR Only 2: 2D; 3: 3D 4: GNSS+DR; 5: Time Only			
gnss.date	date	string	format: yy-mm-dd			
gnss.time	time	string	format: hh:mm:ss			

A.2 Motion Parameters

Parameter Name	Description	Type	Range	Units	Optional	Note
motion.ax	x-axis accelerometer	float		g	mandatory	accelerometer
motion.ay	y-axis accelerometer	float		g	mandatory	accelerometer
motion.az	z-axis accelerometer	float		g	mandatory	accelerometer
motion.gx	x-axis gyroscope	float		deg/s	mandatory	gyroscope
motion.gy	y-axis gyroscope	float		deg/s	mandatory	gyroscope
motion.gz	z-axis gyroscope	float		deg/s	mandatory	gyroscope
motion.roll	roll angle	float		deg	mandatory	
motion.pitch	pitch angle	float		deg	mandatory	
motion.yaw	yaw angle	float		deg	mandatory	

A.3 IO Parameters

Parameter Name	Description	Type	Range	Units	Optional	Note
io.AI{n}	Analog Input n	float	[0,36.0] null：invalid	V	mandatory	n: [1,6]
io.DI{n}	Digital Input n	int	0: low 1: high null：invalid		mandatory	n: [1,6]
io.DI{n}_pullup	Digital Input pullup n	int	0: down 1: up null：invalid		mandatory	n: [1,6]
io.DO{n}	Digital Output n	int	0: low 1: high null：invalid		mandatory	n: [1,4]
io.DO{n}_pullup	Digital Output pullup n	int	0: down 1: up null：invalid		mandatory	n: [1,4]

A.4 OBD Parameters

Parameter Name	Description	Type	Range	Units	Optional	Note
obd.vin	Vehicle Identification Number	string				
obd.e_load	Engine Load	double	[0,250] 0: stopped >0: started	%		
obd.c_temp	Engine Coolant Temp	int	[-40,215]	°C		
obd.rpm	Engine Speed	double	[0,16383.75]	RPM		
obd.speed	Vehicle Speed	int	[0,255]	km/h		
obd.f_lvl	Fuel Level	double	[0,100]	%		
obd.f_rate	Fuel Rate	double	[0,3276.75]	l/h		
obd.dtcs	DTC Count	int	[0,250]			
obd.mil	MIL Status	boolean	0:off 1:on			
obd.b_volt	Battery Voltage	double	[0,3212.75]	V		
obd.a_temp	Ambient Air Temp	int	[-273,1734]	°C		
obd.o_temp	Engine Oil Temp	int	[-273,1734]	°C		
obd.up_time	Engine Start Time	int	[0,65535]	sec		
obd.m_dist	Distance traveled while MIL is Activated	int	[0,65535]	km		
obd.d_dist	Distance traveled since DTCs cleared	int	[0,65535]	km		
obd.m_time	Engine run time while MIL activated	int	[0,65535]	min		
obd.d_time	Engine run time since DTCs cleared	int	[0,65535]	min		
obd.f_press	Fuel Pressure	int	[0,6425]	kPa		
obd.t_pos	Throttle Position	double	[0,100]	%		
obd.brake	Brake Switch Status	boolean	0:brake pedal released 1:brake pedal depressed			
obd.parking	Parking Brake Switch Status	boolean	0:parking brake not set 1:parking brake set			
obd.s_w_angle	Steering Wheel Angle	double	[-31.374,31.374]	rad		
obd.f_econ	Fuel Economy	double	[0,125.50]	km/L		
obd.odo	Odometer	double	[0,526385151.875]	km		
obd.a_pos	Accelerator Pedal Position	double	[0,100]	%		
obd.t_dist	trip distance	double	[0,526385151.875]	km		

Parameter Name	Description	Type	Range	Units	Optional	Note
obd.i_temp	Intake Manifold Temp	int	[-40,215]	°C		
obd.i_press	Intake Manifold Pressure	int	[0,255]	kPa		
obd.b_press	Barometirc Pressure	int	[0,255]	kPa		
obd.f_r_press	Fuel Rail Pressure	int	[0,65530]	kPa		
obd.r_torque	Engine reference Torque	int	[0,64255]	Nm		
obd.f_torque	Engine friction Torque	float	[-125,125]	%		
obd.max_avl_torque	Engine Maximum Available Torque	float	[0,100]	%		
obd.a_torque	Engine actual Torque	float	[-125,125]	%		
obd.d_e_f_vol	Diesel Exhaust Fluid Volume	float	[0,100]	%		
obd.mf_mon	Misfire Monitor Status	int	0:not completed 1:completed			
obd.f_s_mon	Fuel System Monitor Status	int	0:not completed 1:completed			
obd.c_c_mon	Comprehensive Component Monitor Status	int	0:not completed 1:completed			
obd.c_mon	Catalyst Monitor Status	int	0:not completed 1:completed			
obd.h_c_mon	Heated Catalyst Monitor Status	int	0:not completed 1:completed			
obd.e_s_mon	Evaporative System Monitor Status	int	0:not completed 1:completed			
obd.s_a_s_mon	Secondary Air System Monitor Status	int	0:not completed 1:completed			
obd.a_s_r_mon	A/C System Refrigerant Monitor Status	int	0:not completed 1:completed			
obd.e_g_s_mon	Exhaust Gas Sensor Monitor Status	int	0:not completed 1:completed			
obd.e_g_s_h_mon	Exhaust Gas Sensor heater Monitor Status	int	0:not completed 1:completed			
obd.e_v_s_mon	EGR/VVT System Monitor Status	int	0:not completed 1:completed			

Parameter Name	Description	Type	Range	Units	Optional	Note
obd.c_s_a_s_mon	Cold Start Aid System Monitor Status	int	0:not completed 1:completed			
obd.b_p_c_s_mon	Boost Pressure Control System Monitor Status	int	0:not completed 1:completed			
obd.dpf_mon	DPF Monitor Status	int	0:not completed 1:completed			
obd.n_c_mon	NOx Catalyst Monitor Status	int	0:not completed 1:completed			
obd.nmhc_mon	NMHC Catalyst Monitor Status	int	0:not completed 1:completed			
obd.o_s_mon	Oxygen Sensor Monitor Status	int	0:not completed 1:completed			
obd.o_s_h_mon	Oxygen Sensor heater Monitor Status	int	0:not completed 1:completed			
obd.pf_mon	PF Monitor Status	int	0:not completed 1:completed			
obd.brake_prim_press	Brake Primary Pressure	float		kPa		unavailable
obd.brake_sec_press	Brake Secondary Pressure	float		kPa		unavailable